Siam Physics Congress 2016

Wednesday 08 June 2016 - Friday 10 June 2016

Book of Abstracts

Chada Siriphattananon1, Siriporn Romjinda1, and Kriangsak Kraiwattanawong1*
1Department of Chemical Engineering, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok, Thailand, 10520
*E-mail: kkkkrai@hotmail.com
Abstract
A powdered carbon waste derived from a combustion chamber in a pulp mill is eliminated by landfill. The purpose of this work is to add a value to the carbon waste by preparing a tablet activated carbon (TAC). TACs were prepared from the carbon waste with starch as a binder. The carbon waste and starch were blended and molded to form tablet composites. The mass ratio of a binder to a carbon waste (B/C) was ranged from 0.05 to 0.25 g/g. The tablet composite was carbonized at 700 oC for 90 min to become a tablet carbon (TC) and subsequently activated by CO2 at 700-900 oC for 30 min to be TAC finally. TC and TAC were characterized by nitrogen adsorption, scanning electron microscopy (SEM) and compression testing. The results show that the apparent density is decreased by the increase of B/C ratio. At B/C = 0.10 g/g, the modulus of TC is maximized at 0.25 MPa and its TAC is decreased to 0.22 MPa since the mass loss. The SEM images of TC and TAC reveal that the carbon structure from starch is spherical particles deposited on the surface of carbon wastes. The more starch addition, the smaller surface area and the smaller mesopore volume of TCs and TACs are obtained. It is possible that starch may act as film closing the pore and its carbon structure's starch has the low porous properties; therefore, the porous properties of TCs and TACs are decreased with the increase of B/C ratio.
Keywords : Activated carbon: Pulp waste: Starch: Porous properties

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3D small object simulation by using Mach-Zehnder interferometry

Nattapat Surachairattakul[1] ; Pawat Patsawankul[1] ; Supawit Samchusri[1]

[1] *Mahidol Wittayanusorn School*

Corresponding Author(s): pawatsuan@yahoo.com, code_crosser@hotmail.com, ss.mwit24@gmail.com

In order to study small biological objects which cannot be observed with naked eyes, microscope is a common tool using nowadays, but it can be used to observe only 2-dimensions images. Thus in this work, we applied Mach-Zehnder interferometer to create interference fringe using beam expander and 10x lens to expand the image's size, and saved it with CMOS camera into the computer for analysis the image with MATLAB program using Fast Fourier Transform and 2D Filter. Then the intensity of each pixel is read and transformed into the 3D graph. The result show that the shape of monocot plant stem tissue. The studied sample is the square plate with concavity in the middle. It means that the border is thicker than the middle, according to the biological shape of monocot plant stem tissue. Therefore, we can conclude that this technique can be used to investigate small transparent objects. Moreover, we expect that the smaller objects can be investigated precisely if the higher magnifier lens are used.

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A Simple nanosecond Pulse Generator for Light Emitting Diode

Author(s): Yingyot Infahsaeng[1]

Co-author(s): Ahmad Binsalem ; Anusara Chonprakai

[1] *Department of Physics, Thammasat University*

Corresponding Author(s): ahmad-bin@hotmail.com, yingyot.infahsaeng@gmail.com, pang9march@gmail.com

A low-cost and portable pulsed light emitting diode (LED) source is a very important component for time-resolved spectroscopy which is widely used in medical, environmental, photochemistry and photo-physics applications. Typically, the light source with ultrafast short pulse and high repetition rate is very expensive. In this work, therefore, we present the simple nanosecond light pulse driver circuit using commercial light emitting diodes (LEDs) with peak emission wavelength of 460 nm, 532 nm, and 620 nm. A Schmitt trigger was used to provide a square wave signal with a repetition rate of 1.5 MHz. A high-speed "NOT" and "AND" gate were used to produce a nanosecond pulse output with less than 100 ns pulse width. The pulse duration can be adjusted by RC trigger time. Later the nanosecond pulse drive the LED through a high-speed transistor. The pulse duration independences of the output spectral and photon flux per pulse were observed. The bias voltage dependences of the output spectral, photon flux per pulse, and optical pulse width are characterized and discussed.

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A Simulation on the Efffect of Spins to the Emergence of Clustering in Network

Author(s): Tharathep Plienbumrung[1]

Co-author(s): Surachate Limkumnerd [1]

[1] *Chulalongkorn University*

Corresponding Author(s): tharathep.plienbumrung@gmail.com, surachate.l@chula.ac.th

We study a network model which involves spin–spin interactions and spin–link interactions. Each Ising spin can be in two states. The network property of interest is the clustering. It was found that the clustering is unrealistically dense in the Strauss's model. In this research, we observed the clustering at thermal equilibrium of each temperature and each energy couplings by Monte Carlo method. The simulation result shows that the number of triangles can be tuned by adjusting the coupling coefficients, unlike other more elementary models. The transition from low to unrealistically high triangular densities is also discussed.

session II / **28**

A model for predicting tritium flux from blanket mock-up in Tokamak fusion reactors

Author(s): Siriyaporn Sangaroon[1]

Co-author(s): Jiraporn Promping [2] ; Roppon Picha [2] ; Thawatchai Onjun [3]

[1] *Department of Physics, Mahasarakham University, Mahasarakham, Thailand*

[2] *Thailand Institute of Nuclear Technology (Public Organization), Bangkok, Thailand*

[3] *School of Manufacturing Systems and Mechanical Engineering, Sirindhorn International Institute of Technology, Thammasat University, Klongluang, Pathumthani, Thailand*

The tritium is considered as one of main fuels for D-T nuclear fusion reactors, where it is planned to be produced from a blanket of reactors by using the interactions between 14.1 MeV neutrons from nuclear fusion reactions and lithium from the blankets. In this work, the simulations of the tritium production from mock-up breeding blanket due to interactions of neutrons and lithium in the blanket are carried out using the Monte Carlo N-Particle transport code (MCNP) version MCNPX. Four designs of mock-up breeding blanket, including a design with a pure natural lithium, a design with lithium titanate (Li2Ti03) based compound, a design with a compound based on a combination of a pure natural lithium and thorium, and a design with a compound based on a combination of lithium titanate and thorium. It is found that the production of tritium significantly increases with the inclusion of thorium, where an increase of tritium production with a factor of 2 can be achieved.

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A model of plasma heating by large-scale flow

Author(s): Peera Pongkitiwanichakul[1]

Co-author(s): Boldyrev Stanislav [2] ; Fausto Cattaneo [3] ; Jean Perez [4] ; Joanne Mason [5]

[1] *Mahidol University*

[2] *University of Wisconsin-Madison*

[3] *University of Chicago*

[4] *Florida Institute of Technology*

[5] *University of Exeter*

Corresponding Author(s): jcperez@fit.edu, peerious@gmail.com, j.mason@exeter.ac.uk, cattaneo@flash.uchicago.edu, boldyrev@wisc.edu

In this work, we study the process of energy dissipation triggered by a slow large-scale motion of a magnetized conducting fluid. Our consideration is motivated by the problem of heating the solar

corona, which is believed to be governed by fast reconnection events set off by the slow motion of magnetic field lines anchored in the photospheric plasma. To elucidate the physics governing the disruption of the imposed laminar motion and the energy transfer to small scales, we propose a simplified model where the large-scale motion of magnetic field lines is prescribed not at the footpoints but rather imposed volumetrically. As a result, the problem can be treated numerically with an efficient, highly accurate spectral method, allowing us to use a resolution and statistical ensemble exceeding those of the previous work. We find that, even though the large-scale deformations are slow, they eventually lead to reconnection events that drive a turbulent state at smaller scales. The small-scale turbulence displays many of the universal features of field-guided magnetohydrodynamic turbulence like a well-developed inertial range spectrum. Based on these observations, we construct a phenomenological model that gives the scalings of the amplitude of the fluctuations and the energy-dissipation rate as functions of the input parameters. We find good agreement between the numerical results and the predictions of the model.

Session III / **116**

A new charm quark tagging algorithm at the CMS detector.

Author(s): Kittikul Kovitanggoon[1]

Co-author(s): Burin Asavapibhop [1] ; Narumon Suwonjandee [1]

[1] *Chulalongkorn (TH)*

Corresponding Author(s): kittikul.kovitanggoon@cern.ch, narumon.suwonjandeep@cern.ch, burin.asavapibhop@cern.ch

At the Compact Muon Solenoid (CMS), both Standard Model (SM) and Beyond Standard Model (BSM) physics processes can result the final states with charm quark jets. Charm quarks hadronize to D mesons which could travel some distance in the CMS silicon tracker before decaying into showers of detectable particles, called jets. Consequently, charm jets can be distinguished by particular properties such as secondary vertices from displaced tracks with respect to the primary interaction.
The algorithm to identify charm jets, c-tagging algorithm, is invented based on Combined Secondary Vertex algorithm for b-tagging. C-tagging uses multivariate analysis (MVA) techniques to study a set of jet properties in order to identify jets originated from charm quarks. It is the first of its kind at the CMS collaboration. The c-tagging algorithm is integrated into the CMS software (CMSSW). It will be used in supersymmetry (SUSY) searches for new particles such as stop ($\tilde{t}$), the SUSY partner of standard model (SM) top, that may subsequently decay to a charm quark and the lightest supersymmetric particle (LSP), and for SM precision measurements in the data taking at the Large Hadron Collider (LHC) in 2015 and 2016.

Session IX / **15**

A new mass scale, implications on black hole evaporation and holography

Sajuuk E[None]

Corresponding Author(s): taumartemis@gmail.com

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We consider a new mass scale $M_T = (\hbar^2\sqrt{\Lambda}/G)^{1/3}$ constructed from dimensional analysis by using G, $\hbar$ and Λ and discuss its physical interpretation. Based on the Generalized Uncertainty Relation,

a black hole with age comparable to the universe would stop radiating when the mass reaches a new mass scale $M_T' = c(\hbar/G^2\sqrt{\Lambda})^{1/3}$ at which its temperature corresponds to the mass M_T. Black hole remnants could have masses ranging from a Planck mass to a trillion kilograms. Holography persists even when the uncertainty relation is modified to the Minimum Length Uncertainty Relation (MLUR). The remnant black hole entropy is proportional to the surface area of the black hole in unit of the Planck area in arbitrary noncompact dimensions.

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A simple experimental demonstration of a counterintuitive property of photons for an introduction of quantum physics to high school students

Author(s): Suwit Kiravittaya[1]

Co-author(s): Keattisak Sripimanwat [2]

[1] *Naresuan University*

[2] *ECTI*

Corresponding Author(s): suwitki@gmail.com, keattisak.sripimanwat@gmail.com

Nowadays, quantum physics is a basic knowledge for developing many modern/novel applications. In order to introduce it to high school students, a demonstration kit is developed. This kit, which is an extension of Malus's law demonstration kit in classical optics, consists of one lamp (or a laser pointer), three polarizers and a screen. First, an introduction of the polarization property of light to students can be done by using a setup with only two polarizers (Malus's law demonstration kit). Then, a concept of photons, i.e., a quantum/discrete nature of light particles, can be qualitatively introduced. Insertion of the third polarizer between the previously installed polarizers can show the weirdness property of photon, i.e., the indetermination of its polarization (quantum) state when the basis is changed. State description in quantum physics, e.g. by using of the Dirac bra-ket notation, can be further introduced based on the experimental fact. This work will enhance a basic knowledge in physics education of high school students.

Session XIII / **78**

A study of CMB foreground spectral index using Planck data release II

Author(s): wanchalerm khwammai[None]

Co-author(s): Nuanwan Sanguansak [1] ; Utane Sawangwit [2]

[1] *Advisor*

[2] *Co-Advisor*

Corresponding Author(s): wanchalerm.kwm@gmail.com, nsangsci@gmail.com, u.sawangwit@gmail.com

Cosmic Microwave Background (CMB) is the most important evidence for the Big Bang theory. The CMB radiation has been traversing the universe towards us since 378,000 years after the Big Bang. It was accidentally discovered by Arno Penzias and Robert Wilson in 1964 using their horn-feed antenna. This research is looking at foreground emissions of the CMB signal, focusing on synchrotron, free-free, and thermal dust and spinning dust radiation. We use the ESA Planck satellite mission data released in 2015. The Planck mission cover a wide range of radio and microwave frequency bands, from 27-77 GHz the Low Frequency Instrument (LFI) and 100-857 GHz the High Frequency Instrument (HFI). In this work use the spectral index method. From the results, when we observed at low frequency bands, the signal consists of CMB, synchrotron radiation and free-free emission.

The spectral index distribution at high frequency bands have effect from thermal dust emission and effect from zodiacal light. When we considered the spectral index map we see the explicit separation between regions in galactic plane and around galactic plane and when we convert spectral index to temperature, we found that high-galactic latitude region has higher temperature than in galactic plane. This high temperature dust is believed to be a result of Supernovae explosion ejecting gas and dusts outwards and above the Galactic plane. The dust then falls back on to the plane as it cools down providing cold gas supply for new star formation in the Galactic disk.

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A survey of Radium 226 level in water supply of Amphur Muang Khonkhaen

[redacted][1]

[1] *Department of Applied Physics, Faculty of Engineering, Rajamangala University of Technology Isan, Khon Kaen Campus, 150 Srijun Road Amphur Muang, Khonkhaen Province, 40000, Thailand*

Corresponding Author(s): v_atyotha@hotmail.com

Abstract

A Survey of Raduim 226 level in 111 water supply samples of Amphur Meaung Khonkaen were determined by measuring Radium 226 via Manganese Fibers using gamma spectrometry. The average of 226Ra was found to be 0.038 Bq/l, range 0 – 0.13 Bq/l. The average risk of Annual Equivalent Dose was found to be 0.023 mSv/l, range 0 – 0.079 mSv/y. This study show that 226Ra in water supply of Amphur Muang Khonkhean is not more than 0.11 Bq/l which is the standard value of the United States Environmental Protection Agency, and its Annual Equivalent Dose does not exceed 0.1 mSv/y which is the maximum dose for the public water. Therefore, water supply of Amphur Muang Khonkhean is safe for using.

Keyword: Radium 266: Gamma spectrometry: water supply: Khonkaen

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Aerodynamic Visualization and Simulation of Red Taxi

Ekamol Seesomboon[1] ; Nirut Pussadee[2]

[1] *Department of Mechanical Engineering, Faculty of Engineering, Chiang Mai University*

[2] *Department of Physics and Materials Science, Faculty of Science, Chiang Mai University*

Corresponding Author(s): nirut.p@cmu.ac.th, ekamol_s@cmu.ac.th

The modified pickup truck taxi, also known as red taxi, is the only main public transportation in Chiang Mai, Thailand. The smell from the taxi's exhaust experienced while riding in the back of the taxi is uniquely unpleasant. This work, how the air flows over the taxi and how the exhausted particles flow into the back of the taxi were determined with both visualization and computer simulation. The 1:5000 3D red taxi model was constructed using 3D printer. The model was used for various airspeed flow visualization via schlieren photography technique in a customized small wind tunnel. The turbulent wakes formed behind the taxi were found to have caused the exhausted particles to flow to passengers. The computational fluid dynamics simulation was also conducted to compare with the visualization. The simulation results agreed well with the visualization from schlieren photography technique. From both studies, it is suggested that, in order to reduce turbulent wakes, the two side-windows have to be closed while keeping the front overhead-window open.

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Air Flow in Khlui-Phiang-Aw

Author(s): Suwaphat Boonphasuk[1]

Co-author(s): Kittipitch Meesawat [2] ; Sorasak Danworaphong [1]

[1] *School of science*

[2] *Department of Electrical Engineering*

Corresponding Author(s): sboonphasuk@gmail.com, dsorasak@gmail.com, mkittiphong@kku.ac.th

Khlui-Phiang-Aw is a reedless wind instrument and its structure is similar to a long pipe. Blowing Khlui-Phiang-Aw forms a column of air jet to hit a wind cutter, which is a sharp edge in front of the jet outlet. This is the input energy to the instrument. The jet is then altered by the wind cutter, and the alternated pressure is then radiated as sound. This mechanism produces oscillation of the air flow. Most energy is lost due to friction at the wall. The objective of this work is to study the flow in Khlui-Phiang-Aw of which cannot be observed with the naked eyes and can only be perceived by a computer simulation. The simulation is performed by implementing a computational fluid dynamic model and utilize a PC to solve partial differential equation. The result shows that blowing Khlui-Phiang-Aw leads to the accumulation of pressure inside the pipe causing pressure gradient between the inside and outside of the instrument. When the pressure gradient exceeds a threshold, the air at the wind cutter flows out. Thus the pressure inside the pipe is reduced until it is lower than a threshold; consequently, the air at the wind cutter flow into the pipe and this process repeats itself from the beginning again. The simulation shows the correlation between the air velocity that swings up and down at the wind cutter and the pressure gradient around the wind cutter.

Session IV / 482

An Application of Synchrotron-based X-ray Absorption Spectroscopy Study on Advanced Functional Materials

Corresponding Author(s): p.kidkhunthod@gmail.com

Summary:

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An Integrated Field and Remote Sensing Method for Mapping of Seagrass Species, Cover and Biomass in Southern Thailand

Werapong Koedsin[1]

[1] *Remote Sensing & Geo-Spatial Science Research Unit, Faculty of Technology and Environment, Prince of Songkla University, Phuket Campus, Phuket, Thailand*

Corresponding Author(s): werapong.g@phuket.psu.ac.th

Werapong Koedsin1,, *Wissarut Intararuang1, Raymond J. Ritchie2, Alfredo Huete3*
1 Remote Sensing & Geo-Spatial Science Research Unit, Faculty of Technology and Environment, Prince of Songkla University, Phuket Campus, Phuket, Thailand; werapong.g@phuket.psu.ac.th, armysub@gmail.com
2 Tropical Environmental Plant Biology Unit, Faculty of Technology and Environment, Prince of Songkla University, Phuket Campus, Phuket, Thailand, E-mail: raymond.r@phuket.psu.ac.th
3 Plant Functional Biology and Climate Change Cluster (C3), University of Technology Sydney, NSW 2007, Australia, E-mail: Alfredo.Huete@uts.edu.au Correspondence: werapong.g@phuket.psu.ac.th; Tel.: +66-803-297-155

Accurate and up-to-date maps of seagrass biodiversity are important for marine resource management but it is very challenging to test the accuracy of remote sensing techniques for mapping of seagrass in coastal waters with variable water turbidity. Seagrasses beds are typically very patchy and biomass is sometimes very low and so it is difficult to resolve seagrass bed from bare sand and mud. We used Worldview-2 (WV-2) imagery combined with field sampling to demonstrate the capability of mapping species type, percentage cover and above-ground biomass of seagrasses in monsoonal southern Thailand. A high accuracy positioning technique, involving the Real Time Kinematic (RTK) Global Navigation Satellite System (GNSS) was used to record field sample data positions and reduce uncertainties in matching locations between satellite and field data sets. Positional accuracy of less than 10 cm was needed to properly resolve seagrass from bare substrate. Our results showed high accuracy (90.67%) in mapping seagrass distribution and moderate accuracies for mapping percentage cover and species type (73.74% and 75.00%, respectively). Seagrass species type mapping was successfully achieved despite discrimination confusion among Halophila ovalis, Thalassia hemprichii and Enhalus acoroides species with greater than 50% cover. The green, yellow and near infrared spectral channels of WV-2 were used to estimate the above-ground biomass using a multiple linear regression model (RMSE of ±10.38 gDW/m2, R=0.68). The average total above ground biomass was 23.95±10.38gDW/m2. The seagrass maps produced in this study (*) are an important step towards measuring the attributes of seagrass biodiversity and as inputs to seagrass dynamic models.
Keywords: seagrass; remote sensing; percentage cover; species diversity; biomass; Worldview- 2

Summary:

session II / **129**

An Off-Axis Laser Recirculation

Author(s): Akanit Nisup[1]

Co-author(s): Amarin Ratanavis [1] ; Kanokwan Chongcharoen [1] ; Sirinun Sirikunkitti [1]

[1] *Department of Industrial Physics and Medical Instrumentation, Faculty of Applied Science, Lasers and Optics Research Group (LANDOS), Science and Technology Institute. King Mongkut's University of Technology North Bangkok, Bangkok, Thailand*

Corresponding Author(s): amarinphysics@gmail.com, chong.kanokwan@gmail.com, fig_phy.kmutnb@hotmail.com, sirinun@aml-tech.com

This paper presents a development of an optical arrangement that captures photons traveling in the multi-pass fashion based on a so-called laser recirculation. An optical trapping scheme is relied on the principle of nonlinear frequency conversion. In this demonstration, a L-shape resonator performing as the master cavity provides a laser beam with a fundamental frequency to create the frequency-doubled photon. The frequency-doubled laser beam is trapped inside the slave cavity which is designed to be an off-axis resonator. A retroreflector allows the off-axis configuration of the slave cavity. The alignment and trip of the photons was governed by lenses and mirrors of the slave cavity. To prove this novel concept, the demonstration is achieved by using a Quasi-CW pumped Nd:YAG laser at 1064 nm. In the master cavity, this fundamental frequency beam is incident on a nonlinear crystal (OPO) placed inside the cavity to generate the frequency-doubled laser beam at 532 nm. The frequency-double laser beam is then trapped inside the slave cavity. The retroreflector controls the trajectory of such a beam. A lens telescope is placed inside the slave cavity to collimate the laser beam. Using this off-axis laser recirculation, the interference problem can be alleviated. The optical setup is also insensitive to environmental vibration that allows to be operated in a hostile environment. Using an optical ray tracing program, the effective mode volume for the slave cavity can be calculated. The simulation can also predict the maximum roundtrips for various situations. The off-axis laser recirculation shows the promise of the simple robust and reliable multi-pass optical cavity which is suitable for laser spectroscopy and optical switching applications.

Session VIII / **115**

An investigation on lattice vibration and negative thermal expansion of ScF3 and other D09 structure materials

Author(s): Tipaporn Patniboon[1]

Co-author(s): Sirichok Jungthawan [2]

[1] *School of Physics, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand*

[2] *School of Physics, Suranaree University of Technology*

Corresponding Author(s): tpppattani25@gmail.com, sirichok@gmail.com

A large negative thermal expansion (NTE) was discovered in simple cubic scandium trifluoride (ScF3) over a wide range of temperatures. The underlying mechanism has been explained by Li et al. [1] in terms of the vibration mode with the transverse motion of F atoms to their bond direction which behaves as quantum quartic oscillator. In this work, frozen phonon calculations with first-principles methods based on the density functional theory (DFT) have been performed to validate the individual modes in the phonon density of states and also investigate the anharmonic contribution on the potential energy of those vibrations in ScF3. The results showed the quartic potential for the traverse mode of F atoms. In addition, the anharmonic contribution on potential energy of some materials with D09 structure (ReO3, UO3, MoF3, TaF3 and NbF3) has been studied in comparison with ScF3. It has been found that the degrees of anharmonicity significantly depend on the bonding character between the two atomic species which can be described by simple spring-mass model.

[1] C. W. Li, X. Tang, J. A. Muñoz, J. B. Keith, S. J. Tracy, D. L. Abernathy, and B. Fultz, Phys. Rev. Lett. 107, 195504 (2011).

session II / **125**

An optical diagnostic technique for laser removal of graffiti

Author(s): Jidapa Rattanarojpan[1]

Co-author(s): Amarin Ratanavis [1] ; Phumipat Kittiboonanan [2] ; Surapol Sriboonsong [3]

[1] *Department of Industrial Physics and Medical Instrumentation, Faculty of Applied Science, Lasers and Optics Research Group (LANDOS), Science and Technology Institute. King Mongkut's University of Technology North Bangkok, Bangkok, Thailand*

[2] *Landos*

[3] *Department of Industrial Physics and Medical Instrumentation, Faculty of Applied Science, Science and Technology Institute. King Mongkut's University of Technology North Bangkok, Bangkok, Thailand*

Corresponding Author(s): jidako22@gmail.com, 2bronin@gmail.com, phumipat.landos@gmail.com, amarinphysics@gmail.com

In this paper, we propose an optical surface measurement based on laser scattering to monitor situ the laser cleaning threshold for the removal of graffiti. This technique is meant to assist the laser removal process using laser pulses of 10 ns at 1064 nm while probing the weak laser beam at 632 nm. The diagnostic apparatus consists of a HeNe laser performing a probing light source and photodiodes. A polarizing beamsplitting cube is used to split the probe beam into two separate beams which are called the reference beam and the sample beam. The reference beam is sent to the unaffected graffiti surface while the sample beam is incident on the affected graffiti surface. The spots of the two probe beams on the surfaces are imaged onto photodiodes. In this approach, the signals detected by photodiodes can be analyzed and indicated the laser cleaning threshold. A setup of angular laser cleaning allows the simplicity of this optical measurement. For this study, the use of a Q-switch Nd:YAG laser operating at 1 Hz was investigated. By mean of the Z-scan method, the laser fluence of the laser cleaning beam can be varied. The sample under investigation is irradiated by the Z-scan laser beam achieved by the scanning lens. The level of laser cleaning has been also determined through the optical setup. The laser removal of graffiti from mortars under dry and wet conditions was attempted to examine the cleaning procedures. The results obtained by this demonstration have proven to be a reliable technique for an online surface inspection for laser cleaning applications.

Furthermore, this optical diagnostic technique can allow a variety of interesting applications for laser cleaning technology.

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Analysis of Explosive Chemical Compound Crystal Using Image from Polarized Light Microscope

Author(s): Suphattra Sachana[1]

Co-author(s): Narumon Suwonjandee [2] ; Somrit Wongmanerod [1]

[1] *Chulalongkorn University*

[2] *Chulalongkorn (TH)*

Corresponding Author(s): npraewn@hotmail.com, snarumon@gmail.com, somrit.w@chula.ac.th

The explosive compounds that have mostly been found nowadays are ammonium nitrate and potassium nitrate.
To analyze the explosive compounds, the advanced instruments have been used. However they are very expensive, complicated and require specialists to operate such instruments. In this research, the polarized light microscope (PLM), which is cheaper and more portable, has been used to identify standard ammonium nitrate and potassium nitrate by analyzing the optical properties. The polarized images of the surface of each sample prepared by fusion preparation have been taken using PLM under the extinction position together with the retarder of 632.8 nm wavelength. The results show that the polarized images have various interference colors. The difference of each color depends on layer thickness. The thickness of each area that has different color could be estimated by using the Michel Lévy chart, when the birefringence of ammonium nitrate and potassium nitrate are 0.224 and 0.171, respectively. Moreover, the grain patterns of ammonium nitrate and potassium nitrate are different, so their patterns could be used to identify their identities e.g. potassium nitrate layer is observed to have more clear grain boundary than ammonium nitrate. These identities of both compounds can be applied in the identification of explosive compound that are very useful in forensic science.

Session VII / **44**

Analysis of Io's magnetic footprint features using VIPAL magnetic field model

Author(s): chaiyaporn sukollapun[None]

Co-author(s): Suwicha Wannawichian [1]

[1] *Department of Physics and Materials Science, Chiang Mai University*

Corresponding Author(s): suwichawan@gmail.com, enigma_thecode@hotmail.com

Jupiter is the most gigantic planet in the solar system and yet, generating the most intense and enormous magnetosphere. VIPAL magnetic field model is chosen to simulate Jupiter's magnetic field model. VIPAL was constructed based on observations by Pioneer and Voyager spacecrafts. This model appears to have a lot of benefits. For example, it can be used to analyze auroral emission in Jupiter's ionosphere. This model also has the best prediction of contact positions between ionosphere and magnetic field lines that cross Io, called Io's footprint. VIPAL also gives better magnetic field strength prediction than previous models. In order to predict footprint positions in both north and south hemispheres, we traced along the magnetic field lines beginning from Io orbital position to the footprint locations in ionosphere. There are many factors to be considered, for example, the shape of Jupiter, Io's orbit inclination and eccentricity, to get the best prediction of footprint position as possible. These positions are expected to have the emission of auroral features. One of the most important of this features are their brightness. Previous studies found that this brightness has a

strong relation with Io longitude and relates to the latitude of Io in the torus. Therefore, in order to make better physical interpretation, the relation between Io footprint brightness and magnetic field strength is presented in this work.
Keyword: Jupiter, VIPAL, Io, footprint, auroral

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Analysis of OH radical in Cold Atmospheric-Pressure Plasmas by Using UV Absorption Spectroscopy

Author(s): Yuthana Thana[1]

Co-author(s): Athipong Ngamjarurojana [1] ; Dheerawan Boonyawan [1]

[1] *Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Chiang Mai, 50200, Thailand.*

Corresponding Author(s): thana.yuth.1991@gmail.com, ngamjarurojana@yahoo.com, dheerawan.b@cmu.ac.th

Cold atmospheric pressure plasma consisting of OH, O, O3, NO, and NO2 radicals is currently popular in biomedical applications. This is due to its ability on destroying microbes and stimulating on production of new cells. In this work, we have applied ultraviolet (UV) absorption spectroscopy with micro stage XY table add-on for adjustment of radial distance to investigate and measure the density of hydroxyl (OH) in the needle-typed cold atmospheric-pressure plasma jet and dielectric barrier discharge (DBD) plasma and their radial concentration distribution on a surface, which these plasma jets were generated by various argon gas flow rate. Principles and procedures of the UV-absorption spectroscopy technique as well as the experimental results will be reported and discussed in this contribution.

Keyword: OH radical, UV-absorption spectroscopy, Cold atmospheric pressure plasma.

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Analysis of explosive material from several firework and gunshot residue by using analytic techniques and electronic nose

Tossavalai Chanasiriwat[None]

Corresponding Author(s): mky.tossavalai@gmail.com

Tossavalai Chanasiriwat, Teerapat Rutirawut, and Tanakorn Osotchan
Department of Physics, Faculty of Science, Mahidol University, 272 Rama VI Road, Ratchathewi, Bangkok 10400, THAILAND
*Email: tossavalai.cha@student.mahidol.ac.th

Abstract
Nowadays, explosive materials are used widely such as firework and primer cap in bullet. Three elements i.e. antimony, barium and lead, are mainly used in pyrotechnics and bullet. Explosive materials can be classified by many techniques, in this research, gas chromatography-mass spectrometry(GCMS) and atomic absorption spectroscopy(AAS) techniques are used to detect several explosive materials. These materials are also investigated by electronic nose system. Several types of explosive products were investigated including fountain, roman candles, sparklers and gunshot residue because there are two interested function i.e. combustion to appear in various color and to make explosive force. Result from atomic absorption spectroscopy and gas chromatography-mass spectrometry are used to determine chemical element, different substance compound and volatile gas substance. For electronic nose, result can be described similar to these results from analytical techniques. The electronic nose system can be used to classify the type of explosive products.

Keywords: Electronic nose, Explosive material, gas chromatography, sensor array

Summary:

Session XXVI / 490

Anchoring Number-Performance Relationship of Zinc-Porphyrin Sensitizers for Dye-Sensitized Solar Cells: Combined Experimental and Theoretical Study

Siriporn Jungsuttiwong [None]

Invited Speaker

Summary:

Poster Session A / 30

Angular Extension of Io Magnetic Footprint in Corresponding to Io's Longitudinal Variation

Author(s): Suwicha Wannawichian[1]

Co-author(s): Arthit Laphirattanakul [2] ; John Clarke [3] ; Utane Sawangwit [4]

[1] *1. Department of Physics and Materials Science, Chiang Mai University 2. National Astronomical Research Institute of Thailand (NARIT), Chiang Mai, Thailand*

[2] *Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand*

[3] *Center for Space Physics, Boston University, Boston, MA, USA*

[4] *National Astronomical Research Institute of Thailand (NARIT), Chiang Mai, Thailand*

Corresponding Author(s): arthitl@yahoo.com, u.sawangwit@gmail.com, suwichawan@gmail.com, jclarke@bu.edu

The interaction between Io's extended atmosphere and Jupiter magnetosphere is a strong evidence of electrodynamic interaction between intense plasma source and planetary magnetosphere. The result of this interaction is picked up current, which travels along the magnetic field line, from the vicinity of Io toward Jupiter's magnetosphere. At the end of magnetic flux tube, spot emissions were previously proved to be detectable, which are well known as Io's auroral magnetic footprint emissions. Io's magnetic footprint locates a few lower degree latitude from Jupiter main auroral emission. With the conservation of magnetic flux, the size of interaction region at Io, 1.5 Io radii, should be corresponding to the emission size of ~100 km. In this study FUV images of Jupiter's auroral region, which were taken in 2007 by Advanced Camera for Surveys (ACS) instrument on Hubble Space Telescope (HST), were used to analyze the variation of Io's magnetic footprint emission. Regardless of different observing time in one year, the angular size of Io's magnetic footprint shows strong trend of variability, whose peaks appears to be noticeable when Io was near 80 and 295 degrees longitude. This result shows similar two-peak feature as the footprint brightness with some shift in longitude. Based on direct observation of plasma environment near Io by Cassini spacecraft, the azimuthal variation of plasma in Jupiter magnetosphere could be responsible for this shift between maximum brightness and angular size of Io's magnetic footprint.

Summary:

Antifungal Activity of Colloidal ZnO Coated Mulberry Paper Against Aspergillus Niger

Author(s): Nasrafah Latif[1]

Co-author(s): Chat Pholnak [1] ; Monthon Lertworapreecha [2]

[1] *Department of Physics, Faculty of Science, Thaksin University, Phatthalung, 93210, Thailand*

[2] *Department of Biology, Faculty of Science, Thaksin University, Phatthalung, 93210, Thailand*

Corresponding Author(s): chatty2005@gmail.com, nasra_54246@hotmail.com, worapreecha@gmail.com

Zinc oxide is antibiotic material that has been gained considerable interests to be used in antimicrobial cellulosic production. In this work, the antifungal activity of hexagonal ZnO particles coated mulberry paper against *Aspergillus niger* was investigated by standard inhibitory diffusion assay. The different concentrations of 0-12 mg/ml of ultrasonic treated ZnO colloids were prepared and applied to a piece of mulberry paper for the inoculation tested samples. The pathogenic fungal growth on coating paper was monitored by using a direct optical observation at 1, 5, 10 and 15 days after inoculation. The results illustrated that coating contained ZnO particles improved resistance to be moldy when subjected to inoculums containing *Aspergillus niger* fungi. The optimal concentration of ZnO colloids inhibiting the growth of fungus was 12 mg/ml up to 15 days. The results suggest that ZnO particles could be beneficially utilized as an effective fungicide for a household manufacturing of handicraft mulberry paper and promising bulrush-basketry developments.

Session X / **243**

Application of PIN Diode for Pulse X-ray Detector in TPF-II Plasma Focus Device

Author(s): Arlee Tamman[1]

Co-author(s): Boonchoat Paosawatyanyong [2] ; Mudtorlep Nisoa [1] ; Nopporn Poolyarat [3] ; Thawatchai Onjun [4]

[1] *School of Science, Walailak University, Nakhon Si Thammarat 80161, Thailand*

[2] *Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand*

[3] *Department of Physics, Faculty of Science and Technology, Thammasat University, Pathum Thani 12120, Thailand*

[4] *School of Manufacturing Systems and Mechanical Engineering, Sirindhorn International Institute of Technology, Thammasat University, Pathum Thani 12120, Thailand*

Corresponding Author(s): nop096@gmail.com, arlee.tam@gmail.com, paosawat@sc.chula.ac.th, thawatchai@siit.tu.ac.th, mnisoa@yahoo.com

Precision diagnostics of X-ray density and energy in the plasma focus device need high-speed devices which are very complicated and expensive. The multiple PIN diodes, a cost effective light detector, can be used to detect the pulse X-ray which are produced by the TPF-II, a 3.3 kJ dense plasma focus. The detectors are covered by difference thickness and type of X-ray filter materials such as alumina and Mylar in order to prevent the effect of visible light and decrease the X-ray intensity. The experimental data is compared with the simulation data to estimate the X-ray energy.

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Application of Tritium and Stable Isotope as the Tracers on Groundwater and Reservoir Leakage study of Limestone Aquifers in Chiang Dao Area, Northern Thailand

Author(s): Chakrit Saengkorakot[1]

Co-author(s): Boonsom Porntepkasemsan [2] ; Monthon Yongprawat [2] ; Nitipon Noipow [2] ; Wuttikrai Kunsawat [2]

[1] *Nuclear Research and Development Division, Thailand Institute of Nuclear Technology (Public Organization)*

[2] *Thailand Institute of Nuclear Technology (Public Organization)*

Corresponding Author(s): chakrit@tint.or.th, boonsom@tint.or.th, dew083@gmail.com, wkunsawat@yahoo.com, noipow@gmail.com

The groundwater in Chiang Dao Area, Chiang Mai province is geologically related to limestone, which exposed as beautiful Karst topography. The groundwater system in Karst Area usually formed caves and underground conduits with turbulent flows and rapid vertical infiltration. The unique recharge mechanism make the aquifers tends to be complex, high heterogeneity and change in very dynamic with high surface water-groundwater interaction associate vast of springs. The reservoirs in the area usually faced of leakage problems and short of storage in dry season. The stable isotope ratios (δ2H, δ18O) of 42 water samples of groundwater, surface water and springs, collected in 2013-2014, were analyzed by isotopic H2O laser spectroscopy instrument (Picarro L2130-i) and the radionuclide Tritium content in water samples were ultra low level measured by Liquid Scintillation Counter (LSC) with Electrolytic Enrichment. The data can be applied as environmental tracers to identify the GW recharging sources and SW-GW interaction.

In surface water, the reservoir water can be separated to the streams by very high enrichment (δ18O>-5.0) from higher evaporation effect. The SW-GW interaction can be defined by evaporation fingerprint with δ18O>-7.1 in 2 groundwater wells and 5 springs that located close to the reservoirs. Tritium content in SW range from 1.8-2.3 Tritium Unit (TU.) that the range can be defined as "Modern water". Tritium content in GW in the study area range from 0.3-2.0 TU., and can be divided into 2 groups. The GW in recharge area at higher altitude (>620 m. above MSL.) can be interpreted as modern water recharged by Tritium content of 1.8-2.0 TU., while GW in discharge area at lower altitude (422-620 m. above MSL.) can be defined as mixture of modern and sub-modern (prior 1952) GW recharged by lower Tritium content of 0.3-1.6 TU. The reservoirs and GW system including springs in recharge area (altitude >620 m.), which show evaporation fingerprint and "Modern water" tritium characteristic, will be assessed as higher risk in short of storage or decline of water level by leakage or rapidly recharge to the lower GW water system (base flow) in the dry season.

Summary:

Session XI / **167**

Application of Two-Ring Network and Ising Model to Agent-Based Dynamics in Financial Market

Author(s): Kittiwat Tangmongkollert[1]

Co-author(s): Asawin Sinsarp [1] ; Sujin Suwanna [1] ; Wisit Singhsomroje [1] ; Withoon Chunwachirasiri [1]

[1] *MU-NECTEC Collaborative Research Unit on Quantum Information, Department of Physics, Faculty of Science, Mahidol University, Phayathai, Bangkok 10400*

Corresponding Author(s): kittiwat_tm@hotmail.com, wisit.sin@mahidol.ac.th, sujin.suw@mahidol.ac.th, withoon.chu@mahidol.ac.th, asawin.sin@mahidol.ac.th

We applied a two-ring network to study the dynamics of agents in a financial market. Two rings are randomly connected by coupling links. The Ising model is adopted to determine the state of each node, representing a financial agent. To relate the Ising network to a financial market, we mapped the (+1) state to the buying state and (-1) state to the selling state. The probability of changing states depends on the interaction between neighborhood nodes, coupling links, and the external field. Whenever the state of a node changes to (+1), the observed price variable increases by 1 unit and that agent buys 1 unit of stock with this price. Likewise, when a node changes state to (-1), the price decreases by 1 unit and this agent sells 1 unit of stock. Then the profit of individual

nodes can be measured by the difference between its averaging cost and the current price. We vary the number of coupling links between two rings and the intensity of external magnetic field of each ring. We find that the magnetization strength of each ring depended on the number of coupling links. Consequently, the rate of change of the price depends on the network magnetization, and the profit grows as a quadratic function of magnetization. If two rings have opposite signs of magnetization, the less magnetized ring gets a loss in profit and the price moves in the direction of larger magnetized ring. But if both rings have the same sign of magnetization, most agents gain profits.

Session XI / **67**

Application of Unitary-Scaling Decomposition in Nuclear Magnetic Resonance

Author(s): Fattah Sakuldee[1]

Co-author(s): Sujin Suwanna [1]

[1] *Department of Physics, Faculty of Science, Mahidol University*

Corresponding Author(s): fattah.sak@student.mahidol.ac.th, sujin.suw@mahidol.ac.th

In quantum development, dynamical maps are central objects used to describe the behaviour of many quantum systems. While special kinds of mappings attract great interests, such as unitary evolution describing the dynamics in close systems and the Lindblad-type dynamical maps in Markovian open systems, a general formulation of the dynamical map has been rarely investigated. We introduce a unitary-scaling decomposition of a mapping on a finite dimensional state space, composing of a unitary evolution and a real-positive semi-definite matrix, called a scaling matrix, corresponding to the system's dissipative behaviour. We show that the formulation covers the Lindblad dynamics where the Markovian property is assumed, and it constitutes a building block for the beyond-Lindblad dynamics of finite dimensional systems. In order to demonstrate the formulation, in this presentation, we apply the unitary-scaling decomposition to quantum information processing in nuclear magnetic resonance (NMR), which employs the Lindblad dynamics for a two-level system. We also show that, the dynamical map in NMR can be decomposed as a product of the unitary and scaling matrices, which can be constructed from elementary gates in quantum information processing. We believe this formulation and the application in NMR demonstrate that the dynamics in a real situation can be simulated by another quantum system of the same dimension, and the unitary-scaling decomposition is a useful tool in processing information.

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Assessment of Virtual Experiments on Students' Achievements and Attitudes Toward Physics Learning in Upper Secondary Levels

Chompak Nuandee[1] ; Preeda Patcharamaneepakorn[1] ; Ram Tiwari[1] ; Sorajit Arrerut[1] ; Thanarat Khuntak[1] ; Thepnakorn Saenghuachang[1] ; Winai Lerdkasamsont[1]

[1] *IPST*

Corresponding Author(s): thesa@ipst.ac.th, rtiwa@ipst.ac.th, cnuan@ipst.ac.th, sarre@ipst.ac.th, wlerd@ipst.ac.th, preeda.pat@gmail.com, tkhun@ipst.ac.th

The purpose of the research is to compare students' achievements and to study attitudes toward physics learning in Upper Secondary levels before and after being treated by Virtual Experiments (VEs) and the efficiency of VEs. The hypothesis of the research is that students' achievements and attitudes toward physics learning will be improved significantly after VEs are treated. The quasi-experimental procedure, specifically, One-Group Pretest-Posttest Design, was used in the research

and the purposive sampling technique was employed to select schools and students. The research was separated into two phases. In the first phase, VEs were treated on and the data was collected from 176 students in 6 schools governed by the Education Department of Bangkok Archdiocese (EDBA) in academic year 2014. For the second phase, the data was collected from 437 students in 12 national schools in academic year 2015. The achievement tests and questionnaires were used as research instruments. The research hypothesis was tested by dependent t-test statistic. Descriptive data was analyzed by using mean and standard deviation while qualitative data was analyzed by using the content analysis method. The result shows that after being treated by VEs, achievements of students increase significantly by 0.1; however, attitudes of students toward physics learning decrease insignificantly. Students' satisfaction toward VE is quite moderate while comments from students imply that they are able to understand physics concepts better after using VEs. For the overall efficiency, VEs exhibit stable performances.

Poster Session A / **107**

Astrometry of Thaicom series satellite

Author(s): Kanpaton Kasonsuwan[1]

Co-author(s): Suwicha Wannawichian [2] ; Thagoon Kirdkao [3]

[1] *Chaingmai university*

[2] *National Astronomical Research Institute of Thailand (NARIT)*

[3] *Airforce*

Corresponding Author(s): modkanpatom@gmail.com, suwichawan@gmail.com, thagoonk@gmail.com

This paper describes observations of GEOs satellite Thaicom series with 0.7 m telescope at Inthanon Mt., Chaingmai, Thailand. Observation took place 2 nights. Three-frame was done for each set and 2 sets were preceded for each satellite. Then the astrometry technique; LPSR (Least Square Plate Reduction) was used to get object coordinate in order to compare with well-known reference stars in catalogs that we programed on the website astrometry.net. Next we read file on xparallax VIU. These results can be used to calculate angular velocity and to predict orbital parameters for 6 orbits of each satellite. The orbital parameters include eccentricity, semi-major axis, inclination, longitude of ascending node, argument of periapsis and mean anomaly.

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Bicycle vibrations Energy from Piezoelectric Generator to Supply Portable Devices

Pornchai Kopatta[None]

Corresponding Author(s): pornchai2500.pk@gmail.com

The need to decrease in energy consumption of portable devices in daily living, the concept to find various alternative energy sources in surrounding areas. I have developed a piezoelectric generator which generates energy from vibration of a bicycle. In this case, piezoelectric material is used to transform mechanical energy to electric energy. Afterwards, the electric energy will be transformed suitably for charging batteries for storage and use later on. In this research, Values of generated electrical power are reported and commented.

Session VIII / **142**

Carrier mobility for acoustic phonon scattering in 2D extrinsic graphene

anucha pratumma[None]

Corresponding Author(s): puu.an@hotmail.com

We study carrier mobility of 2D extrinsic graphene by acoustic phonon scattering as a function of temperature (T) and carrier density (n). We calculate inverse relaxation times (τ) as a function of energy for different temperatures and resistivity (ρ) as a function of temperature for different densities (n).

Session XVI / **228**

Characteristic and Formation of Hydroxyapatite Synthesized from Heat Treatment of Cuttlefish Bone

Author(s): Kridsada Faksawat[1]

Co-author(s): Ekachai Hoonnivathana [2] ; Kittisakchai Naemchanthara [1] ; Pichet Limsuwan [1]

[1] *King Mongkut's University of Technology Thonburi*

[2] *Kasetsart University*

Corresponding Author(s): puri_kit@hotmail.com, opticslaser@yahoo.com, kridsadadfak@gmail.com, fsciech@ku.ac.th

Hydroxyapatite is one of calcium phosphate phase and widely use in medical and dental application. Hydroxyapatite could be synthesized from natural calcium source. Cuttlefish bone waste are mainly composed of calcium carbonate. This paper, hydroxyapatite was synthesized from cuttlefish bone by high energy ball milling technique. The cuttlefish bone was heated at different temperature from 200 to 1300 °C. The heated cuttlefish bones at different temperature were mixed with di ammonium hydrogen orthophosphate ratio 5:3 moles and added distil water 25 ml. The solution was milled at different time from 5 to 120 min. The structure, morphology and function group of cuttlefish bone and hydroxyapatite samples were investigated with X-ray diffraction (XRD), scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR), respectively. The results show that the natural phase of cuttlefish bone was aragonite phase of calcium carbonate (CaCO3) and changed to pure calcite phase after heated at 500 °C. The calcite phase of cuttlefish bone was completely transformed to calcium oxide (CaO) after heated at 900 °C. For hydroxyapatite synthesizing show that the samples were milled for 5 minutes not only hydroxyapatite phase appeared but also remained initial phase. The pure hydroxyapatite phase appeared that the both aragonite and lime phase precursors were milled for 60 minutes. From experiment, the cuttlefish bone before and after heated can be use a source of calcium for hydroxyapatite synthesizing by high energy ball milling technique.

Session XXIX / **82**

Characteristic investigation of sputtered Co-Cu films on glass substrate

Author(s): Suthasinee Somboonsap[1]

Co-author(s): Watcharee Rattanasakulthong [1]

[1] *Kasetsart University*

Corresponding Author(s): ssomboonsap@gmail.com, fsciwrr@ku.ac.th

A series of sputtered Cox-Cu100-x films with different compositions (x = 88, 76, 65, 52, 38 and 34) were prepared by RF-sputtering process on glass substrate under 10-3 mbar of Ar pressure. XRD results presented both of Co (FCC) and Cu (FCC) phases in (111) plane at 2 = 44.23° and 43.34°, respectively. The intensity of Cu peaks was increased likewise the intensity Co peaks was decreased with increasing Cu composition. Morphology of all deposited films showed the columnar structures. The maximum and minimum surface roughness was observed on Co38Cu62 and Co88Cu12 films, respectively. At the temperature of around 600℃, DTA curves showed endothermic peak representing oxidation reaction of Co and Cu phases. Magnetic properties were investigated by MOKE technique under an applied magnetic field from -44.59 to 44.59 mT. The Co88Cu12, Co76Cu24 and Co65Cu35 films exhibited ferromagnetic phase whereas the Co38Cu62 and Co34Cu66 films showed paramagnetic phase. The maximum coercivity of about 15.1 mT and the minimum of about 1.7 mT were observed on Co88Cu12 and Co52Cu48 films, respectively. It can be concluded that the composition strongly effects on structure, morphology and magnetic properties of the films.

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Characteristic of PbTe thermoelectric material prepared by hydrothermal method

Author(s): PHITSAMAI KAMONPHA[1]

Co-author(s): Somkid Pencharee [2]

[1] *Department of physics,Factulty of Science,Ubon Ratchathani University,Thailand*

[2] *Department of physics,Faculty of Science,Ubon Ratchathani University,Thailand*

Corresponding Author(s): phitsamai.own1993@gmail.com, somkid.p@ubu.ac.th

Structure and particle size of PbTe thermoelectric material prepared by hydrothermal method were investigated. Thermoelectric AgPb18SbTe20 alloy were prepared by hydrothermal method with different heating temperature and time. After that the structure and particle size were characterized by XRD and SEM, respectively. The observed XRD peaks for (111), (200), (220), (311), (222), (400), (420) and (422) can be indexed to structure of PbTe. The most suitable condition for hydrothermal process is 200 oC of heating temperature and 20h of heating time due to the cube shape grains with the size of ~100-200 nm and shaped into a cube.

Keywords: Hydrothermal, Thermoelectric material, Lead Telluride

Session XVII / 158

Characteristics of Daytime Penetration Electric Field in Equatorial Ionosphere during Recurrent Geomagnetic Storms

Author(s): Thana Yeeram[1]

Co-author(s): Pairat Thammasaeng [1] ; Suparerk Aukkaravittayapun [2] ; Teerawong Laosuwan [1]

[1] *Lecturer*

[2] *committee*

Corresponding Author(s): suparerk.a@narit.or.th, thana.thana@hotmail.com, pairat@hotmail.com, teerawong@msu.ac.th

Effects of recurrent geomagnetic storms (RGSs) induced by high-speed solar wind streams (HSSs) and corotating interaction regions (CIRs) on variations in daytime equatorial electric field (EEF) during 2007-2010 have been investigated. The EEF data as derived from magnetometer data together with the solar wind plasma data reveal many events of striking long duration of oscillating (short-lived) prompt penetration electric fields (PPEFs) about 10-12 hours. The PPEFs exhibited different

characteristics depending on the interplanetary origin. The RGSs cause PPEF mainly in the main phase of storms and not all the RGS exhibited penetration of electric field into the ionosphere. Particularly, in some events, PPEF is terminated in the main phase at shock boundary in HSSs.
The turning of magnetic field Bz to the south in the main phase of the magnetic storms are associated not only with the input of energy into the magnetosphere by the magnetic reconnection, but also the PPEF in the day-side equatorial ionosphere by the shielding/overshielding processes. In some events, the northward turning of the IMF Bz is well consistent with quiet time value of the sym-H, which indicates the reduction in the rate of the reconnection.

Session XXII / **198**

Colossal Dielectric Permittivity in (A3+,Nb5+) doped TiO2; A3+ = Cr3+ and Sc3+

Author(s): Noppakorn Thanamoon[None]

Co-author(s): Prasit Thongbai [1]

[1] *Advisor*

Corresponding Author(s): pthongbai@kku.ac.th, idoodee_punbasher@hotmail.com

(Cr,Nb)TiO2 (CN-T) and (Sc,Nb)TiO2 (SN-T) ceramics were prepared via a solid state reaction process. A single phase of rutile TiO2 was confirmed by X-ray diffraction (XRD). Dielectric properties were investigated over frequency range from 40Hz to 10MHz and temperature range from -70C to 220C. The ceramics showed high permittivities (>1000) with low dielectric losses and frequency-stablity. The behaviors of colossal permittivity can be explained by electron-pinned defect-dipoles, interfacial polarization and polaron hopping polarization.

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Commissioning of synchrotron radiation X-ray imaging beamline at the Siam Photon Laboratory

Author(s): Phakkhananan Pakawanit[1]

Co-author(s): Catleya Rojviriya [1] ; Somchai Tancharakorn [1]

[1] *Synchrotron Light Research Institute, 111 University Avenue, Muang District, Nakhon Ratchasima 30000, THAILAND*

Corresponding Author(s): somchai@slri.or.th, phakkhananan@gmail.com, catleya@slri.or.th

Synchrotron radiation X-ray imaging is a powerful tool for observing internal structure of objects. It has been used for medical science, material science, and earth science researches, and also applied in industrial cracking and welding examination. Beamline BL1.2W is a newly constructed facility at the Siam Photon Laboratory dedicated to the X-ray imaging and the synchrotron radiation X-ray tomographic microscopy (SRXTM) technique. The beamline utilizes polychromatic beam of synchrotron radiation in X-ray region, which is produced from multipole wiggler with a magnetic field of 2.4 T and 5 magnetic periods. The X-ray beam is collimated by a toroidal mirror located at 8.9 m from the source and delivered to a sample at 34.12 m downstream. The beam size at sample position is 10 x 4 mm2 (H x V). An X-ray image is generated based on the differences in attenuation coefficient of the material composition. The X-rays that pass through a sample will be converted to visible lights by scintillation and magnified by a microscopic lens system for submicroscopic detailed visualization. Recent commissioning phase of BL1.2W showed that X-ray images could be obtained with a spatial resolution beyond 5 μm.
Currently, BL1.2W is under commissioning phase for the X-ray tomographic microscopy (SRXTM) and will be opened for academic and industrial users by the end of 2016. This technique will allow

for a non-destructive characterization of internal structure via 3D reconstruction and mathematic sectioning of a sample, which will be useful for precious samples.

Session VI / **485**

Computational Microscopy of Nanoparticle-Biomembrane Interactions: Insights into Nanotoxicology and Nanomedicine

Theerapong Puangmali[None]

Corresponding Author(s): theerapong@kku.ac.th

Invited Speaker

Summary:

Poster Session A / **99**

Computational simulation of merging galaxy system

Author(s): Manus Boonmalai[None]

Co-author(s): Suwicha Wannawichian [1] ; Utane Sawangwit [2]

[1] *Department of Physics and Materials Science, Chiang Mai University*

[2] *NARIT*

Corresponding Author(s): suwichawan@gmail.com, manusboonmalai@gmail.com, u.sawangwit@gmail.com

We present computational simulation of merging between two spiral galaxies, while each galaxy has dark matter halo particles and disk particles. After the merging between two galaxies, they are expected to become an elliptical galaxy. This study uses Navarro–Frenk–White (NFW) profile and Sersic profile for describes distribution of particles. NFW profile is an approximated profile of dark matter, which is produced in collisionless dark matter particles. On the other hand, Sersic profile is a mathematical function that describes how the surface brightness/density of a spherical system varies with distance from the center. Those two profiles will be created by N-body simulation, which is called "GAlaxies with Dark matter and Gas interacT" (GADGET2) program. GADGET2 was used to calculate the distribution of particles in galaxy mergers and the formation of galaxy, under the assumption of collisionless dynamics, which is based on Friedman–Lemaître model. Ultimately, the simulations will be used to study influence of supermassive black hole (SMBH) and active galactic nuclei (AGN) on galaxy mergers and their evolution.

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Construction of a Centripetal Force Experiment on LEGO Education

POLLAWAT DUMRONKITPAKORN[1]

[1] *SILPAKORN*

Corresponding Author(s): pollabphy@gmail.com

This paper described the measurement of centrifugal force by using a construction of LEGO Education apparatus. The main component consists of a spindle equipped with motor and connected with a long beam in horizontal. An object connected to a massless spring was put on the beam at the end of the beam. When the beam rotated around spindle axis and the object-spring extended due to the rotation. The extended spring was measured to calculate the centrifugal force from the restore force of spring. The results suggest that the centrifugal force was equal and correspond to the restore force of spring. This apparatus can be used to apply in physics laboratory or in physics classroom for measurement of centrifugal force.

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Construction of a Centripetal Force Experiment on LEGO Education

[1]

[1] *Silpakorn university*

Corresponding Author(s): pollabphy@gmail.com

Pollawat Dumrongkitpakorn1, a*

1The Demonstration school of Silpakorn university, Faculty of Education,
Silpakorn university , Nakhon Pathom 73000, Thailand

a*pollabphy@gmail.com

Abstract
This paper described the measurement of centrifugal force by using a construction of LEGO Education apparatus. The main component consists of a spindle equipped with motor and connected with a long beam in horizontal. An object connected to a massless spring was put on the beam at the end of the beam. When the beam rotated around spindle axis and the object-spring extended due to the rotation. The extended spring was measured to calculate the centrifugal force from the restore force of spring. The results suggest that the centrifugal force was equal and correspond to the restore force of spring. This apparatus can be used to apply in physics laboratory or in physics classroom for measurement of centrifugal force.

Keywords: centrifugal force , LEGO Education and force of sprin

Summary:

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Control of Stimulated Wave Trains in the Belousov-Zhabotinsky

Author(s): Srithamma Srithamma[1]

Co-author(s): Chaiya Luengviriya [2] ; Jiraporn Luengviriya [3] ; Nakorn Kumchaiseemak [2] ; Piyachat Wungmool [2]

[1] *Panatda*

[2] *Department of Physics, Kasetsart University, 50 Phaholyothin Road, Jatujak, Bangkok 10900, Thailand.*

[3] *Lasers and Optics Research Group, King Mongkut's University of Technology North Bangkok, 1518 Pibulsongkram Road, Bangkok 10800, Thailand.*

Corresponding Author(s): g5714401778@ku.ac.th, jiraporn.l@sci.kmutnb.ac.th, fscicyl@ku.ac.th, piyachat_w@windowslive.com, elevia_ice@hotmail.com

Spiral waves are an origin of the most dangerous cardiac arrhythmia leading to fibrillation and sudden death. It is shown that a high-frequency wave train can induce a drift of free spiral waves until they annihilate at the boundary. Elimination of spiral waves by using wave train is also demonstrated in the Belousov-Zhabotinsky (BZ) reaction but lack of the control of the wave period. We present a method to generate and control a train of excitation waves in the BZ reaction. A droplet of 2.5M sulfuric acid (10μl) was used as the wave source while the wave period can be controlled by setting the local temperature at the source location. When the local temperature is increased from 22 to 37oC, the wave period decreases from 4.9 to 2.75 minutes when the bulk temperature is 22oC.

Session V / **65**

Cooling Energy Distribution of Secondary Ions at the Travelling-wave Ion Guide by Helium and Molecular Nitrogen

Author(s): Prutchayawoot Thopan[1]

Co-author(s): Jiro Matsuo [2] ; Liangdeng Yu [3] ; Toshio Seki [4] ; Udomrat Tippawan [1]

[1] *Chiang Mai University*

[2] *Quantum Science and Engineering Center, Kyoto University*

[3] *Thailand Center of Excellence in Physics*

[4] *Department of Nuclear Engineering, Kyoto University*

Corresponding Author(s): matsuo.jiro.7s@kyoto-u.ac.jp, udomrat.t@cmu.ac.th, seki@sakura.nucleng.kyoto-u.ac.jp, thopan_w@hotmail.com, yuldyuld@gmail.com

The Ar-cluster ion source at energy in order of keV was installed with the Q-ToF (Quadrupole Time-of-Flight) premier at the Quantum Science and Engineering Center, Kyoto University. The main component of Q-ToF premier consists of the travelling-wave ion guide, mass filter quadrupole lens, travelling-wave collision cell, and time of flight analyzer. The 1,2-Distearoyl-sn-glycero-3-phosphocholine (DSPC) sample was used to analyze the cooling energy distribution at the travelling-wave ion guide by helium and molecular nitrogen. The DSPC sample was impinged with primary Ar-cluster ions at energy 10 keV and sputtered with secondary ions in energy range from zero to several hundred eV. Sputtered or secondary ions were extracted to the Q-ToF mass spectrometer. The experiment was designed to measure the DSPC mass spectrum in two modes at varied pressures of helium and molecular nitrogen. The first mode was MS mode and the other was MSMS mode which defined the m/z = 790.6 Da, molecular protonated, at the mass filter quadrupole lens. The experiment found that the secondary ion yield (SIY) of the MS mode reached the maximum at 2.0 and 0.4 Pa for helium and molecular nitrogen, respectively. At the MSMS mode, the SIY reached the maximum at 2.5 and 0.4 for helium and molecular nitrogen, respectively. However, in the MSMS mode, some fragments could not be eliminated by the cooling molecular nitrogen. The helium cooling energy distribution and the transverse direction of secondary ions were more effective and stable than molecular nitrogen.

Keywords: Ar-cluster ion source, Q-ToF, 1,2-Distearoyl-sn-glycero-3-phosphocholine (DSPC), MS mode, MSMS mode.

Session XXI / **205**

Correcting misconceptions about energy conservation using STEM approach

Author(s): Chinapat Mongkholsiriwattana[None]

Co-author(s): Mingkhuan Phaksunchai [1] ; Monsit Tanasittikosol [1]

[1] *126 Pracha Uthit Rd, Bang Mot, Thung Khru, Bangkok 10140*

Corresponding Author(s): frien_real@hotmail.com, monsit.tan@gmail.com, mingkhuan.pha@mail.kmutt.ac.th

The aim of this research is to design and create a test to measure the misconception about conservation of energy of the Thai high school students. The design of the test was based on the learning theory in Cognitive Domain from Bloom's Taxonomy and each question is divided into three levels – three-tier question. On first tier it is a question about incident. Second tier question about why the first answer and the third tier is in response to a question about the confidence at first-second tier. The test was submitted to two physics experts to check for correctness in physics details. Furthermore, the test was checked for content validity and item objective congruence by one education expert. Then this test will be used to measure the misconception of students participated in STEM-based activity.

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DESIGN AND CONSTRUCTION OF HIGH VOLTAGE AND HIGH CURRENT DC POWER SUPPLY FOR ELECTROMAGNET EQUIPMENT

Author(s): Apisit Trakoonwattana[1] ; Satsawat Sonsunan[1] ; Supasak Kienwimol[1]

Co-author(s): Aparporn Sakulkalavek [1] ; Nuttakrit Somdock [1] ; Rachsak Sakdanuphab [2] ; Wichit Sirichote [1]

[1] *Department of Physics, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang*

[2] *College of Data Storage Innovation, King Mongkut's Institute of Technology Ladkrabang*

Corresponding Author(s): satsawat.s@hotmail.com, 57605012@kmitl.ac.th, wichit.sirichote@gmail.com, rachsak.s@gmail.com, hunterlekz@hotmail.com, aparporn.sa@kmitl.ac.th, kungbangza@hotmail.com

Hall Effect is a physics phenomena using for electrical property measurement of semiconductor materials. The Hall measurement is done under an applied magnetic field from DC electromagnet. The magnetic field depends on the supply current in electromagnetic coils. In this work, high current DC power supply with voltage control current source and Hall Effect sensor were designed and constructed. The experimental procedures were divided into three parts. Firstly, circuit and schematic designs were simulated by using OrCAD PSpice program and Altium Designer program, respectively. DC supply, current source control and Hall Effect sensor circuits were built in second part. Finally, the circuits were tested on DC electromagnet. Current, voltage and thermal stability of circuits as well as magnetic field were investigated. The maximum power was achieved at 1500W (15A/100V) with the temperature maximum below 40 ℃ and the magnetic field of 1 T was obtained.

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Design and Construction of a Gradient Control System

Chittakorn Polyon[None]

Corresponding Author(s): polyon@yahoo.com

Microcontrollers Arduino Uno and Arduino Due were used to design and construct a gradient control system. These controlled circuits were given digitally signals for selection gradient, frequency encoding gradient and phase encoding gradient. The controlled parameters were performed with Visual C#, a user interface program. Signal levels were adjusted by a digital potentiometer, and converted to analog signals. Both positive and negative signals for those gradients could be produced by a differential amplifier circuits. The output signals were corresponding the designed signals.

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Design and Construction of a Permanent Magnet System for a Free Radical Imaging

Chittakorn Polyon[None]

Corresponding Author(s): polyon@yahoo.com

The aim of this work was to design and build a permanent magnet system with uniform magnetic fields for a free radical imaging system. The magnet system was composed of 50 small permanent magnet cubes. The dimension of a magnet cube is 40 mm x 40 mm x 40 mm. Each piece was placed on two steel plates with dimension of 0.9 cm x 60 cm x 75 cm, which were separated by a space 3 cm and placed in parallel to each other with 40 cm distance. From experimental results, by measuring at the center between plates, the measured magnetic field was 42 mT with a field inhomogeneity of 0.038 ppm, useful for a main magnet in our free radical imaging system.

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Design and Development of Equipment for experimental using free fall motion by laser sensor timer photo gate of low-cost

Author(s): Yuanjit Thumsith[1]

Co-author(s): Vatcharinkorn Mekla [2]

[1] *Ubon Ratchathani Rajabhat University*

[2] *Ubon Ratchatani Rajabhat University*

Corresponding Author(s): choke-kana@hotmail.com, chokekana14@gmail.com

This research deals with the design and construction of experimental apparatus to determine the acceleration due to gravity on Earth by using free fall motion. The apparatus is made of a stainless steel pipe which is commercially sold. The stopwatch is used to measure times with resolution of 0.05 seconds. Falling objects induces signals through magnetic induction. The type GaAs semiconductor laser voltage of 4.5 volts is used as a light source for the photo gate. The control can be done by touch switches to stop with a magnetic force from a permanent magnet with the spring after the object falls. The objects can travel for 1 to 2 meters. The experimentally obtained values of gravitational acceleration (g) were compared to the values obtained from the National institute of metrology (Thailand). The measured value of g is 9.78297 m/s2 at Bangkok that the error was 2.20 percent. The result from the students after using the apparatus showed that the new apparatus can be used to measure g with an error of 1.28 percent.
Keyword: free fall, Gravitational acceleration, the type GaAs semiconductor laser

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Design and Development of an Experimental Apparatus to Study the Conservation of Energy

Author(s): Wisit Tamseewan[1]

Co-author(s): Vatcharinkorn Mekla [2]

[1] *300/130 Moo ban Chareon sti2.Sansuk Subdistric. Warinchamrab Distric.Ubonratchathani. 34190*

[2] *Faculty of Science. Ubonratchathani Rajabhat University.34000.*

Corresponding Author(s): pok_pong99@hotmail.com, choke-kana@hotmail.com

This research is the design and development of an experimental apparatus to study the conservation of energy to serve as a medium of instruction for high school. It has been tested with the experimental method to plot the graph compare the graph of the theory. It has been using Tracker video analysis and modeling tool for physics education support for lab results. It is designed to replace the gravitational potential energy into kinetic energy and elastic potential energy, respectively. It was designed using the principles of the law of conservation of energy. The concept of the design is to use materials that are cheap and easy to procure locally. The results showed that Timer can display the time when an object moves through the photo gate before the fall and spring term can be read clearly when the retaining spring let objects fall at different heights. Applications Tracker video analysis and modeling tool for physics education is used for the speed of the object before the spring and a long stretch of the spring corresponding to the reading of the stopwatch. When letting objects fall at different heights. It was a performance of a trial against the theory of the law of conservation of energy. We concluded that the error is 9.43 %.

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Design and construction of a thermoelectric generator by using solar thermal energy

Author(s): Wichean Piwbang[1]

Co-author(s): Jintana Laopaiboon [1] ; Somkid Pencharee [1]

[1] *Ubon Ratchathani University*

Corresponding Author(s): wkhag@hotmail.com, somkid.p@ubu.ac.th, 2502jin@gmail.com

This research aimed to design and construct a thermoelectric generator by using solar energy as a heat source, a parabolic dishes having diameter 1.5 m. with a focal length 0.5 m. is used to concentrate the solar radiation. Solar thermal energy is absorbed by a sheet of aluminum on focal zone. The hot side of thermoelectric generator (TEG) device was mounted on an aluminum sheet, heat sink with dimensions 120 x 200 x 50 mm. and cooling fans were installing on the cold side of TEG. Our experiment on 28th and 29th march 2016 at department of physics, faculty of science ubon ratchathani university on the north east of Thailand. Perform collection of the data from 8:30 a.m. to 4:00 p.m. From the result of experiment, at 12:30 on 28th March maximum temperature from solar radiation heat on hot side of TEG is 515.7 K, when intensity of solar energy is 1092 w/m^2 and the maximum power output is 6.28 W.

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Design and development of colorimetry program on a smart phone for pH determination.

Author(s): Kanyaphach Armart[1]

Co-author(s): Somkid Pencharee [1]

[1] *Ubonratchathani University*

Corresponding Author(s): piano_karo@hotmail.com, somkid.p@ubu.ac.th

As pH values used specify the acidity - alkalinityof chemicals and was widely used in medical,industrial and environmental. For determine the concentration pH on solution can be made using chemical methods.This study has the capabilities of smart phones to use analysis of color solution as needs to know the pH value.Develop of application on a smart phone for the color measurement with chemical methods. Solution is prepared with a pH 3.0 - 9.0 then drop indicator into solutions. The

color changes according to the pH value. The sample put within a drapesbox for prevent optical interference. Inside the box, install two white LED lamps as the light source.At the front of the box was drillfor take a picture in the box. The data analysis found that Red and Green values affect to the pH changes depictions.Therefore values a relationship of pH with Green will be divided into two periods of two equations and values a relationship of pH and Red is a decided that should be used to during any equations.This research was a simple system can be applied to many applications, low cost and easy to carry.

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Design of Apparatus to Study of a Rotating double cone down an Inclined Plane

Author(s): Kannika HOMDUNGSRI[1]

Co-author(s): Vatcharinkorn MEKLA [2]

[1] *House No 286 Village No2 . Sub - district Ban Nam Om.District Kantharalak.Srisaket.33110*

[2] *Faculty of Science. Ubonratchathani Rajabhat University.34000*

Corresponding Author(s): chokekana14@gmail.com, kannika7133@gmail.com

The design of apparatus to study of a rotating double cone down an inclined plane by tracker video analysis and modeling tool for physics education in order to determine the moment of inertia compared to the moment of inertia is calculated by theory. Using materials made from wood and materials made from super lean, which the object is to control both the volume and the same shape is double cone. We have found that the moment of inertia of the material, made of wood with error value 18.34 % and the moment of inertia of the material is made of super line with error value 9.62 % compared to the moment of inertia was calculated by theory.

Session X / 166

Design of a high-temperature microwave furnace for preparation of highly efficient thermoelectric materials

Author(s): Direk Boonthum[1]

Co-author(s): Chesta RUTTANAPUN [2] ; Mudtorlep NISOA [1]

[1] *walailak university*

[2] *King Mongkut's Institute of Technology Ladkrabang Chalong Krung*

Corresponding Author(s): chesta.ruttanapun@gmail.com, utk2012utk@gmail.com, mnisoa@yahoo.com

The thermoelectric material is a device that can generate electric energy from solar and waste thermal energies. On the other hand, It can generate temperature gradient from electric energy for cooling applications. Recently, researchers are interested in the synthesis of thermoelectric material by using microwave furnace. The efficiency of thermoelectric materials can be increased by microwave assisted synthesis because of rapid sintering and small gain size. High-temperature microwave furnace technology is complicated in the design and control system. The commercial furnaces are very expensive. In this research, we have developed high-power microwave furnace for synthesis of thermoelectric materials. The design of microwave furnace is optimized by Comsol multiphysics. Study of electric distribution in the waveguide and cavity, therefore furnace cavity is optimized to be 28x28x28 cm3. The waveguides and magnetrons are mounted on the four sides of the cavity. Each two waveguides on the opposite sides are placed at 90 degree to each other. The Heating of SIC crucible in the furnace have shown that crucible's temperature can be increased from room temperature to 900o C within only about ten minutes. Heat energy in the furnace depends

on the number of operating magnetrons, which is consistent with the distribution of the calculated electric field.

Session VI / 128

Designing Gold Nanoparticle Translocation through Cell Membrane for the Applications in Nanomedicine

Author(s): Jirawat Assawakhajornsak[1]

Co-author(s): Theerapong Puangmali [2] ; Thodsaphol Lunnoo [3]

[1] *Department of Physics, Faculty of Science, Khonkean Univiersity, Maung district, Khonkean province, 40002*

[2] *Department of Physics, Faculty of Science, Khonkean University, Maung district, Khonkean province, 40002*

[3] *Department of Physics, Faculty of Science, Khon Kaen University, Khon Kaen, 40002*

Corresponding Author(s): jirawat_assa@kkumail.com, theerapong@kku.ac.th, thodsaphonl@kkumail.com

The study of the interaction between nanoparticles and living cell is the fundamental study that can be applied for the efficient drug delivery. In this work, we aim to study and design gold nanoparticles (AuNPs) for the drug delivery by a computer simulation. Computationally, the interaction between AuNPs and cell membrane was studied by coarse-grained molecular dynamic simulation which is suitable for a large complex system. The studied parameters are sizes, varied from 2 nm to 10 nm in diameter, and shapes including (i) spherical NP, (ii) nanorod and (iii) hexapod. The results show that, for sphere-shaped NP, small nanoparticles (2-8 nm in diameter) tend to penetrate across cellular membrane via direct translocation. Whereas, the 10-nm-in-diameter NP is able to form the vesicle (endosome) leading to non-specific endocytosis. Unlike the spherical NPs, rod-shaped and hexapod-shaped NPs are unable to perform endocytosis even they have exactly the same diameter as the spherical counterpart. Our findings are very crucial and will pave the way for the design of the targeted drug delivery.

Keywords : Cellular uptake: Gold nanoparticles (AuNPs): Endocytosis: Size and shape effect

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Detailed ultraviolet asymptotics for AdS scalar field perturbations

Oleg Evnin[1] ; Puttarak Jai-akson[1]

[1] *Chulalongkorn University*

Corresponding Author(s): oleg.evnin@gmail.com, puttarak.jaiakson@gmail.com

We present a range of methods used for accurate evaluation of the leading asymptotics for integrals of products of Jacobi polynomials in limits when the degrees of some or all polynomials inside the integral become large. The structures in question have recently emerged in the context of effective descriptions of small amplitude perturbations in anti-de Sitter (AdS) spacetime. The limit of high degree polynomials corresponds in this situation to effective interactions involving extreme short-wavelength modes, whose dynamics is crucial for the turbulent instabilities that determine the ultimate fate of small AdS perturbations. We explicitly apply the relevant asymptotic techniques to the case of a self-interacting probe scalar field in AdS and extract a detailed form of the leading large degree behavior, including closed form analytic expressions for the numerical coefficients appearing in the asymptotics.

Session VII / **89**

Detection of Indirect Signal Dark Matter from the Milky Way

Author(s): Jaruchit Siripak[1]

Co-author(s): Nuanwan Sanguansak [1] ; Utane Sawangwit [1]

[1] *Physics*

Corresponding Author(s): u.sawangwit@gmail.com, jaruchit1112@gmail.com, nsangsci@gmail.com

We study the prediction of the gamma ray signal generated from Galactic halo dark matter (DM) annihilation. The study focuses on the electron and positron pair production resulting from self-conjugate dark matter particles. We use Milky Way (MW) DM density profile measurement from literatures which are fitted with NFW, Burkett and Einasto models. The most important radiative process in the gamma ray regime is the Inverse Compton Scattering (ICS) of photons by highly energetic electron and positron. We also determine the contribution from Final State Radiation and compare the prediction for different DM masses to the published results from Fermi satellite. We assume electron-positron cross-section $<\sigma\nu>=3 \times 10^{-26} cm^3 s^{-1}$ which typical value for a thermal relic. Although the cross-section is correlated with DM mass in the measurement from gamma ray spectral distribution, we expect cross-section value that is not higher than typical value for DM with mass of few GeV. According to our results, NFW profile and mass of few GeV are closer to observational data than other profiles and other masses of DM particle.

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Determination airborne particulate in communities near sugar plant

piriyq praneekit[1]

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Corresponding Author(s): tockatod8@hotmail.com

ABSTRACT

This research was study particulate matter quantity and element in particulate matter to compare par
The study found that have a lot of communities near the sugar factory. Nongkungtoaw village is selec
The study found that average in Wednesday is 60.20 µg/m3 lass than PCD standard. But particulate mat

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Determination of Damped Harmonic Oscillation through Woltenhofen's Pendulum

Author(s): Anchalee Malaithong[1]

Co-author(s): Kheamrutai Thamaphat [1] ; Watchara Liewrian [1]

[1] *Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangmod, Thungkru, Bangkok 10140*

Corresponding Author(s): mos_physics35@hotmail.com, anchalee.iastro@gmail.com, watchara.liewrian@mail.kmutt.ac.th

Anchalee Malaithong, Watchara Liewrian*, and Kheamrutai Thamaphat
Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangmod, Thungkru, Bangkok 10140

*E-mail: watchara.liewrian@mail.kmutt.ac.th

Abstract
A simple demonstration set for investigating the damping effect of Waltenhofen's eddy current pendulum was developed in this work. The demonstration set composes of a metal plate moving through a magnetic field. The magnetic field was generated by applying a DC current to two solenoid coils. The influences of the magnetic field strength, the material type and the pendulum length of metal plate on the damping effect were studied. The results showed that the chaotic motion of the pendulum occurred at a low magnetic field and the damping action increased with increasing the magnetic field strength. The material type and the length of metal plate influenced on the decay behavior of the damped oscillation. The heavier weight and low resistance of metal plate have higher angular momentum and resulted on the slower pendulum decay. This demonstration set, which is an example of magnetic brake system, can be applied for the contribution on physics teaching as science, technology, engineering and mathematics (STEM) education in high school. It can improve students' knowledge on the magnetic induction and the damping oscillation.

Keywords : Woltenhofen Pendulum: Damped Harmonic Oscillation: Electromagnetic Induction

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Determination of Electrical Properties of Fish Eggs toward Electrical Sex Reversal

Author(s): [redacted][1]

Co-author(s): Sittichai Bunchuai [2]

[1] *Faculty of Technology and Environment, Science of Physics, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

[2] *Biotechnology of Electromechanics Research Unit, Science of Physics, Faculty of Technology and Environment, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

Corresponding Author(s): sakshin.bunthawin@gmail.com, sakshin.b@phuket.psu.ac.th

The present study proposes calculations of electrical parameters to be used for electrical sex reversal technique using Hen-egg model. In the case of tilapia's egg, its actual shape is an asymmetrical prolate spheroid with a short prolate spheroid bottom and a more elongate prolate spheroid at the top with a common equator rather than a symmetrical prolate spheroid. The two semi-minor axes (b, c) are set to equal one another. The ratio between the semi-major (a) and semi-minor axes is 1.3. To analyze the implicit value of electrical breakdown transmembrane potential for electropermeabilization, polarization of the egg was assumed to be the same over the whole egg volume. In the case of the egg

possessing a single dielectric shell, it was analyzed as the equivalent tri-phases of RC-circuit using three pairs of resistors and capacitors to represent the conductive and capacitive properties of the egg's shell, the inner part of the egg and the suspending medium, respectively. The complex specific impedances of each compartment of the egg were finally analyzed. The threshold transmembrane potential for electroporation of tilapia's egg is also evaluated. This approach allowed us to calculate the precise value of electrical properties of tilapia's eggs when they were being induced in transient electric field. The essential parameters calculated from the model were rates of occurrence new pores on membrane surface Nc, resealing pores Nd (Nc/Nd=1.0), time dependent function of pore density with respect to pore diameter size N(r,t), membrane surface area Am= 1-2 μm2, membrane capacitance Cm=1-15 nF.m-2, initial pore radius of the maximum R(max)(400 nm) and the minimum R(min) (250 nm), membrane surface energy = 1-10 mJ.m-2 and membrane including shell thickness of each layer (d), respectively. It should be noted that the latter parameter was evaluate through histological technique which was employed to examine a cross-sectional view of electroporated eggs. We found that the shell thickness of tilapia's egg of O.niloticus was d=5.60.1±μm (SD) (including 8 nm of the plasma membrane layer). To achieve electroporation, the threshold of the induced transmembrane potential TMP was also calculated using the surface tension of the shell of J.m-2 where permittivity of the shell was 10ε0. This yielded a critical TMP of 211 mV for the plasma membrane and 5.60 V for the whole shell, values which are in reasonable agreement with the experimental results.

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Determination of non-uniform graphene thickness on SiC (0001) by X-ray diffraction

Akkawat Ruammaitree[None]

Corresponding Author(s): u4605070@gmail.com

Graphene has excellent electronic properties however the electronic properties considerably depend on its thickness. In this report, thickness distribution analysis of epitaxial graphene films grown on Si-terminated SiC (0001) was demonstrated by using X-ray diffraction (XRD) pattern and a simple equation. Although this technique is simple, it provides fairly accurate information on layer spacing and thickness distribution of graphene layers. Accuracy of these results was confirmed by low accelerating voltage scanning electron microscopy and angle resolved photoemission spectroscopy.

Session XXI / **196**

Developing Learning Activities on Moment of Inertia for Grade 11 Students

Author(s): Watchareeporn Kaewsan[1]

Co-author(s): Udom Tipparach [1]

[1] *Department of Physics, Faculty of Science, Ubon Ratchathani University, Warin Chamrab, Ubon Ratchathani 34190 Thailand*

Corresponding Author(s): watchareeporn315@gmail.com, udom.t@ubu.ac.th

The sets of learning activities on moment of inertia and applications for grade 11 students were designed and created and then used for active learning activities. The activities include the experiment of the relations between linear and angular velocities, moment inertia and related quantities, inquiry activity on rolling of objects with different shapes and radii, and law of angular momentum conservation. The results show that the students understand the concept and students' attitude towards Physics is increased.

Keyword : Learning activity, Moment of inertia, Application

Session XXII / 230

Development of fluorescent-organically modified silica (ORMOSIL) nanoparticles as targeted probe for Leptospira

Author(s): Naphatsorn Kulsayumporn[1]

Co-author(s): Boonyaporn Suwattanapunkul [1] ; Jidapa Watthanaprakarnchai [2]

[1] *Student*

[2] *student*

Corresponding Author(s): ormosilproject@gmail.com, beam.god@gmail.com, jidapa_watt@hotmail.com

Leptospirosis is an infectious disease caused by pathogens of the genus Leptospira. This disease becomes a wide-spreading problem in tropical areas including Thailand. A method of detection which is used nowadays is microscopic agglutination test (MAT) but its detection limit is so high that it cannot be used to detect pathogens in low concentration samples. To develop a new method that has lower detection limit, organically modified silica (ORMOSIL) nanoparticles with encapsulated fluorescent dyes were used. In this research, fluoresecent-ORMOSIL nanoparticles were synthesized and tagged by antibodies that are specific for Leptospira. After synthesizing, these nanoparticles were characterized by transmission electron microscope (TEM) which showed that they are spherical shapes and their average size is 42.4 nm. Moreover, they were analyzed by fourier transform infrared spectroscopy (FTIR) which reported that there is carboxyl group on their surfaces. Finally, its detection limit is reported as 10 5 cells/ml by observing agglutination with pathogens under fluorescent microscope. According to this experiment, we can conclude that fluorescent-ORMOSIL nanoparticles are able to be used as a targeted probe for Leptospira. For future works, we expect to develop this method to have a multiplex function and to be used as targeted probe for other diseases.

Session V / 211

Development of mobile photometer for DNA quantitation using UV-LED.

Author(s): Kathawut Thamthinthai[1]

Co-author(s): Somsak Dangtip [1]

[1] *Mahidol University*

Corresponding Author(s): wallingyatanwut@hotmail.com, somsak.dan@mahidol.edu

Light as electromagnetic wave when travelling through a liquid solution, it could perturb and interact with molecules in that solution. DNA absorbs light specifically at 260 nm. The absorbance is related to DNA concentration through Beer-Lambert law of absorption. This relationship is a common basis of DNA quantification in spectrophotometers. A bulky deuterium lamp or halogen lamp is commonly used as 260-nm light source. Their use has limited the mobility of spectrophotometer. UV-LED is an alternative light source with light weight and more compact in size. In this work, we

have developed 260-nm LED and a photo-diode as a compact and mobile photometer. At present, the development is still in its early stage. Some experimental results of DNA quantification are reported in this conference.

Session IX / **11**

Dimensional Reduction of Eleven Dimensional Supergravity on SU(2) Group Manifold and N=4 Gauged Supergravity

Author(s): Patharadanai Nuchino[None]

Co-author(s): Parinya Karndumri [1]

[1] *Chulalongkon University*

Corresponding Author(s): danai.nuchino@hotmail.com, parinya.ka@hotmail.com

The Kaluza-Klein reduction giving rise to four-dimensional N=4, half-maximal SO(4) gauged supergravity of the D = 11 supergravity is mainly studied. Apart from some special cases, a spherical Kaluza-Klein reduction is in general not consistent. There exists, however, an alternative way to provide a consistent Kaluza-Klein reduction. The guaranteed-consistent reduction, known as the Scherk-Schwarz reduction, requires doing the dimensional reduction on a group manifold of some particular Lie group. From the fact that the SU(2) group manifold is topologically S3 embedded in the S7, the Kaluza-Klein reduction involving S3 can be obtained from a group manifold reduction via replacing the two S3 in the reduction ansatz by the two SU(2) group manifolds. The reduction ansatz is guaranteed to be consistent and give some understanding for the consistency of S7 reduction. By this reduction ansatz, solutions in four-dimensional N=4 SO(4) gauged supergravity theory can be embedded in 11-dimensional supergravity.

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ENHANCINGN STUDENTS' CONCEPT ON PROJECTILE MOTION BY CLASSROOM AND OUTDOOR ACTIVITIES

Author(s): fuangladda polthep[1]

Co-author(s): Udom Tipparach [1]

[1] *Department of Physics, Faculty of Science, Ubon Ratchathani University, Warin Chamrab, Ubon Ratchathani 34190 Thailand*

Corresponding Author(s): fuang282@hotmail.com, udomt@ubu.ac.th

We have designed and created learning activities in classroom and outdoor experiments in Physics on Projectile motion. The purpose of the experiments is to increase learning achievement. The activities are composed of classroom experiment to obtain the relation between vertical and horizontal motion on the dimensions of positions and times. The students were also provided video about projectile motion in action and predicted simulation. The outdoor activities consist of projectile motion in different situations such as throwing a ball at different angles and pitching an object vertically while moving horizontally. These activities can improve students' understanding the concept of projectile motion. The students' attitude towards learning physics is positive.

Keywords: Projectile, learning activity, outdoor and indoor, normalized gain

session I / **42**

Earth's auroral activity at polar region in responding to solar wind dynamic

Author(s): Paparin Jamlongkul[None]

Co-author(s): Suwicha Wannawichian [1]

[1] *Department of Physics and Materials Science, Chiang Mai University*

Corresponding Author(s): paparin.jamlongkul@gmail.com, suwichawan@gmail.com

The occurrence region of the Earth's aurora is mostly near the pole. The terrestrial aurora has a feature of emission band, which locates around geomagnetic latitude between 61 and 73 degrees. The appearance of the aurora is not in a stable form but changing with time. This study presents three periods of Earth's auroral activity on April 28th, 2007, which was observed by the Visible Imaging System (VIS) cameras on board POLAR spacecraft. The image size is 256×256 pixels, which was taken in 12 second of exposure time during the Global Geospace Science (GGS) program. The analysis of auroral activity shows that the brightening zone of the auroral oval changes with various time scales. To compare with the model of auroral activity over the entire polar region, there are two characteristic phases around 2~3 hours, an expansive phase and a recovery phase (Akasofu, 1964). In addition, the solar wind data, which are interplanetary magnetic field (IMF), Earth's magnetic field, solar wind plasma speed, and solar wind proton density will be used to determine the corresponding of auroral activity to solar wind dynamic in each phase. From this study, the various cases of terrestrial auroral activity will be presented.

Keywords: auroral activity, solar wind dynamics

session I / 32

Earth's gamma-ray emission in geographical coordinates with Fermi-LAT data

Author(s): Suttiwat Madlee[None]

Co-author(s): Warit Mitthumsiri [1]

[1] *advisor*

Corresponding Author(s): hot_busdy@hotmail.com, mwarit@hotmail.com

The Earth's gamma ray emission is produced from the interactions between cosmic rays (CRs), high-energy particles in space, and the Earth's upper atmosphere. These gamma rays are measured by the Large Area telescope (LAT), the instrument onboard the *Fermi* Gamma-ray Space Telescope (*Fermi*) which was launched in 2008 to orbit the Earth at the altitude of ~540 km. Here we present preliminary results of the Earth's gamma ray intensity, which for the first time has been analyzed in geographical coordinates, using the latest version of LAT data. This study will provide better understanding of the geomagnetic field, the Earth's upper atmosphere, and CRs.

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Effect of Drying Temperature on Quality of Cocoon

Author(s): Konlayut Deejing[1]

Co-author(s): Sathaporn Srilakhondee [1] ; Tanachai Ponken [1]

[1] *Program of Physics, Faculty of Science and tecnology, Rajabhat Maha Sarakham University*

Corresponding Author(s): sathapornsrilakhondee@gmail.com, konlatik@hotmail.com, ponken_t@hotmail.com

The purpose of the research was to study the effect of drying temperature on reelability percentage and mechanical properties (tensile strength and elongation) of raw silk. The experiments were carried out under the conditions of drying temperature range 60 – 100 ℃. The initial moisture content of cocoon was approximately 250-230 % dry basis (db). It was dried until down to a final moisture content of 10% db. After drying, dried silk cocoons were reeled with reeling machine. The results showed that the reelability percentage of all cocoon drying conditions were not significantly different ($p>0.05$). However, reelability percentage of dried cocoon was higher than the fresh cocoon. For mechanical properties, it found that dried cocoon at drying temperature of 60 and 80 ℃ resulted in a higher tensile strength of raw silk than that drying of 100 ℃ ($p<0.05$). While as, elongation of raw silk of dried cocoon at 100 ℃ was higher than that dried cocoon at 60 and 80 ℃.

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Effect of Economic in Factory installing Voltage Regulator

Author(s): Duangkamol Dungphontong[1]

Co-author(s): Panuwat Ruenruangrit [2] ; Wasan Pinate [3]

[1] *1**

[2] *2*

[3] *3*

Corresponding Author(s): d.dungphontong@gmail.com, kaapplied@hotmail.com, panuwat_u@yahoo.com

There are many factors contributing to a problem of voltage drop in electricity distribution system such as a proximity to large electricity demand during the peak hours, a long distance between the industries/end users and the electricity substations, load factors and etc. To solve the problem, the electric utility normally compensates this drop by increasing the input voltage level in the transmission line. To avoid these consequences, in this research, the tap – switching voltage regulator is introduced to a sample of manufacturers located in Mahasarakham industrial estate, its conventional input voltage level is approximately 229 volts which is higher than the nominal voltage level. After the regulator installation, the input voltage is lower to 220 volts. It leads to 4.36 % electricity saving per month. Since the electricity consumption is reduced around 21,144.51 kWh per month or 61,319.08 Baht/month. The investment will break even within only 1.32 years.

Keywords: Economic Return, Voltage Regulator

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Effect of Electromagnetic Fields on oil Palm Germination

Author(s): Chadapust Sudsiri[1]

Co-author(s): Nattawat Jumpa [1]

[1] *Prince of Songkla University*

Corresponding Author(s): nattawat.j@psu.ac.th, jutipornc@gmail.com

Oil palm has widely been grown in Southern Thailand. Nowadays, it has been become an important economic plant. The oil from different varieties are used for bio-energy and industrial uses and also for human consumption. However, production of young oil palm trees is still limited and the plants are expensive because it takes up to 8 months for germination to occur and the germination percentage is only about 60 %. The slow germination rate and the high failure rate leads to additional costs because it makes disease control much more difficult. Electromagnetic Fields (EMFs) are known to

increase overall percentage germination and shortens the incubation time of several plant species. We therefore present a physical method to stimulate oil palm germination by treating seeds with EMF. Oil palm seeds were exposed to EMF fields of 100mT to 250 mT and compared to controls. The treatments also were done for different period of times varying from 30 min to 5 hrs. The treated seeds were placed in germinators and sprayed with magnetically treated water. Germination percentages improved on seeds exposed to EMF and the time before germination decreased compared to the controls. The seeds which were exposed to EMFs at of 200 mT for 4 hrs started initial primary root at 8 days after magnetic treatment. There was 30% germination after 8 days incubation and 100% germination after 35 days. The results indicated that electromagnetic fields significantly shorten the time taken for oil palm seeds to germinate and greatly increases the proportion of seeds that do germinate. It reduces germination time of oil palm seeds from 8 months to 8 days and provides very high percentage of germination.

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Effect of Epoxy Molding Compound Floor Life to Reliability Performance for Integrated Circuit (IC) Package

udom peanpunga[None]

Corresponding Author(s): udoopo@gmail.com

This research studied about an epoxy molding compound (EMC) floor life to reliability performance of integrated circuit (IC) package. Molding is the process for protecting the die of IC package form mechanical and chemical reaction from external environment by shaping EMC. From normal manufacturing process, the EMC is stored in the frozen at 5 C and left at around room temperature for aging time or floor life before molding process. The EMC floor life effect to its properties and reliability performance of IC package. Therefore, this work interested in varied the floor life of EMC before molding process to analyze properties of EMC such as spiral flow length, gelation time, and viscosity. In experiment, the floor life of EMC were varied to check the effect of its property to reliability performance. The EMC floor life were varied from 0 hours to 60 hours with a step of 25 C and observed wire sweep, incomplete EMC, and delamination inside the packages for 5x5 mm2 of QFN packages. The evaluation showed about clearly effect of EMC floor life to IC packaging reliability.

Keywords: Integrated circuit (IC) packaging, epoxy molding compound (EMC), molding compound floor life, gelation time

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Effect of Fiber Length on Mechanical Properties of Root Vitiver Fiber Reinforced Epoxy resin Composites

Pongsathorn Kongkaew[1]

[1] *Program of Physics , Mahasarakham university*

Corresponding Author(s): ch_ko29@hotmail.com

The effects of Vetiver fiber length on the mechanical properties of Root Vetiver fiber/epoxy resin composite were investigated. Five different samples were produced by varying the length of the fiber 3, 5, 7, 9 and 13 mm at 12% wt. fiber loading using the hand lay-up moulding technique. The tensile strength, tensile modulus, percent elongation, flexural strength, flexural modulus, impact strength of the composite were analysed.
The results showed that the tensile strength, flexural strength and impact strength increased with increase fiber length. However, the tensile strength, tensile modulus and percent elongation had their highest values of 26.08 MPa, 729.9 MPa and 5.56 % respectively at 13 mm fiber length suggesting critical fiber length for effective and maximum stress transfer. The impact energy at failure had their

highest values of
20.154 KJ/m2 at 13 mm fiber length.

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Effect of Heat Treatment on Properties of Sputtered Co100-xCux Film

Author(s): Gun Chaloeipote[1]

Co-author(s): Watcharee Rattanasakulthong [1]

[1] *Department of Physics, Faculty of Science, Kasetsart University*

Corresponding Author(s): fsciwrr@ku.ac.th, gunchaloeipote@gmail.com

Granular Co100-xCux films with the different compositions of x = 19, 40, 54, 65 and 76 were prepared on glass substrate by RF-sputtering technique. After deposition, the films were annealed for 30 min at temperature of 400℃ in Argon atmosphere. XRD result confirmed that the as-deposited films showed Co (220) and Cu (111) phases and annealed films showed Co3O4 (3 1 1) and CuCoO (3 1 1) phases. AFM results revealed the dependence of surface morphology on the film composition and heat treatment because of the difference of the deposition and segregation rate of Co and Cu atoms. The magnetic properties from VSM showed that Co81Cu19 film annealed at 400℃ exhibited a perpendicular magnetic anisotropy. The saturation magnetization does not only depend on magnetic composition but also rely on annealed temperature. It can be concluded that the desirable surface morphology and magnetic properties of sputtered Co-Cu film can be controlled by an appropriate heat treatment and composition.

Keywords: Co-Cu film, Sputter deposition, Heat treatment, Magnetic properties

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Effect of Inner Chamfer Angle Capillary Profile for Wire Bonding Process to Circuit Under Pad of Integrated Circuit (IC) package

Araya Taengthet[None]

Corresponding Author(s): dinamokievvv@gmail.com

In this work, an inner chamfer angle of capillary was studied for wire bonding process to circuit under pad of Integrated circuit (IC) package. Wire bonding process is so important for electrical connection of IC packaging. The capillary is an important equipment that used for connection a die with a package and profile of capillary also effect to reliability of a package. In experiment, 3x3 mm2 of TQFN packages were studied for Au wire bonding. The inner chamfer angle of capillary were varied for 60, 90, and 120 degree to find appropriate angle for IC packaging reliability. For analysis, the packages were analyzed by wire pull, ball shear, and intermetallic compound (IMC) for circuit under pad packages. Moreover, the packages also observed with scanning electron microscope (SEM), and reliability testing. The results revealed that the inner chamfer angle of capillary effect to reliability of circuit under pad packages

Keywords: Integrated circuit (IC) packaging, Wire bonding process, Capillary, Inner chamfer angle (ICA), Circuit under pad (CUP)

Session V / 145

Effect of Liquid Viscosity on Particle Equilibrium Position in Straight Microchannel

Author(s): Kullawat Inthaud[1]

Co-author(s): Nirut Pussadee [1]

[1] *Department of Physics and Materials Science, Faculty of Sciences Chiang Mai University, 239 Huay Kaew Road, Muang District, Chiang Mai, Thailand, 50200*

Corresponding Author(s): kullawat.inthaud@gmail.com, nirut.j@cmu.ac.th

The flow of suspended particle in various fluid viscosities was investigated in this study. The particles in viscous fluid flow are affected by transverse inertial force and shear lift force, so their equilibrium position will be located where these forces balance. The straight 200x100 μm2 cross section, 5 cm long microfluidic device used in this study was fabricated using printed circuit board technique. The 10 micron polystyrene microspheres suspended in propylene glycol with various viscosities solution were used in determining effect of liquid viscosity on particles equilibrium position. The computational fluid dynamic simulation was carried out to calculate particle equilibrium position and compare with experimental result. Since small volume fluid is needed in microfluidic experiment, the device can used to determine viscosity of small amount unknown liquid.

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Effect of Liquid Viscosity on Particle Equilibrium Position in straight microfluidic channel

Kullawat Inthaud[1] ; Nirut Pussadee[2]

[1] *Chiang Mai University*

[2] *Chiang Mai university*

Corresponding Author(s): nirut.p@cmu.ac.th, kullawat.inthaud@gmail.com

The fluid mechanics of single-phase flow with relatively viscosity in straight microfluidic channel was investigated experimentally. The adopted technique is based on particle migration phenomenon occurring when fluid with 10 micron diameter particles flow in straight 200 micron width 100 micron height microfluidic channel. The method is applied to find equilibrium position of the particles in propylene glycol solution at various ranges of viscosity. The objective is to find relationship of particle equilibrium position with viscosity. The result is compared with computational simulation for particle equilibrium position. The particles in viscosity fluid flow are affected by initial force and velocity gradient. The particles equilibrium position locate where those force balance.

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Effect of N2 Flow Rate on MoO3 Microbelts Synthesized by Thermal process and Their CO2 gas Sensitivity Properties

Author(s): Pitchanunt Chaiyo[1]

Co-author(s): Amorn Thedskulwong [2] ; Orathai Thumthun [2] ; Supakorn Pukird [3] ; Supon Sumran [2]

[1] *student*

[2] -

[3] *corresponding author*

Corresponding Author(s): beerchaiyo@gmail.com, supon_sumran@yahoo.com, amn_scii@hotmail.com, orathai_thumthan@yahoo.com, psupakor27@yahoo.com

MoO3 microbelts were successfully prepared by thermal process using MoS2 as a precursor. During synthesis process, nitrogen gas (N2) was purged into the furnace at three different flow rates; 6 sccm, 8 sccm, and 10 sccm, respectively. MoO3 microbelts with width in range of 8-50 and thickness approx. 2-5 then were prepared as a CO2 gas sensor, and the sensitivity was investigated by measuring the ratio of resistance of gas sensor in air to resistance of gas sensor in CO2 atmosphere for 60 s. The results show the sensitivities of gas sensors increase with time linearly and the sensitivity of CO2 gas sensor prepared from 10 sccm of N2 flow rate is the highest at 1.99, whereas the sensitivities of the other CO2 gas sensors prepared from 6 sccm and 8 sccm of N2 flow rates are lower and relatively identical at 1.39 and 1.40, respectively. In addition, the electrical properties of MoO3 microbelts studied by I-V characteristic curves reveal ohmic behavior.
Keywords: MoO3 microbelts, Thermal process, Gas sensor, I-V curve

Session XXII / **54**

Effect of boron addition on the structure and magnetic properties of CoPt nanoparticles

Supree Pinitsoontorn[1]

[1] *Khon Kaen University*

Corresponding Author(s): dewfanclub@hotmail.com

We reported the effect of boron addition on magnetic properties and structure of CoPt nanoparticles. The CoPt-B nanoparticles were synthesized by means of the polyol process. The magnetic property measurement showed that the CoPt-B sample exhibited a much larger coercivity compared to the sample without B additive at the same annealing temperature. Transmission electron microscopy and energy dispersive X-ray spectroscopy revealed that the average particle size was about 2 nm for the as-synthesized sample with the ratio of Co and Pt was close to 1:1. After annealing, the particle sizes increased but the composition was maintained. The phase transformation of the nanoparticles versus temperature was investigated using a combination of X-ray diffraction and in-situ X-ray absorption analysis. It was shown that the phase transition temperature at which the nanoparticles change from the disordered A1 phase to the ordered L10 phase occurs at temperature of 600 ⁰C. We concluded that boron additives could reduce the ordering temperature of CoPt of about 100 ⁰C.
The addition of B at up to 60% promoted the formation of the L10 phase when the nanoparticles were subjected to annealing at 600 ⁰C. If the B content is higher than 60%, the phase transition is suppressed. The evidence of B addition on the structure of CoPt nanoparticles was further supported by the magnetic measurements. The results show that the coercivity of the annealed CoPt-B nanoparticles was enhanced by the B additions from 20 to 60%, with the maximum coercivity of 12,000 Oe for the CoPt-40%B sample.

Session X / **234**

Effect of low pressure plasma on brown rice

Wasit Arworn[None]

Corresponding Author(s): wasit_arworn@hotmail.com

Low pressure plasma is one of the most widely used mechanisms for processing materials especially to modify their surface properties. The application of low pressure plasma in agricultural sector has also been realized. In this research, low pressure plasma was generated at radio-frequency and about 2.0 mbar in a vertical plasma reactor. The reactor is to facilitate plasma treatment of very

short plasma residence time (0.1 s). This low pressure plasma has then been applied to treat a whole grain of pigmented or brown rice. We have also studied this effect on white rice as a comparison. It has been found that low pressure plasma have significantly reduced an optimal cooking time, lowered moisture content and promoted water absorption. The rheological property, using rapid-visco analysis, has indicated further significant changes in peak viscosity, setback and enthalpy ΔH after plasma treatment. SEM images show the plasma treatment has caused the rice grain surface to be more porosity.

Session XV / 123

Effectiveness of Including Problem-Solving Strategy in Circular Motion in an Introductory Physics Lecture

Author(s): Arunee Eambaipreuk[1]

Co-author(s): Kwan Arayathanitkul [1] ; Narumon Emarat [1]

[1] *Department of Physics, Faculty of Science, Mahidol University, Bangkok, 10400, Thailand*

Corresponding Author(s): kwan.ara@mahidol.ac.th, eam.arunee@gmail.com, narumon.ema@mahidol.ac.th

In this study an alternative method based on interactive instructions was included in Introductory Physics lectures to facilitate student learning in the topic of circular motion. In a preliminary study, we found that the concept of circular motion was challenging for many students although they had already learnt this topic in high school. They could not achieve the final step of problem-solving strategy which could possibly lead them to the correct answers. This motivated us to create a specialized problem-solving strategy for enhancing students' problem-solving abilities. The specialized strategy was developed and provided in the lecture worksheet to guide students when they thought about solving circular motion problems. The worksheet included not only the specialized strategy but also problems for students to practice in class. This helped engage students to work on problems with their peers which is the main aim of interactive instruction. The effectiveness of the specialized strategy was evaluated by comparing the results of an examination between two participant groups; one learning with non-specialized strategy and the other one with the specialized strategy. We found that number of students in the latter group who could solve the problem until achieving the correct answer is greater than the other one. More interestingly, we also noted that the lower performance group was given the guided questions in the exam problem but the higher performance group was given the open-ended question. This asserts that the specialized strategy could help improve student abilities in solving circular motion problems.

Keywords: Circular motion, Problem-solving strategy, Lecture worksheet

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Effects of Hydrodynamic Interaction on Diffusion and Convection of Spherical Particles through a Row of Parallel Cylinders

Author(s): Natthawat Damrongrak[1]

Co-author(s): Panadda Dechadilok [1]

[1] *Department of Physics, Faculty of Science, Chulalongkorn University*

Corresponding Author(s): poeymoneykeeper@gmail.com, panadda.d@chula.ac.th

For a spherical particle that is at least several times larger than the solvent molecules and is moving in a bulk fluid, its diffusivity is simply the ratio between thermal energy and its drag coefficient

according to the Stokes-Einstein equation. This work focuses on transport of spherical particles through a row of parallel cylinders. Because the drag coefficient of the particle becomes anisotropic, the particle diffusivity, instead of being a scalar, is a second order tensor which can be calculated from the mobility tensor of the particle. In addition, in the presence of a pressure gradient, the convective hindrance factor of the particle, the change in its convective rate due to a particle-cylinder hydrodynamic interaction, is also a second order tensor. In this work, the anisotropic drag coefficient are calculated using finite element method, assuming Low Reynolds number. The obtained diffusivity and convective hindrance factor tensor are then substituted in the steady-state convection diffusion equation which is solved in order to determine the particle concentration and the particle sieving coefficient. The effect of coupling between particle translation and rotation as well as that of the off-diagonal terms of the mobility tensor are also investigated.

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Effects of Nitrogen Carrier Gas on MOVPE Growth of GaAsN Films

Author(s): Teerapat Lapsirivatkul[1]

Co-author(s): Kentaro Onabe [2] ; Sakuntam Sanorpim [1]

[1] *Chulalongkorn University*

[2] *University of Tokyo*

Corresponding Author(s): onabe@k.u-tokyo.ac.jp, teerapatlapsirivatkul@hotmail.com, sakuntam@gmail.com

Metal organic vapor phase epitaxy (MOVPE) is commonly used to produce a single crystalline GaAsN thin films by using hydrogen gas as carrier gas, leading precursors to reaction chamber. By the way, hydrogen gas has a possibility to flammable, thus it is need to special treatment to avoid this problem. On the other hand, the nitrogen gas (N_2) is chosen one instead of hydrogen gas because nitrogen gas is safer from flaming and it has lowering thermal conductivity. Structural and vibrational properties of GaAsN ($0 < N < 5\%$) films grown using nitrogen gas as a carrier gas were characterized by atomic force microscopy (AFM), scanning electron microscopy (SEM) and Raman spectroscopy. Effects of nitrogen carrier gas on morphologies and nitrogen incorporation of GaAsN films, which have varied two conditions, 100% of hydrogen carrier gas and 50% of hydrogen carrier gas to nitrogen gas. The results show that using nitrogen gas is cause of shifted growth temperature by lowering thermal conductivity. As using hydrogen gas, nitrogen gas needs higher temperature. As a result, we can expand the growth window and establish further incorporation of N in the GaAsN samples.

Session XVI / **224**

Effects of Sintering Temperature on Physical Properties of Chitosan/Hydroxyapatite Composite

Author(s): Chalongwut Boonpratum[1]

Co-author(s): Kittisakchai Naemchanthara [2] ; Pichet Limsuwan [2]

[1] *Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok, Thailand*

[2] *King Mongkut's University of Technology Thonburi (KMUTT)126 Pracha Uthit Rd., Bang Mod, Thung Khru, Bangkok 10140, Thailand*

Corresponding Author(s): puri_kit@hotmail.com, i_am_krit@hotmail.co.th, opticslaser@yahoo.com

The chitosan/hydroxyapatite composite were prepared from hydroxyapatite synthesized from chicken eggshell and chitosan of shrimp. The composite was added chitosan with different concentration from 1 to 15 g and sintered at various temperature from 200 to 1200c with an increment 100c. The

crystal structure, function group, morphology and thermal behavior of composite was investigated by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM) and thermogravimetric analyses (TGA), respectively. The results showed that the crystalline of composite was increased with increasing temperature. The porous of composite was appeared after sintered at 300c due to decomposed of chitosan. The number and size of pore was depended on amount of chitosan. The results of this research indicated that the sintering temperature could be produced porous on chitosan/hydroxyapatite composite.

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Effects of atmospheric Dielectric Barriers Discharge plasma treatment on germinated rice

Nopporn Poolyarat[None]

Corresponding Author(s): nop096@gmail.com

In this work, an effect of atmospheric Dielectric Barriers Discharge (DBD) plasma treatment on germinated rice is presented. A DBD plasma is generated by using a simple apparatus consists of stereo amplifier and car ignition coil. Then, the DBD plasma is used for treating germinated rice with various conditions and results on physical effect, such as root's length, and chemical effect, such as GABA content, are observed. The results show a promising improvement on germinated rice.

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Effects of ground humidity on spatial sensitivity of bare neutron counter

Author(s): Ittipat Promnorakid[1]

Co-author(s): Alejandro Saiz Rivera [2] ; David Ruffolo [2] ; Pierre-Simon MANGEARD [2] ; Thepprasith Svetatula [1] ; Warit Mitthumsiri [2]

[1] *Chulalongkorn University*

[2] *Mahidol University*

Corresponding Author(s): thep.sci.pccp@hotmail.com, asaizrivera@gmail.com, ruffolo.physics@gmail.com, mwarit@hotmail.com, h4u7n1t7e5r@gmail.com, psmangeard@gmail.com

A BF3 gas-filled proportional detector, or neutron counter, can be used for detecting atmospheric neutrons, which are created from (primary) cosmic rays colliding with air molecules. These (secondary) atmospheric neutrons can produce tertiary neutrons by interacting with other objects, such as buildings and ground. The number of produced tertiary neutron depends on the type of materials and the energy of the atmospheric neutrons. Neutron counters are usually operated inside a lead producer and a polyethylene reflector, in the standard neutron monitor configuration; when used with no producer and no reflector, they can be called bare neutron counters. The sensitivity of a bare neutron counter as a function of distance from the detector has never been studied in detail. Therefore, we use Monte Carlo simulations to calculate the neutron counter sensitivity inside the Princess Sirindhorn Neutron Monitor (PSNM) station at Doi Inthanon, Thailand (18.59°N, 98.49°E, 2,560m altitude) at different atmospheric neutron energies (1keV - 1GeV). We are interested in two conditions: dry and wet (5% humidity) ground. Here we present the result of our study as compared with previous simpler simulations.

Session XXVI / 208

Effects of van der Waals Interaction on Structural and Electronic Properties of Methylammonium Lead Iodide Perovskites

Author(s): Vichawan Sakulsupich[1]

Co-author(s): Rakchat Klinkla [1] ; Thiti Bovornratanaraks [1]

[1] *Department of Physics, Chulalongkorn University Bangkok, 10330, THAILAND*

Corresponding Author(s): thiti.b@gmail.com, rugphy@gmail.com, vichawan.s@gmail.com

Methylammonium lead iodide ($MAPbI_3$) belongs to perovskite material class with chemical formula ABX_3, with A and B representing cations and X as anions. Ideal perovskite has cubic crystal structure with corner-sharing BX_6 octahedral network and A at the center of the octahedral cage. This hybrid organic-inorganic perovskite has recently gained intensive research interests due to their high efficiency as photovoltaic materials.
Our study employs density functional theory (DFT) to study the structural and electronic properties of cubic $MAPbI_3$. It has been shown in earlier studies that van der Waals interaction is crucial to DFT calculation accuracy regarding structural property determination. We investigate the importance of this non-local interaction and determine which van der Waals functional is suitable for DFT study $MAPbI_3$ systems.

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Effects of zinc oxide nanoparticles on thermal stability of polystyrene thin films

Nampueng pangpaiboon[None]

Corresponding Author(s): ma2pa@hotmail.com

In these day, polymer thin films is the base of various electronic device. The films need to be stable on solid substrates while processing application to preserve their properties. However, increasing temperature by operation of an electronic device causes polymer thin films lost their stability. In early 21st century, some researcher has discovered that a thermal stability of polymer thin film are enhanced by adding small amount of nano-fillers. This phenomena is different from classical knowledge which the existence of impurity in polymer thin film usually induces dewetting behavior. This research investigates the effects of addition of zinc oxide nanoparticles on thermal stability of polystyrene thin film. The films studied in this work are varied from 10 to 50 nm. The concentrations of zinc oxide nanoparticles are less than 1 wt.%. After annealing the polystyrene thin films for various time, the morphologies are studied by using optical microscope. Dewetting area are observed and calculated to compare the percentages of each samples.

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Electrical Property of Titanium Doped Gallium Phosphide Thin Film Deposited by Asymmetric Bipolar Pulsed-DC Magnetron Sputtering for Intermediate Band Solar Cell (IBSC)

Author(s): Tanachai Ponken[1]

Co-author(s): Thanusit Burinprakhon [1]

[1] *Department of Physics, Faculty of Science, Khon Kean University, 40002, Thailand*

Corresponding Author(s): tanachaiponken@gmail.com, thanusit@kku.ac.th

Ti-Ga-P thin films were prepared by an asymmetric bipolar pulsed-dc magnetron sputtering technique using GaP:Ti targets onto glass substrate at 300℃ in an argon atmosphere. The sputtering targets contained GaP powder compacted between metallic titanium (Ti) sheets, at the surface area ratio GaP:Ti of 1:1, 2:1, and 5:1. The crystal structure, electrical sheet resistance, and surface morphology of the as-deposited films were analyzed by X-ray diffraction (XRD), the linear 4 point probe technique, and atomic force microscopy (AFM), respectively. The XRD patterns showed that the as-deposited films are polycrystalline of cubic zinc blend structure. The sheet resistance at room temperature were 0.97E+1 and 6.02E+1 Ω/cm2 for the films obtained from the GaP:Ti_1:1 and GaP:Ti_2:1 targets, at the deposition time of 60 minutes. The film obtained from the GaP:Ti_2:1 target exhibited the sheet resistance which exponentially increases with decreasing temperature in the range of 180K – 50 K, indicating semiconducting behavior. On the other hand, the film obtained from the GaP:Ti_1:1 target showed the sheet resistance which is independent on the decreasing temperature, suggesting a rather metallic behavior. AFM images indicated the formation of metallic Ti clusters within crystalline grains of the films. The cluster density appears higher in the films obtained from the GaP:Ti_1:1 target than those obtained from the GaP:Ti_2:1 target. The results of this study suggest that it is possible to dope Ti into GaP host semiconductor by co-sputtering of GaP and Ti. However, above a certain concentration of Ti, the formation of metallic titanium inclusions within crystalline grains is promoted, leading to metallic like electrical behavior.

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Electrodeposition of micro-nanostructured nickel film on flexible substrate

Author(s): Jedsada Manyam[1]

Co-author(s): Prayoon Songsiriritthigul [2] ; Rungroj Maolanon [1] ; Thanawat Rimpongpisal [3]

[1] *National Science and Technology Development Agency*

[2] *3School of Physics, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand*

[3] *Department of Materials Engineering, Faculty of Engineering, Kasetsart University, Bangkok 10900, Thailand*

Corresponding Author(s): prayoon.song@gmail.com, rungroj@nanotec.or.th, jedsada.nanotec@gmail.com, first2537@hotmail.com

High surface area nickel such as porous nickel has been found advantage for being utilized in a high capacity electrical energy storage device, gas sensor and catalyst. However, typical fabrication technique is template-assisted in which template material is consumable contributing to production cost, especially in the case of nanoscale featured nickel. Here, we proposed a template-free fabrication technique for micro-nanostructured nickel film on a flexible substrate utilizing the modified Watts nickel plating process. Thin nickel film was electroplated on an aluminum foil substrate precedingly coated with a layer of zinc microcrystal. Morphology, composition and structure of the as-fabricated film were studied. Porosity of the film was indirectly examined using reflectance spectroscopy and contact angle measurement. Multiscale structured nickel film was achieved in which nickel particles with a few hundred-nanometer diameter were featured on the microstructured underlayer. The electroplated nickel film was crystalline and highly orientated in [111] direction. Enhancement of light trapping and an increase in hydrophobicity after stearic acid treatment were observed, attributed to the presence of microcavities at the film surface. The presented fabrication technique for high surface area nickel film is ease to scale up and could be useful for mass-production of a nickel-based functional device. Benchmark with other fabrication techniques will be discussed.

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Electronic Properties and Phase Transitions of GaN under Pressure

Author(s): Akkarach Sukserm[None]

Co-author(s): Prayoonsak Physicist ; Udomsilp Pinsook

Corresponding Author(s): akkarach.sukserm@gmail.com, pinsook@gmail.com, pprayoonsak@hotmail.com

The ab-initio density-functional theory (DFT) within both the Local Density Approximation (LDA) and the Generalized Gradient Approximation (GGA) is performed to study the electronic properties and the structural phase transitions of Gallium nitride (GaN) with wurtzite (WZ), zinc-blende (ZB), rocksalt (RS) and cmcm structures under pressure in the range of 0 to 100 GPa. The calculations show that the lattice parameters, the band structures and the partial density of states (PDOS) of these phases are in good agreement with the other experimental and theoretical data. In addition, we found that both the ZB and WZ structures are stable phases at ambient pressure. The structural phase transitions of GaN under high pressure are in the sequence WZ, ZB -> RS phases. The cmcm phase has not been reported before. This could be a new phase for GaN.

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Electrospun of Epoxidized Natural Rubber (ENR) with Poly vinyl alcohol (PVA) ENR-PVA composite membrane for PEMFC applications

Author(s): Pornchai Chinnasa[1]

Co-author(s): Ekaphan Swatsitang [2] ; Piyaporn Sarasee [3] ; Wichaid PonHan [1] ; Yuwadee Phoemphun [3]

[1] *Program of Physics Rajabhat Mahasarakham University*

[2] *Department in Physics Khon Kaen University*

[3] *Rajabhat Mahasarakham University*

Corresponding Author(s): wichaid@rmu.ac.th, chinnasa@hotmail.com, yulovenon@gmail.com, ekaphan@kku.ac.th, nop_mtc@hotmail.com

The aim of this study is to electro spun epoxized natural rubber / poly (vinyl alcohol) (ENR/PVA) blend with composites membranes which were prepared by electrospinning technique for PEMFC Applications. Various concentrations of epoxidized natural rubber (ENR) solution in N,N-dimethylformamide (DMF) and tetrahydrofuran (THF) were directly added to PVA solution for plasticization of the electro spun nanofibrous. Then study the properties of the membrane, Chemical properties, Morphology, Dynamic-Mechanical Thermal Analysis (DMTA), Electrical properties, Water uptake, Ion exchange capacity (IEC) and proton conductivity of various membranes were determined. From the scanning electron microscopy (SEM) were used to characterize the pristine and plasticized nanofibrous. DMTA results indicated that the addition of PVA resulted in the shifting of glass transition temperature (Tg) towards lower temperatures. Water uptake Electrical properties Ion exchange capacity (IEC) and proton conductivity lower When the approximately of PVA increase.

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Elimination of Pinned Spiral Waves by On-Off Formed Electric Field in Excitable Media

Author(s): Preeyabol Suwannakrua[1]

Co-author(s): Chaiya Luengviriya [1] ; Jarin Kanchanawarin [1] ; Malee Sutthiopad [1] ; Nakorn Kumchaiseemak [1]

[1] *Department of Physics, Kasetsart University, 50 Phaholyothin Road, Jatujak, Bangkok 10900, Thailand*

Corresponding Author(s): fscicyl@ku.ac.th, fscimls@ku.ac.th, g5714401174@ku.ac.th, fscijro@ku.ac.th, elevia_ice@hotmail.com

We present numerical simulations on a release of spiral waves pinned to an unexcitable circular obstacle in a two-dimensional excitable medium using the Oregonator model. For a given obstacle,

a constant electric field with amplitude stronger than a critical value Eunpin causes a pinned spiral wave to drift away from the obstacle. Our results show that the energy applied to unpin the spiral wave can be reduced by using a time varying electric field. For an on-off formed electric field with Eunpin and an appropriate on-off period, the applied energy is decreased to 35% of constant electric field.

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Enhancement of Electrical Sex Reversal Combined with Immersion Technique

Author(s): Sakshin Bunthawin[1]

Co-author(s): Sittichai Bunchuai [1]

[1] *Biotechnology of Electromechanics Research Unit, Science of Physics, Faculty of Technology and Environment, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

Corresponding Author(s): sakshin.bunthawin@gmail.com, sorawuth.b@psu.ac.th

The present study proposes an alternative technique of sex reversal for Nile tilapia (Oreochromis niloticus L.) to enhance all-male yield using transient pulse-electric fields combined with immersion technique. Tilapia's eggs obtained from our parent breeding stocks were selected as the egg-stage development during segmentation-pharyngula (2-3dpf) (day post fertilization) for electrical inductions with the optimized electric field strengths of 87.50 kVm-1generated between narrow plate electrodes. Before induction, eggs were carefully washed and re-suspended in the special electroporation medium (EPM) (to be patent) prepared using HEPES buffer with various micro-concentrations of the androgen hormone of 17alpha-methyltestosterone (MT) of 500-1,000-1,500-10,000 µg.l-1 MT. All experiments had been performed at room temperature. It was found that tilapia's eggs suspended in EPM with the ratio of 100 eggs/500 ml EPM had the critical tolerance limit at 10,000 µg.l-1 MT for the maximum duration of 24 hrs with hatching rates of 91.00%±2.65%, 79.33%±6.11%, 90.33%±2.08% and 81.67%±12.42% (P>0.05), respectively. Increasing MT concentrations shifted survival rates of tilapia to the lower values as 83.33%±3.06%, 73.00%±7.00%, 79.33%±3.51% and 57.00%±1.41% (P<0.01), respectively. The optimized electrical parameters used for the present study were constrained at the induced voltage of 375 VDC, 5 square wave pulses, 50 µs pulse durations with 1:1 mark-space ratio. We achieved to enhance all-male sex reversal rates of tilapia eggs combined with the immersion technique at 89.23%%±1.16%. By comparison to experiments of 1,500 µg.l-1 MT without immersion, all-male sex reversal rate had a lower value as 81.25% with hatching of 87.70%±15.13% (mean ± SD) and survival rate of 73.04%%±6.15% (mean ± SD).

Session XXVIII / 204

Enhancing reduced-graphene oxide capacitor by photoexcitation experiment

Author(s): Alisa Saengsonachai[None]

Co-author(s): Mongkol Sapankaew [1] ; Phiphut Chaiyadech ; Yodchay Jompol [1]

[1] *Mahidol University*

Corresponding Author(s): alisa.saengsonachai@gmail.com, phiphut.ch@gmail.com, yodchay.jom@mahidol.ac.th, m.sapankaew@gmail.com

The development of a high power and high energy density supercapacitor would enable a technology for future space missions due to the need of ultra-lightweight devices, relatively high energy, and high power density with multiple charging cycles. This gives rise to the nanostructured supercapacitors that could provide an operational regime that enhances current technology for making such

sorts of devices. In this work, we have fabricated thin-film reduced graphene oxide (rGO) electrodes for ultra-lightweight supercapacitor by drop-casting technique on polyethylene terephthalate (PET) substrate. With an application of white light illuminated under a certain power on such the rGO thin-film electrodes, their sheet resistance was decreased gradually, which indicate the increasing of free charged carriers in the rGO film. After sandwiching two identical rGO film electrodes of about 4 cm2 with an electrolyte gel, a capacitor is formed with silver epoxy contacts. The capacitance of such a device was estimated using an RC (resistor-capacitor) circuit with a variety of different bias resistors. We found its capacitance of our rGO capacitors in order of micro Farads with light illumination, which is comparable with the commercial ones. This research should give an understanding of capacitance enhancement by photo-excited charge carriers in such a nanostructured device.

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Entanglement in discrete-time two coupled harmonic oscillators

Author(s): Watcharanon Kantayasakun[1]

Co-author(s): Sikarin Yoo-Kong [2] ; Watchara Liewrian [3]

[1] *Department of physics,Faculty of science,King Mongkut's University of Technology Thonburi*

[2] *Ratchaburi campus,King Mongkut's University of Technology Thonburi*

[3] *Department of Physics,Faculty of science,King Mongkut's University of Technology Thonburi*

Corresponding Author(s): watchara.lie@kmutt.ac.th, moontown_lop@hotmail.com, syookong@gmail.com

We study entanglement for a coupled harmonic oscillator system both discrete-time level and continuous-time level through the linear entropy (LE). We find that the nature of entanglement is drastically different between these two levels of the time structure. In the continuous-time case, we find that LE increases with the increasing of coupling constant and the system slowly gets into a maximally entangled state at extremely large value of coupling constant. In contrast, in the discrete-time case, we find that LE decreases with the increasing of a coupling constant and is zero at a critical value of the coupling constant. After that LE will increase again with the increasing of the coupling constant and the system suddenly gets into a maximally entangled state at a particular value of the coupling constant called a cut-off value. We also find that the nature of entanglement at discrete-time level and continuous-time level eventually becomes identical under the continuum time limit. This result of study shows that the system at discrete-time level exhibits much more intriguing phenomena than the one at continuous-time level.

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Estimation of Turbidity Coefficient in the Atmosphere of Thailand

Sayan Phokate[1]

[1] *Applied Physics, Faculty of Engineering, Khon Kaen Campus, Rajamangala University of Technology Isan, Khon Kaen, Thailand*

Corresponding Author(s): syphokate@hotmail.com

This aim to calculate Ångström turbidity coefficient in the atmosphere of Thailand. Its value is derived from solar radiation data for three years between 2011-2013, which relate to visibility data. The result shows that Ångström turbidity coefficient is inversely proportional with the visibility data. Moreover, the value variation is depended on time period of the year. High value was present from November to March whereas it trend to decrease during April to October. The average value varied between 0.171 ⊠ 0.0016 and 0.253 ⊠ 0.0013, the average annual is equal to 0.211 ⊠ 0.0024.

session II / **227**

Evaluation of radiation dose from powder and bulk hydroxyapatite for routine dosimeter

Author(s): Kanokwan Boonsook[1]

Co-author(s): Kittisakchai Naemchanthara [2] ; Pichet Limsuwan [2] ; Sumalee Ninlapruk [3]

[1] *King Mongkut's University of Technology Thonburi (KMUTT)*

[2] *King Mongkut's University of Technology Thonburi*

[3] *Office of atom for peace*

Corresponding Author(s): spong_eci@hotmail.com

The aim of this study is to analyze the interaction of gamma radiation with powder and bulk hydroxyapatite synthesized from quail eggshell at various doses for development hydroxyapatite as a routine dosimeter. The powder and bulk of hydroxyapatite were irradiated with gamma from 0.1 kGy to 10 kGy. Electron spin resonance (ESR) spectroscopy was used to determine and evaluate dose response from characteristic signal. The center peak group of both ESR signals was occurred g-value at 2.0029, 2.0022, 2.0018 and 1.9986 that indicated the radiation induced inorganic free radicals of 4 molecule ions as CO-, CO2-, CO33- and CO2-, respectively. The correlation between the intensity of ESR signal with the dose response of bulk hydroxyapatite was good polynomial function in range 0.2 kGy to 2 kGy. Furthermore, the free radicals stability of hydroxyapatite during 45 - 90 days after irradiated showed a small decay about 25%. These results have shown that the bulk hydroxyapatite from quail eggshell could be used a good and easily routine dosimeter for high dose.

Session XIII / **92**

Evolution of large-scale outflow over the past 9 billion years of the Universe

Author(s): Suraphong Yuma[1]

Co-author(s): Alyssa B. Drake [2] ; Chris Simpson [3] ; Masami Ouchi [4]

[1] *Mahidol University*

[2] *CRAL, Observatoire de Lyon*

[3] *Liverpool John Moores University*

[4] *The University of Tokyo*

Corresponding Author(s): c.j.simpson@ljmu.ac.uk, surayuma@gmail.com, ouchms@icrr.u-tokyo.ac.jp, alyssa-bryony.drake@univ-lyon1.fr

In the present-day universe, galaxies can be divided into two main categories: young blue disk galaxies that are actively forming new stars, and old red elliptical galaxies that are passively evolving and forming no new stars any further. It is known that some of star-forming disk galaxies should evolve into passively-evolving ellipticals in the past. However, due to its relatively short timescale, the galaxy in the middle of this transforming phase had not been observed yet. In this talk, I will introduce a systematic approach to identify high-redshift galaxies with large-scale outflow. With Subaru telescope, we have discovered 12 galaxies at $z \sim 1.2$ (8.4 Gyr ago) showing a largely extended (> 30 kpc) [OII]λ3727 nebula, which we call [OII] blobs (OIIBs). Some of these galaxies are probably experiencing the final phase of star formation with their gas heated and expelled out by active galactic nuclei or supernova feedback, and quenching star formation whose process is a key to produce passively-evolving ellipticals. As a systematic search, we could derive the number density of these blobs and found that only 3% of star-forming galaxies at z~1 are facing the star-formation quenching process involving spatially extended [OII] emission. We are currently extending our search to cover 9 billion years of the universe ($z = 0.1 - 1.5$) and find that the number densities of blobs tend to decline toward low redshifts consistent with the cosmic star formation history. In contrast, the

fraction of galaxies experiencing large-scale outflow remains constant over time, suggesting that the phase of large-scale outflow is probably short in an order of hundred million years. Detailed study of large-scale outflow in these blobs are performed by ongoing spectroscopic observations with world largest telescopes such as Subaru and Keck. Their physical properties will also be discussed in this talk.

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Evolution studies on structural and optical properties of CH3NH3PbI3 films prepared by a sequentially sprayed chemical deposition technique

Author(s): Thidarat Supasai[1] ; nakorn henjongchom[None]

Co-author(s): Nopporn Rujisamphan [2]

[1] *Department of materials science, Faculty of science, Kasetsart University, 50 Ngam Wong Wan Rd, Ladyaow Chatuchak Bangkok 10900*

[2] *Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand, Theoretical and Computational Science Center (TaCS), Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok 10140 Thailand*

Corresponding Author(s): nakorn_nemesis@hotmail.com, fscitrs@ku.ac.th, nopporn.ruj@kmutt.ac.th

We have successfully prepared layers of CH3NH3PbI3 perovskite on fluorine doped tin oxide (FTO) coated on glass substrates using a sequentially spray-nebulous chemical deposition method. A sequence of spraying Pb(NO3)2 and CH3NH3I aerosols dissolved in non-toxic solvents was carried out to prepare compact and high crystalline CH3NH3PbI3 perovskite films. The concentration of Pb(NO3)2 precursor solution was varied in a range of 0.1 M - 0.3 M while the CH3NH3I concentration was kept constant at 0.2 M. The evolution of crystal structure along with their changes in grain sizes and surface morphologies were investigated by X-ray diffraction (XRD) and scanning electron microscopy (SEM) techniques. The XRD results indicated that sprayed CH3NH3PbI3 films from the Pb(NO3)2 precursor solution with a relatively high concentration i.e. 0.3 M, showed significantly improved crystallinity on the CH3NH3PbI3 perovskite film. The lattice parameters for the tetragonal unit cell are a = 8.845 ± 0.005 Å and c=12.602 ± 0.005 Å. SEM images revealed the morphology of Pb(NO3)2 layer was spongy-like features. These features were converted into a cuboid structure when the aerosols of CH3NH3I were brought into the contact with the Pb(NO3)2 layer, simultaneously the perovskite structure being formed. In contrast to the traditional one-step spin coating approach by which an absorption edge energy of about 1.5 eV was found after evaporating the common solvent, the evolution of the absorption edge energies of CH3NH3PbI3 films as prepared by the sequentially spray-nebulous chemical deposition has gone through an intermediate phase and was found to depend a large extent on reaction time of Pb(NO3)2 and CH3NH3I.

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Fabrication and magnetic properties of Fe-doped SrTiO3 nanoparticles

Author(s): wichaid ponhan[1]

Co-author(s): Anusara Thiangtham [2] ; Pornchai Chinnasa [2] ; Rinda Sangyaw [2]

[1] *1**

[2] *1*

Corresponding Author(s): wichaidponhan@gmail.com, rinda19932401@gmail.com, anpuy@hotmail.com, chinnasa@hotmail.com

Fe-doped SrTiO3 nanoparticles were fabricated by sol-gel method using a solution that contained poly(vinyl pyrrolidone) (PVP), iron oxide (Fe2O3), strontium dinitrate (N2O6Sr), and titanium(diisoproproxide) bis(2, 4-pentanedionate) 75 wt% in 2-propanol. The precursor of SrTiO3 and Fe-doped SrTiO3 are acquired from sol-gel method. The SrTiO3 and Fe-doped SrTiO3 nanoparticles were successfully obtained from calcination of all precursors at 800 oC in argon for 2 h. The SrTiO3 and Fe-doped SrTiO3 nanoparticles were characterized by SEM, XRD, TEM and VSM. Room temperature magnetization results revealed ferromagnetic behavior for the Fe-doped SrTiO3 samples. The origin of ferromagnetism observed in the Fe-doped SrTiO3 nanofibers was also discussed.
Keywords : Strontium titanate, nanoparticles, ferromagnetic and diluted magnetic oxide.

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Fabrication of Free Standing Photonic Crystal Film Consisting of Polystyrene Nanoparticles

Jitprabhat Ponchai[1]

[1] *Mahidol university*

Corresponding Author(s): plewsleep@gmail.com

Method for fabricating a free standing film of colloidal photonic crystal (CPC) has been studied. The CPC films were previously fabricated by drop-coating monodisperse polystyrene nanoparticles on agarose hydrogel. The water-based medium in these CPC films was not long-term stable and the changing of air-humidity resulted in the variation of their optical properties. To sustain the optical properties of CPC film, the gel medium in the film can be replaced by more stable materials with slightly changing the periodic ordered structure of crystalline colloidal array (CCA). In this work, the polystyrene nanoparticles with a diameter of 160 nm were suspended in a nonionic polymerizable monomers solution which composed of N-vinyl pyrrolidone, acrylamide, N,N' methylene bis acrylamide and benzoin methyl ether. A solid film was formed by shining UV light on the suspension to initiate the polymerization process. From this process, the CCA was fixed into the free standing film. Moreover, the free standing films of CPC were also prepared with various particle concentrations in the suspension in water between 250 to 1000 g/L.The diffraction spectra from these free standing films were measured by optical diffractrometer.The shifting of diffraction peak of free standing photonic crystal film can be described by the decrement of the nanoparticle distance.

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Fabrication, characterization and magnetic properties of Fe-doped SrTiO3 nanofibers

Author(s): wichaid ponhan[1]

Co-author(s): Nipatta Noona [2] ; Pornchai Chinnasa [2] ; Santi Maensiri [3] ; Yuwadee Khanma [2]

[1] *1**

[2] *1*

[3] *2*

Corresponding Author(s): santimaensiri@g.sut.ac.th, wichaidponhan@gmail.com, chinnasa@hotmail.com, kaewnoona14@gmail.co
yuwadeeorm@hotmail.com

We report the fabrication of Fe-doped SrTiO3 nanofibers by electrospinning a precursor mixture of iron nitrate/Diisopropoxytitanium bis(acetylacetonate)/PVP, followed by calcination treatment of the electrospun composite nanofibers. The Fe-doped SrTiO3 nanofibers were characterized by scanning electron microscopy (SEM), X-ray diffraction (XRD) and transmission electron microscopy

(TEM). The magnetic properties were measured by vibrating sample magnetometry (VSM). Room temperature magnetization results showed ferromagnetic behavior in the calcined samples having clear hysteresis ferromagnetism in the field range of ± 5000 Oe. The saturation specific magnetization (Ms) increased with increasing Fe proportion. The Ms and coercivity (Hc) values of the samples were in the ranges of 0.1 – 1.35 emu/g and 128 - 234 Oe, respectively.

Keywords : Electrospinning, nanofibers, Strontium titanate, ferromagnetic and diluted magnetic oxide.

Poster Session A / 191

Fast photometric observation of new eclipsing white dwarf binaries using the 2.4m Thai National Telescope

Author(s): Narenrit Thananusak[None]

Co-author(s): Puji Irawati [1] ; Suwicha Wannawichian [2]

[1] *NARIT*

[2] *Department of Physics and Materials Science, Chiang Mai University*

Corresponding Author(s): puli.irawati@narit.or.th, n.thananusak@gmail.com, suwichawan@gmail.com

Among time-resolved studies of compact binaries, systems including white-dwarfs are particularly challenging due to their faintness and to the short duration of the eclipses. The 2.4m Thai National Telescope (TNT) equipped with ULTRASPEC is an ideal facility for such investigations, due to a combination of sensitivity and relatively long instrument allocations. We report our work on the newly found eclipsing post common envelope binaries (PCEB) from the Catalina Sky Survey (CSS). PCEBs consist of white dwarf star with a low mass companion. While most of PCEBs usually have short orbital periods of a few hours, some systems are found to be in long (>1 day) period. In this work, we focus on PCEB with orbit period less than 0.5 day. To select the system, we create the light curve of all PCEB in the CSS data and calculate the orbital phase for all these binaries. Then we choose the systems with prominent eclipses for our follow up observations. We obtain the light curve of four systems with 2.4m TNT. However we see the primary eclipse only in two systems, J0500+1431 and J0738+2855, while in another system, J2234+2456 we get only partial eclipse. Next, the time of the mid—eclipse using several methods (e.g. kwee van woerden and least square) will be calculated. Moreover the new ephemerides for these systems will be provided.

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Filterless Water Filtration Using Curved Rectangular Channel

Author(s): Techin Artnarong[1]

Co-author(s): Nirut Pussadee [1]

[1] *Department of Physics and Materials Science, Faculty of Science Chiang Mai University, 239 Huay Kaew Road, Muang District, Chiang Mai, Thailand, 50200*

Corresponding Author(s): techin_loveyou@hotmail.co.th, nirut.p@cmu.co.th

Filterless water filtration is a method used to separate particles from wastewater using Dean flow, a secondary flow perpendicular to the main flow, in curved channel. The positions of the particles in the channel depend on three forces, wall interaction force, shear gradient lift force, and secondary flow drag force. In this work, a one loop spiral channel of 34 cm diameter with 20x5 mm2 channel cross-section was constructed in acrylic slab to filter out large colloidal particles from wastewater. Computational fluid dynamics simulation was done to visualize secondary flow and locate equilibrium position with various flow rates inside curved channel. It was found that, with the flow rate

between 8.3 and 11.3 ml/s, a couple hundred microns size particles were able to be filtered out. This device can be further developed and used to alleviate clean water crisis in rural area.

Session VI / 27

Filtration of Electrically Neutral Macromolecules through Glomerular Capillary Wall

Author(s): Numpong Punyaratabandhu[1]

Co-author(s): Panadda Dechadilok [1]

[1] *Department of Physics, Faculty of Science, Chulalongkorn University*

Corresponding Author(s): panadda.d@chula.ac.th, a.pong.bandhu@gmail.com

The main function of human kidneys is to filter blood and remove metabolic waste while retaining the normal blood composition and volume. The first step of this process is blood filtration through glomerular capillary wall; a membrane consists of multiple layers: endothelium cell layer, the glomerular basement membrane (GBM) and the epithelial foot processes with their interconnecting slit diaphragm. This work focuses on a hydrodynamic model describing hindered transport of electrically neutral macromolecules through the slit diaphragm and the glomerular basement membrane (GBM). The glomerular basement membrane was modeled as a medium consisting of two fibers, collagen type IV and glycoaminoglycan, whereas the epithelial slit was modeled as a row of parallel cylindrical fibers. The non-uniform cylinder spacing is assumed to follow the gamma distribution. The mean value of the spacing and its standard deviation are calculated from the experimentally obtained hydraulic permeability using the Newton-Raphson's method. The averaged sieving coefficients through the slit diaphragm are calculated by using this distribution function and are combined with the sieving coefficients through GBM to find total sieving coefficients. Results are found to agree very well with total sieving coefficients of Ficoll solutes obtained experimentally. Effects of physiological change observed in patients with membranous nephropathy on glomerular size-selectivity are also investigated.

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Finding the Optimum Microphysics and Convective Parameterization Schemes for the WRF Model for LPRU, Thailand

Author(s): Saijai Cumwan[1] ; Wannisa Kanta[1]

Co-author(s): Ronald Macatangay [2] ; Thiranan Sonkaew [1]

[1] *Lampang Rajabhat University*

[2] *National Astronomical Research Institute of Thailand*

Corresponding Author(s): thiranan@lpru.ac.th, saijaicumwun@hotmail.com, ronmcdo@gmail.com, panggeeka@hotmail.com

Nested model simulations were performed using the Weather Research and Forecasting (WRF) model (v. 3.6) ran in the High-Performance Computer (HPC) cluster of the National Astronomical Research Institute of Thailand (NARIT) for northern Thailand (2 km spatial resolution and hourly output), for the whole of Thailand (10 km spatial resolution and hourly output), and for the entire Southeast Asia (50 km spatial resolution and 3-hourly output). Combinations of the WRF Single-Moment 3-class, the WRF Single-Moment 5-class, the Lin et al. (Purdue), the WRF Single-Moment 6-class and the WRF Double-Moment 6-class microphysics parameterization schemes, as well as the Betts-Miller-Janjic, the Kain-Fritsch scheme, the Grell-Freitas (GF) ensemble and the Grell 3D cumulus parameterization schemes were utilized to determine the optimum microphysics and convective parameterization of the model when compared to observations at the Lampang Rajabhat University (LPRU) during the

hot dry season from May 1-12, 2015. Using metrics such as the bias, mean abosolute error, root-mean-square error, correlation coefficient and the slope showed that the Lin et al. (Purdue) microphysics scheme combined with the Betts-Miller-Janjic convective parameterization was optimum for the 2 km resolution, while the WRF Single-Moment 3-class microphysics and Kain-Fritsch convective parameterization combination was optimum for the 10 km resolution.

Session VIII / **114**

First-Principles Study of Alkali Metal Intercalated in 2H-MoS2

Author(s): Thanundon Kongnok[1]

Co-author(s): Sirichok Jungthawan [1] ; Sukit Limpijumnong [1]

[1] *School of Physics, Suranaree University of Technology*

Corresponding Author(s): thanundon_kongnok@hotmail.com, sirichok@gmail.com, sukit@sut.ac.th

MoS2 is a compound in transition metal dichalcogenide (TMDC) family that is semiconductor with layered honeycomb structure (2H) having strong in-plane bonding and weak out-of-plane van der Waals (VDW) interactions. In the bulk form, MoS2 has an indirect band gap where valence band maximum and conduction band minimum are located at the Γ point and the middle point between Γ-K point, respectively. Alternatively, the monolayer form has direct band gap (at the K point) which is more suitable for device applications. However, exfoliation of bulk MoS2 into monolayer results in a considerable defect density that has extremely low photoluminescence quantum yield. It has been proposed that the electronic characteristic of the monolayer can be reproduced experimentally in MoS2 by K intercalation [1]. In this work, the effects of alkali metal intercalation (such as Li, Na, K, and Rb) are investigated by using first-principles calculations. The results show significant expansion of interlayer spacing and contribution of electron donation from alkali metal to the conduction band of MoS2. The expansion of the interlayer spacing depends on atomic radii of the intercalated metals. Moreover, band gap type is changed from indirect to direct because of the expansion of the interlayer spacing reduces the electronic interactions between adjacent layers creating a quasi-monolayer character. The effects of K concentration have been investigated by varying the number of K atoms in the 2×2×1 supercell of MoS2Kx (where x = 0.25, 0.50, 0.75 and 1.00). In order to compare the results from supercell calculations with the primitive cell, the electronic structures from supercell calculations are unfolded [2] onto the high symmetry paths as defined in the first Brillouin zone of the primitive cell. It has been found that the interlayer spacing of MoS2K0.25 is large enough to exhibit quasi-monolayer character. The unfolded electronic structures show a direct band gap located at the K point with larger band gap than bulk MoS2. The Fermi level is a bit higher than conduction band minimum due to electron donation from alkali metal. Our results suggest that different atomic radii and concentration of intercalated alkali metals could provide an opportunity to tune band gap type and value of TMDC materials.

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Poster Session A / **79**

Fourier analysis of Io's magnetic footprint brightness variation

Author(s): Tatphicha Promfu[1]

Co-author(s): John T. Clarke [2] ; Suwicha Wannawichian [3] ; Utane Sawangwit [4]

[1] *Department of Physics and Materials Science, Faculty of Science, Chiang Mai University,Chiang Mai, Thailand*

[2] *Center for Space Physics, Boston University, Boston, MA, USA*

[3] *1. Department of Physics and Materials Science, Faculty of Science, Chiang Mai University,Chiang Mai, Thailand 2. National Astronomical Research Institute of Thailand (NARIT), Chiang Mai, Thailand*

[4] *National Astronomical Research Institute of Thailand (NARIT), Chiang Mai, Thailand*

Corresponding Author(s): ptatphicha@gmail.com, jclarke@bu.edu, suwicha.w@cmu.ac.th, utane@narit.or.th

The interaction between Jupiter's magnetic field and Io creates the bright spot, which is called "Io's magnetic footprint" (IFP). This footprint is a result of plasmas, which are picked up from Io along the magnetic field line and collide with atmospheric particles in Jupiter's ionosphere. The brightness of Io's magnetic footprint varies according to different positions of the Io in plasma torus. In addition, the brightness of Io's magnetic footprint also varies during the strong volcanic eruption on Io. This research study factors that affect variability of interaction between Jupiter's magnetosphere and Io. The brightness variation of Io's magnetic footprint is indicated by Io's system III longitude. Io's magnetic footprint in this research was observed by Hubble Space Telescope (HST) which conducted with Advanced Camera for Surveys (ACS) instrument. The data of Io's magnetic footprint brightness from observed ultraviolet images in 2007 were analyzed with modeled brightness variation by IDL program (Interactive Data Language). In-depth detail of Io's magnetic footprint was studied by Fourier analysis to find variation between Io's magnetic footprint brightness and location of Io's system III longitudes. The result shows that the variation of brightness could be controlled by several factors. Consequently, the magnetic field in Jupiter's ionosphere and its effect on Io's magnetic footprint brightness should play an important role in footprint brightness variation, which requires more investigation. Moreover, the connection between Io's system III longitude that corresponding to Io's location in plasma torus and magnetic field mapping into Jupiter's ionosphere should be studied further in more detail.

Keyword: Jupiter,Io,satellites: aurorae

Session IX / 143

GEOMETRY DESCRIPTION OF ALICE INNER TRACKING SYSTEM UPGRADE

Author(s): Parinya Namwongsa[1]

Co-author(s): Chinorat Kobdaj [1]

[1] *Suranaree University of Technology (TH)*

Corresponding Author(s): chinorat.kobdaj@cern.ch, parinya.namwongsa@cern.ch

The purpose of this research is to generate the detailed geometry of the inner barrels of the inner tracking system (ITS) upgrade at ALICE, CERN. The new ITS are divided into two parts, inner and outer barrels. Each part consists of detector barrels and service barrels. The scope of our work is limited to detector barrels and DC to DC power supply of the inner barrels, using AliROOT framework. The geometry is written in C++ programming language and compiled to ".root" files. These files can be used in the simulation process of the experiments and in the calculation of material budgets.

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Gamma-ray shielding and elastic properties of recycled silica gel glasses

Author(s): Poonnaphob Sopapan[1]

Co-author(s): Cherdsak Bootjomchai [2] ; Oruethai Jaiboon [2] ; Raewat Laopaiboon [3] ; jintana Laopaiboon [3]

[1] *Department of Physics, Faculty of Science, Ubon Ratchathani University*

[2] *Department of Physics, Faculty of Science, Ubon Ratchathani University, Ubon Ratchathani 34190, Thailand*

[3] *Glass Technology Excellence Center, Ubon Ratchathani University, Ubon Ratchatani, 34190, Thailand*

Corresponding Author(s): raewatl@yahoo.com, chinjunk1120@gmail.com, cherdsak_per@hotmail.co.th, 2502jin@gmail.com, oruethai.jaiboon@googlemail.com

The purpose of this work is to study the elastic moduli and gamma-ray shielding properties of the recycled silica gel glass (RSG) in 10CaO–xPbO–(90-x)RSG glass systems (where x = 20 to 45 mol.%) were prepared by the rapid quenching technique. In this work, the silica gel deterioration are source of silicon dioxide (SiO2) in this glass systems. Densities and longitudinal ultrasonic velocities values of the prepared glass samples were used for calculated the elastic properties (longitudinal modulus). Gamma-ray shielding properties have been estimated in terms of mass attenuation coefficient and half value layer at photon energies 662, 1173 keV. Gamma-ray shielding parameters of glass samples have been compared with theory, experiment value and standard nuclear radiation shielding (barite concrete). It has been inferred that PbO containing glass samples indicates the better shielding properties. The obtain results show that changes in elastic properties of this glass systems depend on the PbO content, which are related to the number of non-bridging oxygens (NBOs) and bridging oxygens (BOs). The result concluded that silica gel deterioration can be potential candidates for gamma-ray shielding applications.

Keyword : glasses, silica gel, ultrasonic velocity, gamma-ray shielding

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Generalized Three-Form Field and Its Thermodynamic Description at Lagrangian Level

Pitayuth Wongjun[None]

Corresponding Author(s): pitayuthw@nu.ac.th

A Lagrangian formulation of perfect fluid is a powerful tool to study the dynamics of the universe, especially interacting approach between dark energy and dark matter. A general description in this formulation is complicated and then it is difficult to handle since it invokes many functions. In field theory point of view, a non-canonical scalar field can be used to describe the perfect fluid with constant equation of state parameter. However, it cannot provide a consistent description since it cannot provide the intrinsic vector perturbations to the theory as well as non-adiabatic perturbations. In this presentation, the Lagrangian formulation of perfect fluid due to the non-canonical three-form field is proposed. It is found that the perfect fluid with constant equation of state parameter can be realized by using this three-form field. The fluid dynamics of the perfect fluid is investigated and found that the non-adiabatic perturbations can be generated and thermodynamics description of the theory corresponds to the system in which the particle flux is not conserved.

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Graphene Oxide/Hydroxyapatite Hybrid Materials for Detection of Ethylenediaminetetraacetic Acid

Author(s): Worapot Prongmanee[None]

Co-author(s): Piyapong Asanithi [1]

[1] *(1)Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand (2)ThEP Center, Commission of Higher Education, 328 Si Ayuthaya Rd, Thailand*

Corresponding Author(s): worapot.nano@mail.kmutt.ac.th, asanithi@hotmail.com

Ethylenediaminetetraacetic acid (EDTA) is a well-known agent for chelating metal ions as found in various applications, i.e. environmental controls, food and non-alcoholic-beverage additives, etc. High content of EDTA in foods and environments is of health and environmental concerns. In this work, graphene oxide (GO)/hydroxyapatite (HAp) composite synthesized by chemical approaches was used as an active material for detecting EDTA in phosphate buffered saline (PBS) via potentiometric methods. GO/HAp composite was deposited on gold electrode by a drop-dried deposition technique. Cyclic voltammetry (CV) results showed that GO/HAp composite offers better EDTA detection than graphene oxide modified gold electrode. In addition, amperometry of GO/HAp composite on gold electrode showed a good linear relationship between oxidation peak current and EDTA concentrations (0.5 to 9 μM) with the detection limit of 0.5 μM.

Keyword: Graphene oxide, Hydroxyapatite, Ethylenediaminetetraacetic Acid, Detection,

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Growth and Characterization of N-type and P-type Aluminum Antimonides

Phannee Saengkaew[None]

Corresponding Author(s): s_phannee@hotmail.com

III-V semiconductors, such as III-nitrides, III-arsenides, III-phosphides, and III-antimonides, have been applied in optoelectronic devices and electronic sensors as light-emitting diodes, solid-state lighting, optical storages and semiconductor detectors. In this project, the growth of high crystalline quality AlSb films with suitable optical and electrical properties has been investigated in order to develop AlSb-based room-temperature radiation detectors. By using X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Raman Spectroscopy, Fourier Transform Infrared Spectroscopy (FT-IR), I-V characteristics and Hall-Effect measurements, the crystal structure, surface morphology, optical properties and electrical properties of AlSb films were analyzed. ⊠400-nm-thick AlSb films were prepared by RF-magnetron sputtering process in argon atmosphere at a pressure of 10^-2 mbar, a power of 250 W and the ratio of Al and Sb of 85:15.In order to generate the n-type and p-type AlSb films, Cu and Si doping in AlSb films were performed by the ratio of Al, Sb and dopants of 82:14:4. Undoped and doped AlSb films were achieved with a single crystal plane of (111), a lattice constant of 6.095 Å and a crystal size of 0.88 nm. To analyze the crystalline quality of AlSb films, Raman spectroscopy indicates all AlSb films with strains and lower crystalline quality by Si and Cu doping. By I-V measurements, the electrical conductance of AlSb:Cu, AlSb:Si and undoped AlSb were obtained as 8.13, 0.36 and 0.28 mSiemens, respectively. Moreover, Hall-Effect measurement approves of n-type AlSb films by Cu doping and p-type AlSb films by Si doping with quite high carrier concentrations about 10^17 cm-2 but still low carrier mobility. In further, PN junction didoes will be designed on Si substrates to develop the AlSb-based room-temperature radiation detectors.

Session XXIX / 200

Growth and Characterizations of AZO Thin Films by Pulsed DC Magnetron Sputtering

Author(s): Kittikhun Seawsakul[None]

Co-author(s): Mati Horprathum [1] ; Pitak Eiamchai [2] ; Prayoon Songsiriritthigul [3] ; Saksorn Limwichean [2]

[1] *co-advisor*

[2] *Co-Researcher*

[3] *Thesis advisor*

Corresponding Author(s): inthezone555@hotmail.com, pitak.eiamchai@nectec.or.th, saksorn.limwichean@nectec.or.th, mati.horprathum@nectec.or.th, prayoon.song@gmail.com

Aluminum-doped zinc oxide (AZO) thin films were fabricated by the pulsed dc magnetron sputtering technique on different types of the substrates. The influences of the argon flow rate on the crystal structures, the physical morphologies, the optical properties, and the electrical attributes were investigated with the grazing-incident X-ray diffraction (GIXRD), the field-emission scanning electron microscopy (FE-SEM), the UV-Vis-NIR spectrophotometry, and the Hall measurements, respectively. The GIXRD analyses indicated that the AZO films were predominantly polycrystalline with the hexagonal wurtzite structure. The FE-SEM micrographs showed that the film thickness was increased with the increase of the argon-gas flow rate. The optical transmission of the prepared thin films exhibited higher than 84 % in the visible range. Finally, the AZO thin film deposited at 120 sccm-argon flow rate yielded the highest electrical resistivity of 8.453 × 10−3 Ω cm, with the carrier concentration of -1.623 × 1020 cm−3, and the charge mobility of 4.551 cm2/Vs.

Keyword: AZO, thin film, TCO, sputtering

Session XXVIII / **261**

Growth and characterization of n-type and p-type Aluminum Antimonides

Phannee Saengkaew[None]

Corresponding Author(s): s_phannee@hotmail.com

Phannee Saengkaew1,*, Kulthawat Cheewajaroen1, Sakuntam Sanorpim2, Visittapong Yordsri3, Chanchana Thanachayanont3, Noppadon Nuntawong4 and Watcharee Rathanasakulthong5
1 Department of Nuclear Engineering, Faculty of Engineering, Chulalongkorn University, Bangkok, Thailand
2 Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok, Thailand
3 National Metal and Materials Technology Center (MTEC), National Science and Technology Development Agency, Ministry of Science and Technology, Pathumthani, Thailand
4 National Electronic and Computer Technology Center (NECTEC), National Science and Technology Development Agency, Ministry of Science and Technology, Pathumthani, Thailand
5 Department of Physics, Faculty of Science, Kasetsart University, Bangkok, Thailand

E-mail: Phannee.S@chula.ac.th, s_phannee@hotmail.com

III-V semiconductors, such as III-nitrides, III-arsenides, III-phosphides, and III-antimonides, have been applied in optoelectronic devices and electronic sensors as light-emitting diodes, solid-state lighting, optical storages and semiconductor detectors. In this project, the growth of high crystalline quality AlSb films with suitable optical and electrical properties has been investigated in order to develop AlSb-based room-temperature radiation detectors. By using X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), Raman Spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), I-V characteristics and Hall-Effect measurements, the crystal structure, surface morphology, optical properties and electrical properties of AlSb films were analyzed. ~400-nm-thick AlSb films were prepared by RF-magnetron sputtering process in argon atmosphere at a pressure of 10-2 mbar, a power of 250 W and the ratio of Al and Sb of 85:15. In order to generate the n-type and p-type AlSb films, Cu and Si doping in AlSb films were performed by the ratio of Al, Sb and dopants of 82:14:4. As shown in Fig.1, undoped and doped AlSb films were achieved with a single crystal plane of (111), a lattice constant of 6.095 Å and a crystal size of 0.88 nm. To analyze the crystalline quality of AlSb films, Raman spectroscopy indicates all AlSb films with strains and lower crystalline quality by Si and Cu doping as presented in Fig.2. By I-V measurements in Fig.3, the electrical conductance of AlSb:Cu, AlSb:Si and undoped AlSb were obtained as 8.13, 0.36 and 0.28 m~-1, respectively. Moreover, Hall-Effect measurement approves of n-type AlSb films by Cu doping and p-type AlSb films by Si doping with quite high carrier concentrations about 1017

cm-2 but still low carrier mobility. In further, PN junction didoes will be designed on Si substrates to develop the AlSb-based room-temperature radiation detectors.

Summary:

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Growth of Highly Oriented CaCu3Ti4O12 Thin Films on LaAlO3 (100) and NdGaO3 (100) Single Crystals Substrates by a Sol-Gel Method

Author(s): Satreerat Hodak[1] ; Suriyong Pongpaiboonkul[2]

Co-author(s): Anurat Wisitsoraat [3] ; Ditsayut Phokharatkul [4] ; Jose Hodak [5]

[1] *Suppervisor*

[2] *Ph.D student*

[3] *Co-suppervisor*

[4] *Co-worker*

[5] *co-author*

Corresponding Author(s): suriyoung@yahoo.com, xxxxx3@xxx.xxx, xxxxx1@xxx.xxx, xxxxx2@xxx.xxx, satreerat.h@chula.ac.th

CaCu3Ti4O12 (CCTO) thin films have been deposited successfully on LaAlO3 (100), NdGaO3 (100) substrates using a sol-gel method and they exhibited highly-preferential orientations. These substrates were chosen in terms of small lattice mismatch between CCTO and the substrate. The X-ray diffraction patterns showed that the CCTO film layers grown on different studied substrates have different preferential orientations. In the case of our CCTO films on LaAlO3(100), the {h00} were the most prominent reflections while CCTO on NdGaO3(100) showed the {hh0} dominant reflections. The plane view and cross sectional FE-SEM images showed a smooth and crack-free surface throughout the film with large grains and dense packing. The interface between the CCTO film and the single crystal substrate was sharp. We found evidence that the occurrence of a phase transition in the LAO substrates is detrimental to the film quality. Thus, the optimum temperature for annealing CCTO films on LAO substrates is 800 °C while for NGO substrates the annealing is at 1000 °C. The correlation between the preferred orientations of the films and their dielectric properties were also reported.

References:

[1] S.K. Hodak, C.T. Rogers, Microstructure and dielectric response of SrTiO3/NdGaO3 interdigitated capacitors, Microelectron. Eng. (2008), 85, 444-451.

[2] S. Pongpaiboonkul, D. Phokharatkul, J.H. Hodak, A. Wisitsoraat, S.K. Hodak, Enhancement of H2S-sensing performances with Fe-doping in CaCu3Ti4O12 thin films prepared by a sol–gel method, Sens. Actuators B (2016), 224, 118-127.

Session IX / 8

Hawking fluxes and Anomalies in the Rotating Regular Black Holes with the Time-Delay

Shingo Takeuchi[1]

[1] *Institute of Fundamental Physics, Naresuan University*

Corresponding Author(s): shingo.portable@gmial.com

We are going to calculate the flow of the angular momentum and flux of the Hawking radiation in the rotating regular black hole with the time-delay proposed in arXiv:1510.08828, based on the anomaly cancellation. We first try to reduce the field theories to the infinite two-dimensional massless free models in which the anomaly cancellation method is possible, in the three metrics in arXiv:1510.08828. We demonstrate that the two of them can be reduced. We perform the calculation in these two metrics, and obtain the flow of the angular momentum and flux of the Hawking radiation in these two metrics. Our result involves the three effects:~the quantum gravity effect regularizing the gravity sources of the black holes, the black hole rotation, and the time-delay. Hence our result could be considered to correspond to a more realistic Hawking radiations. (This study has been submitted to arXiv on 15 March, where the given arXiv number is arXiv:1603.04159. This study is going to be submitted to an international journal, Classical and Quantum Gravity soon.)

Session VIII / **486**

High Pressure Phase Transitions of Transition Metal Hydrides

Udomsilp Pinsook[None]

Corresponding Author(s): pinsook@gmail.com

Invited Speaker

Summary:

Session XIX / **97**

High-z Quasars Black Hole Mass Estimation via Photometric Reverberation Mapping

Author(s): Grittiya Pongsupa[1]

Co-author(s): Suwicha Wannawichian [1] ; Utane Sawangwit [2]

[1] *Chiang Mai University*

[2] *National Astronomical Research Institute of Thailand*

Corresponding Author(s): p.grittiya@gmail.com, u.sawangwit@gmail.com, suwichawan@gmail.com

The mass of supermassive black holes (SMBHs) of high redshift (z) quasars is crucial for understanding SMBH-galaxy co-evolution. The traditional method, spectroscopic reverberation mapping (SRM), would fail for most high-z quasars and is inefficient for a large quasar sample. Photometric reverberation mapping (PRM) has been recently proposed in order to utilise the up-coming high cadence, large sky coverage and deep photometric survey of the next generation large telescopes such as LSST. Such method is akin to the well established photometric redshift technique employed by cosmological community. In this talk, I will give a brief review of the PRM and highlight our on-going work of observational campaign at the 2.4m Thai National Telescope (TNT) to provide a proof-of-concept for such a technique. Our campaign aims to determine the size of Broad Line Region (BLR) around 10-15 high-z quasars which is essential to determine the central SMBH mass. The quasar sample used in our study was selected from SDSS-III BOSS in the sky regions accessible by the TNT during Thai dry season (November - April). The SDSS spectra were used to select spectroscopically confirmed quasars with redshift 0.8 $\leq$ z $\leq$ 1.2. Furthermore, we used the spectral Radius-Luminosity (R-L) relation calibrated from low-z AGNs to select quasars with BLR size $\leq$ 60 light-day suitable for the the length of TNT observing season. We are completing the second observing season this April. The data are now being analysed and we will report the results of our study in the talk.

Poster Session A / 176

Improvement of Spherical Astronomy Perception by Using Stellarium Program

Author(s): Tanin Nutaro[1]

Co-author(s): Chahkrit Sriwunkum [1] ; Chalermpon Mutuwong ; Chanvit Junngarm [1]

[1] *Ubon Ratchathani University*

Corresponding Author(s): ictmtk21773@gmail.com, tnutaro@gmail.com, snoobykak@gmail.com

We have developed the lessons to help students understand the motion of celestial objects easier than before by using Stellarium program. Stellarium is a free open source planetarium program that can be run on many computer platforms and also on a tablet. It shows a realistic sky in 3D, just like what you see with the naked eye, binoculars or a telescope. It is being used in planetarium projectors. The article will show the appropriate way to exploit the realistic graphic features of the program for the instructors who teach spherical astronomy.

Summary:

Session XXIX / 239

Improving hydrophobicity of alumina sheet using plasma treatment

Author(s): Peera Champathet[None]

Co-author(s): Somsak Dangtip [1] ; Tanakorn Osotchan [1] ; Vuthichai Ervithayasuporn [1]

[1] *Mahidol University*

Corresponding Author(s): peerace@hotmail.com, somsak.dan@mahidol.edu, vuthichai.erv@mahidol.ac.th, tanakorn.oso@mahidol.

The lifetime of instruments alumina base that operate in an open field environment can be extended via improving their hydrophobicity. One of the solutions of this problem is coated a specific type of layer that can provide hydrophobicity and durable in field environment. Alumina sheets of square shape; 25 x 25 mm, are used as substrate. The alumina surface was activated using plasma treatment. The sheets were then spin-coated with UV-curable thiol-ene resin; consisting of (3-Mercaptopropyl)trimethoxysilane, Heptadecafluorodecyl methacrylate (HDFDMA), 2,4,6,8-tetramethyl-2,4,6,8-tetravinylcyclotetrasiloxane (TMTVSi), and Pentaerythritol tetrakis(3-mercaptopropionate) (PETMP). The hydrophobic TMTVSi and HDFDMA thin films were activated through Thiol–ene Click reaction. The wettability of coated alumina was carried out. The preliminary contact angle analysis has shown that thin film between HDFDMA and PETMP to be hydrophobic with water contact angle of greater than 90^{\circ} More work such as creating cross-linked thiol-ene network structure is underway to improve from hydrophobic to super hydrophobic.

Session XXIX / 152

Influence of Annealing Temperature and Ga Concentration on Ga-doped ZnO Transparent Thin Films by Sol-gel dip coating Methods

Author(s): Wisanu Pecharapa[1]

Co-author(s): Kamonchanok Rueangon [1] ; Warut Khumon [1]

[1] *College of Nanotechnology, King Mongkut's Institute of Technology Ladkrabang, Bangkok, 10520 Thailand*

Corresponding Author(s): kpewisan@gmail.com, ro.kamonchanok@gmail.com, tanoz@gmail.com

In this work, ZnO transparent conductive thin films doped with 0-5 at% of Gallium (GZO thin films) have been prepared. GZO thin films were deposited by sol–gel dip coating method. Each dip-coated film was baked at 250℃ for 5 min and then annealed at 300℃, 400℃, and 500℃ for 2 hr under air ambiance. The effects of Ga dopant and annealing temperature on the structure, electrical resistivity, and important optical properties were investigated. Transmission spectrum shows high optical transparency in high-temperature annealed. XRD results and SEM images exhibit the significant change in the film's morphologies and crystallinity with variation in Ga doping content. Meanwhile increasing annealing temperature results in the significant enhancement in its crystallinity. The electrical properties measured by four-point probe technique can be enhanced by the incorporation of Ga dopant.

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Initiation of Multiarmed Spiral Waves in the Belousov-Zhabotinsky Reaction

Author(s): Benjamas Ponboonjaroenchai[1]

Co-author(s): Chaiya Luengviriya [1] ; Jiraporn Luengviriya [2] ; Malee Sutthiopad [1] ; Nakorn Kumchaiseemak [3] ; Piyachat Wungmool [1]

[1] *Department of Physics, Faculty of Science, Kasetsart University, Bangkhen, Bangkok, 10900, Thailand.*

[2] *Lasers and Optics Research Group, King Mongkut's University of Technology North Bangkok, 1518 Pibulsongkram Road, Bangkok 10800, Thailand*

[3] *Department of Physics, Faculty of Science, Kasetsart University, Bangkhen, Bangkok, 10900, Thailand*

Corresponding Author(s): piyachat_w@windowslive.com, jiraporn.l@sci.kmutnb.ac.th, elevia_ice@hotmail.com, fscicyl@ku.ac.th, g5714401158@ku.ac.th, fscimls@ku.ac.th

Spiral waves have been investigated in many different excitable media. A set of multiarmed spiral waves is a spacial self-organization and rarely studied in experiments because they are difficult to be created. We present a method to generate multiarmed spiral waves pinned to an unexcitable circular obstacle in a thin layer of the Belousov-Zhabotinsky reaction using a partition method. A thin rectangle and a thin disk made from chemically innert plastic (acrylic) are used as the partition and the obstacle, respectively. We demonstrate an initiation of three-armed spiral waves.

Session XXVII / 74

Initiation of a partially pinned scroll wave in excitable chemical media

Author(s): Porramain Porjai[1]

Co-author(s): Benjamas Keawnuch [1] ; Chaiya Luengviriya [2] ; Chalo Wongsawang [1] ; Jarin Kanchanawarin [2] ; Malee Sutthiopad [2]

[1] *Faculty of Science and Technology, Valaya Alongkorn Rajabhat University under the Royal Patronage, 1 Moo 20 Phaholyothin Road, Khlong Nuang, Klong Luang, Phathum Thani 13180, Thailand*

[2] *Department of Physics, Kasetsart University, 50 Phaholyothin Road, Jatujak, Bangkok 10900, Thailand*

Corresponding Author(s): fscijro@ku.ac.th, faasbek@ku.ac.th, fscimls@ku.ac.th, chalo_w@hotmail.com, fscicyl@ku.ac.th, porramain@vru.ac.th

Scroll waves are three-dimensional excitation waves, generally observed in many excitable media. The occurrence of electrical scroll waves in hearts causes some cardiac arrhythmia. Freely rotating scroll waves often drift and annihilate when they hit the boundary. In contrast, scroll waves pinned to unexcitable obstacles (e.g., blood vessel or scars) are discovered to appear last longer. The situations may be more complicated when the scroll waves are partially pinned with an obstacle. We present a successful method for initiating a partially pinned scroll wave in the excitable chemical media-the Belousov-Zhabotinsky reaction. The scroll wave gradually develops a cone-shaped structure because its pinned and freely moving parts have different dynamics.

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Integration of STEM Education into Classrooms on Fluid Mechanics for high school

Author(s): Kanda Supapunt[1]

Co-author(s): Udom Tipparach [2]

[1] *Department of Physics, Faculty of Science, Ubon Ratchathani University, UbonRatchathani Thailand 34190 Thailand*

[2] *Department of Physics, Faculty of Science, Ubon Ratchathani University, Warin Chamrab, UbonRatchathani 34190 Thailand*

Corresponding Author(s): philipdadada@gmail.com, udom.t@ubu.ac.th

We have designed and constructed learning activities in Physics on Fluid Mechanics. The purpose of the research is to enhance understanding, build up scientific attitude, and extend retention of students. The activities consist of the experiments on density, pressure, buoyancy, atmosphere and fluid dynamics. The lessons were integrated through STEM Education. The findings show that the students were enthusiastic and engaged. The students' learning achievement attitude towards Physics was increased. The retention rate was also extended.

Keyword : STEM Education, Fluid Mechanics, Understanding, Attitude, Retention Rate

Session VII / **492**

Introduction to non-minimal derivative coupling to gravity

Burin Gumjudpai[None]

Invited Speaker

Session XI / **50**

Investigating rare events with modified Monte Carlo method based on fluctuation theorem

Takol Tangphati[1]

[1] *Department of physics, Chulalongkorn university*

Corresponding Author(s): ta_kol@hotmail.com

The Monte Carlo (MC) method is a useful tool to solve a broad range of problems numerically; random numbers are used to decide whether a process is accepted resulting in a desired equilibrium

distribution. In certain complex problems where transitions to some states are rare, however, this method dramatically consumes more resources and spends a long time trying to find the equilibrium states. To improve upon the conventional MC, we apply a fluctuation theorem (FT) to MC which provides a relative weight of a backward trajectory with respect to the forward one. Interestingly, not only does FT double information but also assists a probability of system to converge to equilibrium more rapidly. We apply the algorithm to solve a test problem where the energy barrier to a certain state is comparatively high. The result of the simulation is consistent with the analytic solution, but with significant speed gain compared to that from the conventional method.

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Investigation of 90RWG – 10Na2O – 0.01Cu2O thermoluminescence glass on the effective atomic number and elastic properties

Author(s): Yutthachai Jaichueai[1]

Co-author(s): Reawat Laopaiboon [1]

[1] *Department of Physics, Faculty of Science, Ubon Ratchatani University, Ubon Ratchatani 34190, Thailand*

Corresponding Author(s): yuthachai.a@gmail.com, raewatl@yahoo.com

In this work, thermoluminescence radiation dosimeter type 90RWG – 10Na2O – 0.01Cu2O was investigated on their elastic properties and structural properties. The effective atomic number was also compared between theoretical and experimental value. The glass samples were prepared by melt quenching technique. All samples were melted at temperature 1250 ℃ for 4 hr and annealed at temperature 500 ℃ for 2 hr. Then, the elastic moduli (bulk modulus, Young's modulus Poisson's ratio and micro-hardness) were calculated before and after gamma irradiation at 1 kGy. FTIR spectroscopy was measured in wave number range 400 - 4000 cm-1 in order to study structure of the glass samples before and after gamma irradiation. The linear attenuation coefficient was measured using the narrow beam transmission method. The results of elastic properties and structural properties before and after gamma irradiation suggested the detriment of bridging oxygens in glass network from gamma irradiation exposure.

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Investigation of Surface Properties of Polymer Compound Blended with Nanoparticles

Author(s): Wantana Sukkaew[1]

Co-author(s): Alongkot Treetong [2] ; Tutiyaporn Thiwawong [3] ; Vassata Sensaard [4]

[1] *King Mongkut's University of Technology North Bangkok*

[2] *National Nanotechnology Center*

[3] *KMITL*

[4] *KMUTNB*

Corresponding Author(s): sukkaewwantana@gmail.com, alongkot@nanotec.or.th, tthiwawong@gmail.com, kyotenmaruvassata@gmail.com

This research was studied to focus on hydrophobic and hydrophilic properties, surface morphology and adhesion force of polymer compound using nanoparticles and atomic force microscope (AFM) by blend with nanoparticles. For this research used Poly(methyl methacrylate) (PMMA) that blended with nanoparticles such as Zinc oxide (ZnO) and Titaniumdioxide (TiO2) by varied nanoparticles ratio. From the results were found that when increased ZnO nanoparticles ratio the contact angle

of PMMA was decreased. But for TiO2 was shown that when raised the nanoparticles compound contact angle was increased together.

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Investigation of lead silicate glass prepared from silica gel for used as gamma-ray shielding materials: A comparision between CaO and SrO

Author(s): Pattaranipa Gunhakoon[1]

Co-author(s): Oruethai Jaiboon [2] ; Rewat Laopaiboon [3] ; Sonkid Pencharee [3] ; jintana Laopaiboon [4]

[1] *Department of Physics, Faculty of Science, Ubon Ratchatani University, Warinchamrab, Ubon Ratchatani, 34190,Thailand.*

[2] *Department of physics,Faculty of Science, Ubon Ratchatani University,Warinchamrab, Ubon Ratchatani, 34190,Thailand.*

[3] *Department of physics, Faculty of Science, Ubon Ratchatani University,Warinchamrab, Ubon Ratchatani,34190,Thailand.*

[4] *UBU*

Corresponding Author(s): 2502jin@gmail.com, somkid.p@ubu.ac.th, yimyindee@gmail.com, raewatl@yahoo.com, oruethai.jaiboon@googlemail.com

Gamma-ray mass attenuation coefficients have been calculated theoretically for 10CaO-xPbO-(90-x)silica gel waste and 10SrO-xPbO-(90-x)silica gel waste glass systems (where x = 20, 25, 30, 35, 40 and 45 mol%) by using WinXCOM program developed by National Institute of Standards and Technology. Then, the results were obtained further used to calculate half value layer and mean free path values. It was found that the 10CaO-xPbO-(90-x)silica gel waste glass system have higher values of mass attenuation coefficients and lower values of half value layer than 10SrO-xPbO-(90-x)silica gel waste glass system for most of gamma ray energy at 662, 1173, 1332 keV. Moreover, the density, molar volume, elastic moduli, Debye and softening temperature were applied to study the structural properties of both glass systems.
Keywords: Glasses; Silica gel waste; Elastic properties; Gamma-ray shielding

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Invited speaker Dr. PATIPAN UTTAYARAT ****

Summary:

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Invited-06

Worrasak Sukkabot[1]

[1] *Department of Physics, Faculty of Science, Ubon Ratchathani University, Ubon Ratchathani 34190, Thailand*

Corresponding Author(s): w.sukkabot@gmail.com

Invited Speaker

Summary:

Session XVII / 57

Ionization in Earth's atmosphere near polar regions following the solar storm on January 20, 2005

Author(s): Warit Mitthumsiri[1]

Co-author(s): Achara Seripienlert [2] ; Alejandro Saiz [1] ; David Ruffolo [1] ; Pierre-Simon MANGEARD [3] ; Usanee Tortermpun [1]

[1] *Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand*

[2] *Division of Physics, Faculty of Science and Technology, Rajamangala University of Technology Thanyaburi, Pathum Thani 12110, Thailand, National Astronomical Research Institute of Thailand (NARIT), Chiang Mai 50200, Thailand*

[3] *Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand, National Astronomical Research Institute of Thailand (NARIT), Chiang Mai 50200, Thailand*

Corresponding Author(s): mwarit@hotmail.com, psmangeard@gmail.com, alejandro.sai@mahidol.ac.th, arirang_me@hotmail.com, achara.seri@gmail.com, david.ruf@mahidol.ac.th

Cosmic-ray induced ionization in the lower atmosphere (below ~ 15 km) is mainly caused by Galactic cosmic rays. However, some strong solar events can produce high energy ions with large intensity, which can penetrate to the lower atmosphere and produce significant ionization. We have modeled this effect for the solar storm of 20 January 2005, one of the strongest solar particle events ever recorded. This event produced energetic particles that can be detected by ground-based detectors, especially near the polar regions. We use the cosmic ray intensity vs. time as inferred from two neutron monitors, one located near the north pole (Inuvik) and the other located near the south pole (McMurdo). Then we performed Monte Carlo simulations of particle-air interactions using a realistic atmospheric model created from measured meteorological data to calculate atmospheric ionization at different altitudes and times for Inuvik and McMurdo. For the case of galactic cosmic rays, our simulation results of atmospheric ionization are consistent with balloon measurements. We have also studied the equivalent dose rate at airplane altitude. This research project is supported by Mahidol University and the Thailand Research Fund.

Session X / 91

Larmor Electric Field and Electron Temperature Anisotropy: Signatures for Magnetopause Magnetic Reconnection

Author(s): Kittipat Malakit[1]

Co-author(s): David Ruffolo [1] ; Michael Shay [2] ; Paul Cassak [3] ; Surapat Ek-In [1]

[1] *Mahidol University*

[2] *University of delaware*

[3] *West Virginia University*

Corresponding Author(s): ruffolo.physics@gmail.com, pacassak@wvu.edu, shay@bartol.udel.edu, kmalakit@gmail.com, surapat.ek-in@cern.ch

Magnetic reconnection is a key energy converting and plasma mixing process that plays important roles in different plasma systems. However, the physics of this key plasma process is only partially understood. Recently, NASA has launched Magnetospheric Multiscale (MMS), a group of four spacecrafts that use the earth magnetosphere as a laboratory, to specifically study physics of reconnection. However, MMS cannot send all of the data back to the earth due to limited communication bandwidth. Therefore, it needs a hint whether it is already around reconnection sites so that it knows when to change the data collecting mode from low resolution to high resolution. Using fully kinetic particle-in-cell simulations of asymmetric reconnection, we have found Larmor electric field, a new feature of reconnection electric field that has its origin based on the physics of finite Larmor radius.

The scaling relations for the Larmor radius structure width and the strength of the field are proposed and tested successfully for many different upstream conditions that have the ion temperature greater than the electron temperature, similar to the conditions found at the magnetopause reconnction. Effects of the guide field have also been studied. The stronger the guide field the smaller the Larmor radius and so the thinner the width of the Larmor electric field structure. The magnitude of the field gets stronger as expected as well. Furthermore, we found that in the region where the Larmor electric field exists there will also be an electron temperature anisotropy. The anisotropy comes from electrons reacting to the parallel component of Larmor electric field leading to counter streaming motion of the electrons and therefore high parallel electron temperature. The Larmor electric field in conjunction with the electron temperature anisotropy can be used as a good reconnection signature alarming MMS that it is coming close to the a reconnection site.

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Laser-scribed technique for making high-performance reduced-graphene oxide capacitor

Author(s): Phiphut Chaiyadech[None]

Co-author(s): Alisa Sansonachai [1] ; Yodchay Jompol [2]

[1] *Co-worker*

[2] *advisor*

Corresponding Author(s): princess_alisa@hotmail.co.th, phiphut.ch@gmail.com, yodchay.jom@mahidol.ac.th

Graphene-based supercapacitors have been fascinated by many researchers since they can provide both high power densities and ultrahigh energy densities and hence high capacitance. Graphene is a material that has high porous surface roughness and because of its superior conductivity making them suitable for ultra-lightweight conducting electrodes for charged-storage device such as batteries and capacitors. In this work, we present a laser-scribed technique for fabricating reduced-graphene oxide (RGO) supercapacitor. The RGO was first coated on Polyethylene terephthalate (PET) substrate by drop casting technique which gives ease of use preparation process on flexible substrate. A rectangular shape electrode pattern was formed by using an in-house laser scriber to turn the RGO film into a conducting electrode. The RGO capacitor was then formed by the two RGO electrodes inserted by a thick phosphoric electrolyte gel. We found capacitance of such RGO device in order of milli-Farad after testing its I-V characteristics and an RC circuit testing. We found their capacitance of two to five mF under a given bias, which are comparable with the recent graphene-oxide supercapacitor and are better than that of the commercial capacitor. The capacitance of such devices was evaluated from the charge-discharged model from I-t measurement under normal light illumination. This research should provide an application technique for extendable charged-energy storage devices for harvesting energy.

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Leakage detection with the direct current resistivity method: A study of Tha Thung Na dam case

Author(s): Sarunya Chomchaiya[1]

Co-author(s): Chatchai Vachiratienchai [2] ; Weerachai Siripunvaraporn [1]

[1] *Department of Physics, Faculty of Science, Mahidol University, 272 Rama VI Rd., Ratchathewi, Bangkok 10400*

[2] *Curl-E Geophysics Co., Ltd. 85/87 Moo 6, Nantawan village, Utthayan-Aksa Rd., Salaya, Phutthamonthon, Nakhonpathom, 73170*

Corresponding Author(s): sarunya.cho@gmail.com, wsiripun@gmail.com, chatchai.vac@gmail.com

Seepage is one cause of dam failures, particularly on embankment dam. To prevent the threat, dam investigation and monitoring must be conducted for its own safety and public safety. One possible method for dam leakage detection and monitoring is the direct current resistivity (DCR) method which is a geophysical technique used to image the resistivity structure beneath survey profile. Leakage causes resistivity changes on dam making it possible for detection. Since each dam has its own unique characteristic, conducting a general DCR survey along the dam crest cannot efficiently indicate the leakage beneath. We propose dam leakage detection procedure using Tha Thung Na dam as study case. To check resistivity anomaly which might cause by the leakage, 3-D resistivity structure of Tha Thung Na dam must be first constructed. The 2-D DCR profile on the dam crest was conducted and inverted to produce the resistivity structures. These resistivity structures along with the 3-D forward modeling code were used to construct the 3-D resistivity structure. 3-D effects from the water levels and dam geometries are then studies. Numerical simulations of water leakage on the dam core at different depths and different sizes are then conducted with the 2-D DCR profile on the dam crest. The studies reveal that (1) the 3-D resistivity structure of the dam is necessary as a reference, (2) it is possible to detect the water leakage underneath if the leakage is not too deep, and the volume is large, and (3) water level and 3-D geometry plays important roles for the leakage detection.

Keywords : direct current resistivity method, 3-D effects, dam, leakage detection

Session IV / **483**

Lepidocrocite titanate microcrystals as a platform for constructing two-dimensional (2D) nanomaterials and related structures

Invited Speaker

Summary:

Session XIII / **85**

Local Structures of Universe from CMB Dipole measurement.

Raengboon Incee[None]

Corresponding Author(s): raengboon.inc@gmail.com

From the observation of cosmic microwave background (CMB), we found the pattern of temperature fluctuation that has variation of one hot pole and one cold pole, i.e. dipole pattern. This indicates our motion relative to the CMB rest-frame, which is also taken to be rest-frame of the universe. From the CMB dipole field, we determine the velocity of the Sun (V) or solar system with respect to CMB to be in the direction of Galactic longitude and latitude $(l, b) = (263\ , 48\ )$,with speed 368 kms^{-1}. But this relation of Sun relative to CMB is the sum of three components. Therefore, we can be decompose it into a sum of local and external components. $V_{Sun\rightarrow CMB} = V_{Sun\rightarrow GC} + V_{GC\rightarrow LG} + V_{LG\rightarrow CMB}$, that $V_{Sun\rightarrow GC}$ is the motion of Sun relative to Galactic center (GC), $V_{GC\rightarrow LC}$ is the motion of Galactic center relative to Local Group (LG) and $V_{LG\rightarrow CMB}$ is the motion of LG relative to CMB rest frame.

Session XIII / **49**

Locating of Meteorite from Fireball in Thailand on 7th Septem-

ber 2015 by Contrail Calibration with Coordinates of Background Star

Teerayut Loylip[1]

[1] *191 floor 3 191 Huay Kaew Road Muang District, Chiangmai Thailand*

Corresponding Author(s): rambolove012@gmail.com

Teerayut Loylip1,2 , Suwicha Wannawichian2
1Department of Astronomy, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand
2National Astronomical Research Institute of Thailand (NARIT), Chiang Mai, Thailand
ABSTRACT
Fireball is the extremely bright meteor, which could be asteroid, comet or near Earth objects (NEOs). Those objects fall through the Earth's atmosphere, while they are heated and glow due to the collisions with particles in the atmosphere. Its contrail appears like a long tail of smoke in the sky. Their remains from the burning in atmosphere impact onto the ground. The residue of burning meteor is called "Meteorite". Astronomers can search fragments of the meteorite by compare contrail's images with background star's images that were taken from the same place to determine the location of the meteorite impact. These contrail images were used along with observing data from eyewitnesses of fireball. From this information we can confirm the direction of fireball and burning tail of the meteorites. From fireball which appeared in Thailand since September 7th 2015, we can estimate the contact point by comparing photo of contrails to background star. The contact point could locate in Sai Yok national park, Kanchanaburi province, Thailand, which is the target of finding parts of meteorite. This research will report the proceeding of meteorite explore which might remain in that area.
Keyword : fireball, asteroid, comet, Near Earth Objects (NEOs), meteorite, contrail

Poster Session A / 120

Lyman Alpha Emitter properties at z ~ 3

Pimpunyawat Tummuangpak[None]

Corresponding Author(s): pimptu@kku.ac.th

Selecting high redshift galaxies through their strong emission in the Lyman alpha feature using the narrow-band imaging method has come to be a very effective technique to isolate high redshift galaxies. Objects selected in this way are called Lyman Alpha Emitters (LAE). At redshift z ~ 3, there are several hundreds of spectroscopically confirmed LAE by several groups. In this work, we discuss LAE observational data both from photometric observation and spectroscopic follow-up observation. We then use our LAEs at z ~ 3 to measure LAE number densities and the clustering correlation function. We also performed a cross-correlation analysis of LAE and LBG (Lyman break galaxies).

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MODELING FOR PREDICTING SOIL CHARACTERIZATION USING ELECTRICAL RESISTIVITY

Author(s): Somkuan Photharin[1]

Co-author(s): Arporn Srimat [2] ; Rungnapha Chantarasakha [3] ; Vidhaya Treelo-ges [4]

[1] *Faculty of Science and Engineering, Kasetsart University Chalermphrakiat Sakon Nakhon Province Campus, Muang, Sakon Nakhon 47000. THAILAND,*

[2] *Faculty of Natural Resources and Agro-Industry, Kasetsart University, Chalermphrakiat Sakon Nakhon Province Campus, Muang, Sakon Nakhon 47000. THAILAND*

[3] *Faculty of Science and Engineering Kasetsart University Chalermphrakiat Sakon Nakhon Province Campus, Muang, Sakon Nakhon 47000. THAILAND,*

[4] *Department of Plant Science and Agricultural Resources, Faculty of Agriculture, Khon Kaen University, Muang, Khon Kaen, 40002, THAILAND*

Corresponding Author(s): sky_ubu@hotmail.com

This research aims to study the relationship between variables to model for predicting soil characteristics using electrical resistivity of the soil. The samples of soil were collected from farm of Kasetsart University Chalermphrakiat Sakonnakhon Province Campus. This modeling was considered the pH, organic matter, moisture, bulk density and texture. Then analyzed the relationship between variables using statistical methods were the correlation coefficient Spearman Rank and simple regression found that the electrical resistance of the soil was associated with the pH, organic matter, moisture and bulk density, but not associated with the texture were statistically significant at the 0.05 level. When analyzed for the best estimate model by applying a regression. The Cubic model was best estimate model for organic matter and moisture, the Exponential model was best for pH and the Quadratic model was best for bulk density. In this research, it was found that the electrical resistivity was associated many characteristics of soil and consequently it was impractical to create a model for predicting soil characteristics.

Session XXVIII / 199

Magnetic Track Width Modeling

Author(s): Sujin Suwanna[1]

Co-author(s): Chakkrit Supavasuthi [2] ; Ittipon Cheowanish [2] ; Ruchipas Bavontaweepanya [1] ; Satit Thepprathankit [3] ; Theera Yaemglin [4]

[1] *Department of Physics, Faculty of Science, Mahidol University, Phayathai, Bangkok*

[2] *Western Digital (Thailand), Co. Ltd., Bang Pa-in, Phra Nakhon Si Ayutthaya*

[3] *Department of Statistics, Faculty of Science, Kasetsart University, Ladyaow Chatuchak, Bangkok*

[4] *Western Digital (Thailand), Co. Ltd., Bang Pa-in, Phra Nakhon Si Ayutthaya; Institute of FIeld Robotics, King Mongkut's University of Technology Thonburi Bangkok*

Corresponding Author(s): sujin.suw@mahidol.ac.th, satitpor@gmail.com, theera.yaemglin@wdc.com, chakkrit.supavasuthi@wdc.com, ruchipas_sci@hotmail.com, ittipon.cheowanish@wdc.com

We perform lapping experiments on magnetic readers' and writers' heads to determine the relationship between the magnetic track width and the electrical lapping guides, used as sensors to control the writer's and reader's lapping process. The experimental results are used to construct the model calibration curve and calculate the magnetic track width sensitivity function, defined as the rate of the change of the magnetic track width with respect to the writer's height. First-principle calculations of this relationship and the magnetic track width sensitivity are also carried out with the Landau-Lifshitz-Gilbert equation using the Object Oriented Micro-Magnetic Framework (OOMMF) software. The modeling from both approaches yields consistent results, and shows that the magnetic track width sensitivity obeys a power-law relation. Consequently, we are able to investigate, predict and compensate the magnetic track width in a lapping process with reasonable accuracy.

session I / 34

Mapping the Milky Way galaxy from the observation of 21-cm spectral line from HI using SRT 4.5 m of NARIT

Author(s): Attasit Phakam[1]

Co-author(s): Kitiyanee Asanok [1] ; Phrudth Jaroenjittichai [2]

[1] *Khon Kaen University*

[2] *NARIT*

Corresponding Author(s): astronomy.thailand@gmail.com, phrudth@gmail.com, kitiyanee@gmail.com

In this study, the preliminary results are presented about the studies of kinematics properties of rotation of our galaxy and mapping the Milky Way galaxy only on quadrant I which is observed from the emission lines of neutral hydrogen (HI) at frequency 1420 MHz. Those observed HI clouds lead us to calculate the radial velocity from a shift in frequency of HI's cloud which is called Doppler effect. The radial velocities are used to calculate rotational velocities for plotting galaxy rotation curve and mapping Milky Way galaxy. The rotation curve of galaxy shows the value almost flat curve with increasing the distances. Moreover, the result of graph is used to study the distribution of mass in our galaxy. Scope of the study, HI spectrum is observed at galactic latitude 0° and from galactic longitude 25° to 85° with increasing 5° in each step. The parameter are used in this calculation as follows; the Sun's velocity obits around the Galactic center is equal to 225 ±5 km/s and the Sun's distance from Galactic center is equal to 8.34 ± 0.34 kpc respectively. We have used small radio telescope (SRT) of National Astronomical Research Institute of Thailand (NARIT) which has diameter 4.5 m. However, the radio telescope has some trouble in mechanic parts and is preparing to adjust the new receiver system in particular HI frequency. We hope to finish observation in the end of year 2016.

Session IX / 81

Mass-varying Massive Gravity with k-essence

Lunchakorn Tannukij[1] ; Pitayuth Wongjun[2]

[1] *Mahidol University*

[2] *The Institute for Fundamental Study, Naresuan University*

Corresponding Author(s): lunchakorntannukij@gmail.com, pitayuthw@nu.ac.th

Massive gravity, a gravity theory in which a graviton is given a non-zero mass, plays an important role in the late-time cosmology. Due to the inability to provide a non-trivial cosmological solution, a mass-varying massive gravity is introduced by allowing the graviton mass to change accordingly due to an extra scalar field. Unfortunately, the varying graviton mass shrinks in time and thus vanishes trivially at the moment of the late-time expansion. Here we present a new class of mass-varying massive gravity in which the graviton mass is now also a function of a kinetic term of the scalar field. Such a structure is quite remarkable since not only the graviton mass introduces an effective dark energy but there is another contribution which has a chance of being a dark matter candidate. Lastly, the cosmic evolution of this model is investigated through numerical calculations and it can be concluded that the cosmic evolution can alleviate the well-known cosmic coincidence problem.

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Measurement of Sucrose Content in Solution using UV-Vis Spectroscopy

Author(s): Jirattiporn Sanguansuttigul[1]

Co-author(s): Kheamrutai Thamaphat [1] ; Pichet Limsuwan [1]

[1] *Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangmod, Thungkru, Bangkok 10140*

Corresponding Author(s): mos_physics35@hotmail.com, zhedew19@gmail.com, dew1999@hotmail.com

Jirattiporn Sanguansuttigul, Kheamrutai Thamaphat* and Pichet Limsuwan
Green Synthesis and Application Laboratory, Applied Science and Engineering for Social Solution, Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangmod, Thungkru, Bangkok 10140

*E-mail: s903607@yahoo.com

Abstract
In food, beverage, and sugar production processes, one of the most important control parameters required in the product quality control is sucrose content or named as Brix percentage. Several methods have been developed to measure the Brix percentage. The UV-Vis spectroscopy is an alternative method to analysis sucrose content in solution due to its easy and simple. Based on Beer-Lambert law, the results showed that the highest absorption peak of sucrose solution was observed at approximately 197 nm associated with sigma to phi* electronic transition of carbon in sucrose molecule. The absorbance at this UVC wavelength increased with increasing sucrose content. The quantitative analysis can be obtained by plotting a standard curve of absorbance versus Brix percentage. The results achieved in this work can be used to develop a low cost portable device for sucrose measurement using UVC lamp and photodiode as a light source and detector, respectively.

Keywords : % Brix: Sucrose Concentration: Beer-Lambert Law: UV-Vis Spectroscopy

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Microfluidic System Fabrication for Cell Lysis

Author(s): Pongsaran Chimsiri[1]

Co-author(s): Nirut Pussadee [1]

[1] *Department of Physics an Materials Science, Chiang Mai University*

Corresponding Author(s): pongsaran1993@gmail.com, nirut.p@cmu.ac.th

For cell analysis, cell membrane disruption or cell lysis is necessary in extracting intracellular components for further examination. One of the high efficient cell lysis techniques is electroporation, in which the high electric field strength is used to create nano-size pores on cell membrane. By using microfluidic system, high electric field strength can be generated using low applied voltage due to ability to fabricate electrodes in very close proximity. Computer simulation was used to optimize electric field strength in designing microchannel. In this experiment, 2.5 cm long and 50 x 40 microns^2 cross section microchannel was fabricated in PDMS structure. The channel was attached on 30 nm thick gold planar micro-size electrodes on a glass slide. The spacing between fabricated electrodes was 83 microns, capable to producing 1.5 kV/cm when applying 15 V external voltages, which is a threshold electric field in destructing cell membrane. Algae cells were successfully used to demonstrate the performance of the device in disrupting membrane structure.

Session XVI / 229

Microstructure of Hydroxyapatite from Waste Eggshell Synthesized under Different Temperature.

Author(s): Aekgaran Sangmala[1]

Co-author(s): Kittisakchai Naemchanthara [1] ; Pichet Limsuwan [1]

[1] *King Mongkut's University of Technology Thonburi (KMUTT)126 Pracha Uthit Rd., Bang Mod, Thung Khru, Bangkok 10140, Thailand*

Corresponding Author(s): puri_kit@hotmail.com, malawi_lek@hotmail.com, ipicuwan@kmutt.ac.th

Hydroxyapatite, Ca10(PO4)6(OH)2 were prepared by the reaction of calcium hydroxide from waste chicken eggshell and di-ammonium hydrogen orthophosphate solution and heated at different temperature from 200 to 700 ℃ for 4 hour. The crystal structure, function group and morphology of hydroxyapatite were investigated by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM), respectively. The structure was found to be hydroxyapatite phase at 200 to 600℃ and the crystalline size increased with increasing temperature. However, the hydroxyapatite phase was transformed to tri-calcium phosphate phase completely at 700 ℃. The morphology of hydroxyapatite were agglomerates and sphere particles. These experiments show that the hydroxyapatite could be synthesized from waste chicken eggshell and reduced time and cost for biomaterials application.

Session IX / **257**

Monte Carlo Production Management in CMS Experiment

Author(s): Gurpreet Singh Chahal[1]

Co-author(s): Burin Asavapibhop [1] ; Narumon Suwonjandee [1] ; Phat Srimanobhas [2]

[1] *Chulalongkorn (TH)*

[2] *Chulalongkorn University (TH)*

Corresponding Author(s): burin.asavapibhop@cern.ch, gurpreet.singh@cern.ch, narumon.suwonjandeep@cern.ch, norraphat.srimanobhas@cern.ch

Monte Carlo (MC) samples are the essential components for almost all particle physics related experimental analyses. These samples are widely used for preparations of physics analyses and for predictions regarding future experiments. The MC production for a large-scale experiment like CMS is a huge effort in which billions of simulated events for thousands of individual physics processes are produced, with different conditions (e.g. detector alignment), different inputs (e.g. parton shower v/s ME generators) and many workflows (e.g. parametrised simulation vs detailed GEANT-based simulation). In 2012, the web-based service Monte Carlo Management (McM) was developed and put in production in order to aggregate the information needed for the configuration and prioritisation of the events production, to ensure the book-keeping and all the processing requests placed by the physics analysis groups as well as to interface with the CMS production infrastructure. This talk describes the strategy followed by the CMS experiment to collect, manage, process and track MC requests, as well as the tools written and deployed to satisfy the MC needs of each physics group with automated computing operations tools.

session I / **18**

Neutron Monitor Research in Thailand

Author(s): David Ruffolo[1]

Co-author(s): Alejandro Saiz [1] ; Burin Asavapibhop ; Chanruangrith Channok [2] ; Chaweewan Chaiwattana [3] ; Cherdchai Wuttiya [2] ; Manit Rujiwarodom [4] ; Nalinee Aiemsa-ad [5] ; Nattapong Kamyan [1] ; Nipon Gasiprong [2] ; Paisan Tooprakai [4] ; Pierre-Simon MANGEARD ; Pradiphat Muangha [1] ; Supon Sumran [2] ; Suttiwat Madlee ; Tanin Nutaro [2] ; Thiranee Khumlumlert [6] ; Waraporn Nuntiyakul [7] ; Warit Mitthumsiri

[1] *Mahidol University*

[2] *Ubon Ratchathani University*

[3] *Ubon Ratchathani*

[4] *Chulalongkorn University*

[5] *Rajabhat Rajanagarindra University*

[6] *Naresuan University*

[7] *Chandrakasem Rajabhat University*

Corresponding Author(s): mpaisan@hotmail.com, chawewan.chai@gmail.com, ngasiprong@yahoo.com, p_chang24@hotmail.com, hot_busdy@hotmail.com, thiraneek@nu.ac.th, psmangeard@gmail.com, supon_sumran@yahoo.com, w.nuntiyakul@gmail.com, tnutaro@gmail.com, nalinee_nook@hotmail.com, david.ruf@mahidol.ac.th, physics007@gmail.com, fhoone@hotmail.com, manit.ru@chula.ac.th, mwarit@hotmail.com, burin.asavapibhop@gmail.com, leonid21ster@gmail.com, alejandro.sai@mahidol.ac.th

A neutron monitor (NM) detects atmospheric secondary particles, mostly neutrons, due to cosmic rays, i.e., energetic particles from space. The main goal of an NM is to track time variations in the cosmic ray flux to high precision, over time scales from minutes to decades. These time variations are due to effects of the solar wind and solar storms, both of which vary with the 11-year sunspot cycle and/or the 22-year solar magnetic cycle. This talk summarizes NM research in Thailand, including the establishment of the Princess Sirindhorn Neutron Monitor (PSNM) at the summit of Doi Inthanon, and analysis of data from PSNM and other NMs worldwide. We have explained trains of enhanced daily variation at PSNM in terms of the cosmic ray anisotropy associated with high-speed solar wind streams. We analyzed data from a ship-borne NM operated by a US-Australian collaboration during 1994-2007, and confirmed a change in the cosmic ray spectrum due to a solar magnetic polarity reversal. We have developed Monte Carlo simulations of cosmic ray showers in the atmosphere and secondary particle interactions in an NM. Using a portable calibration NM from South Africa, we measured the effects of the PSNM building on the calibrator count rate and explained them in terms of Monte Carlo results. We also developed a new capability for a single NM station (PSNM) to track short-term variations in the cosmic ray spectrum, not only the cosmic ray flux, and show data on different spectral responses to different solar storms. Finally, we discuss our modeling of data from polar NMs to determine the emission of relativistic solar particles from the giant solar storm of 2005 Jan 20, which enhanced Earth's radiation environment by 50 times in some locations, and we discuss the effects of major solar storms on human economic activity.

Session VII / 258

Neutron detector response to cosmic rays during latitude surveys

Author(s): Alejandro Saiz[1]

Co-author(s): David Ruffolo [1] ; John Bieber [2] ; John Clem [2] ; John Humble [3] ; Marc Duldig [3] ; Paul Evenson [2] ; Pierre-Simon MANGEARD ; Roger Pyle [2] ; Waraporn Nuntiyakul [4]

[1] *Mahidol University*

[2] *University of Delaware*

[3] *University of Tasmania*

[4] *Chandrakasem Rajabhat University*

Corresponding Author(s): evenson@udel.edu, david.ruf@mahidol.ac.th, jwbieber@bartol.udel.edu, john.humble@utas.edu.au, alejandro.sai@mahidol.ac.th, psmangeard@gmail.com, marc.duldig@utas.edu.au, fhon188@hotmail.com, clem@bartol.udel.edu, rogerpyle@gmail.com

The study of the flux, spectrum, and directional distribution of cosmic rays arriving to Earth provides unique information in the fields of Astrophysics and Space Physics. At energies above ~ 1 GeV, the best way to study cosmic rays is by detecting, at ground level, the secondary particles produced by cosmic rays in the atmosphere, including neutrons. One standard type of neutron detector to measure cosmic ray flux and its variations is the neutron monitor, a large instrument composed of gas-filled proportional counters surrounded by a neutron-producing material (such as lead) and neutron moderating/reflecting components (e.g., polyethylene). A network of neutron monitors around the world can provide cosmic ray directional information as well as a measure of the spectrum, thanks to the differences in the Earth's magnetic field acting as a magnet spectrometer. However, difficulties are still found in combining data from different neutron monitors due to local environmental effects and inherent differences in the detector setup. Other ways to study the cosmic ray spectrum include the detailed analysis of distributions of time delays between consecutive neutron counts in a neutron monitor, and the simultaneous detection of neutrons using two kinds of detectors with

different energy response at the same location, e.g., a neutron monitor and neutron bare counters (with no lead or polyethylene). These techniques also require callibration nevertheless. In this presentation we discuss results of the operation of a mobile neutron monitor (capable of producing time delay distributions) and neutron bare counters on board a ship during a series of latitude surveys that carried the detectors from the West coast of the USA to the coast of Anctartica and back, thus providing with measurements of cosmic ray flux in a consistent way from near the Earth's magnetic pole to the magnetic equator.

Session III / **480**

Non-standard Light Yukawas and Higgs Portal

Session XVII / **186**

Northern Thailand velocity structure from azimuthal tele-seismic receiver function studies

Author(s): Tosapol Pengsai[1]

Co-author(s): Songkhun Boonchaisuk [2] ; Sutthipong Noisagool [1] ; Weerachai Siripunvaraporn [1]

[1] *Department of Physics Faculty of Science Mahidol university*

[2] *Mahidol University, Kanchanaburi Campus*

Corresponding Author(s): s.noisagool@gmail.com, wsiripun@gmail.com, sboonchaisuk@gmail.com, pengsai.t@gmail.com

Northern Thailand (NT) can be classified as the earthquake prone area, there are many active faults cutting through the area. The largest earthquake in Thailand modern history was also occurred on one of the active fault zones in the area on May 5th, 2014. In order to correctly estimate the epicenter and magnitude of the local earthquake, seismic velocity profile of the area is necessary which can be estimated from the receiver function (RF) studies. In this study, during period of this study January 2011 – August 2014, seismic data recorded by ten seismic stations in the northern Thailand were used to calculate receiver function time series. Earthquake sources in this study incident crustal layers from different directions respect to source location e.g. Japan, New Zealand, Papua New Guinea and a few from Europe. Receiver function for each station then processed in two different schemes. First, for each station, all receiver functions were processed together to produce crustal thickness and velocity structure beneath the seismic stations. Second, the tele-seismic waveforms were azimuthally classified according to its origin before processing to yield azimuthal RFs. Then Azimuthal RFs were used to estimate crustal thickness and velocity structures for each azimuth. The results reveal that both all RFs and azimuthal RFs yield similar result that crustal thickness increasing from 32 km in western part to about 40 km to the eastern part of NT. But ,there are two station, CMMT and LAMP, Chiangmai and Lampang province respectively, that present crustal thickness from azimuthal RFs is greater than that of all RFs about 1 km. Low velocity layer (LVL) can be observed with the waveform analysis. This LVL was supported by inversion of all RFs and azimuthal RFs which consistency provide the LVL at depth about 10 to 16 km at Mae Hong Son province and deeper at the depth about 16 to 24 km from Lampang province to Phitsanulok province.

Keyword : earthquake, receiver function, tele-seismic, azimuthal, low velocity layer

Session VI / **484**

Nucleation of Hydroxyapatite and Protein Crystals on Rough Surface

Piyapong Asanithi[1]

[1] *(1)Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand (2)ThEP Center, Commission of Higher Education, 328 Si Ayuthaya Rd, Thailand*

Corresponding Author(s): asanithi@hotmail.com

Summary:

Session XI / 163

On the Lagrangian 1-Form Structure of the Hyperbolic Calogero-Moser System

Author(s): Umpon jairuks[1]

Co-author(s): Monsit Tanasittikosol [2] ; Sikarin Yoo-Kong [3]

[1] *Theoretical and Computational Physics Group, Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Thailand*

[2] *Theoretical and Computational Physics (TCP) Group, Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Thailand, 10140.*

[3] *Theoretical and Computational Science Center (TaCS), Faculty of Science, King Mongkut's University of Technology Thonburi, Thailand, 10140. ∗ Ratchaburi Campus, King Mongkut's University of Technology Thonburi, Thailand, 70510.*

Corresponding Author(s): monsit.tan@gmail.com, ajairuk@gmail.com, syookong@gmail.com

In this work, we present another example of the Lagrangian 1-form structure for the hy- perbolic Calogero-Moser system both in discrete-time level and continuous-time level. The discrete-time hyperbolic Calogero-Moser system is obtained by considering pole-reduction of the semi-discrete Kadomtsev-Petviashvili (KP) equation. The key relation called the discrete-time closure relation is directly obtained from the compatibility between the temporal Lax matrices. The continuous-time hierarchy of the hyperbolic Calogero-Moser system is obtained through two successive continuum limits. The continuous-time closure relation, which is a consequence of continuum limits on the discrete-time one, is also shown to hold.

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On-Site Sequential Signal Generator of Dead and Living Yeast for Brewery Industry

Author(s): [redacted][1]

Co-author(s): Kata Jaruwongrungsee [2] ; Raymond Ritchie [3]

[1] *Faculty of Technology and Environment, Science of Physics, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

[2] *Nanoelectronics and MEMS Laboratory, National Electronics and Computer Technology Center (NECTEC), National Science and Technology Development Agency (NSTDA), Ministry of Science and Technology (MOST), Pathumthani 12120, Thailand*

[3] *Biotechnology of Electromechanics Research Unit, Science of Physics,Faculty of Technology and Environment, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

Corresponding Author(s): sakshin.b@phuket.psu.ac.th, raymond.r@phuket.psu.ac.th, sakshin.bunthawin@gmail.com

Living and dead yeast cells of all species have the same characteristics which cannot be distinguished by observation through a microscope, even if the species Saccharomyces cerevisiae has a prolate spheroid, clear yellowish and semi-major axe of 3-5 microns. In brewery industry living yeast cells during the early stages of "lag phase" growth through "exponential phase" were preferred and needed for start-up the fermentative process. The "static phase" of yeast cells possesses the highest cell density which is the optimized stage for the process. The final destination of yeast cells is mortality (death phase) which their growth rate has the minimum. There will be dead cells mixed with living cells according to cell cycle. In the past, the traditional method to check living and dead yeast cells is staining cells with "methylene blue" (or cystal violet). However the method must be done by a laboratory specialist, take time to determine cell densities through a microscope using manual cell counting devices (hemocytometer). The present project had been fully supported from Singha Beverage Company to overcome the problem and to invent the equipment that can determine dead and living cells with real time analysis and automatic report. We employed the principle of cell polarizations in AC non-uniform electric fieldS with theoretical calculation of the lower critical frequency to separate dead and living yeast cells. The invention was achieved by combination of a sequential signal generator (SSG) (to be patent) equipped with tablet computer (touch screen) for on-site operation in the brewery industry. Dead and living yeast cells were separated by tuning the unique sinusoidal electric fields (to be patent) and their percentages were analyzed through image processing with numerical report. The phase difference addressing on the opposite electrodes fixed as Pi-radian which their phase sequences can automatically be altered and circulated. This is the first equipment in the world to report success in the processing portion of living and dead yeast cells with the rapid-time analysis of 15-20 minutes per sample. The invention can be applicable to another biological cells which have the same structure comprising the plasma membrane (cell membrane) of a phospholipid lipid bilayer with or without single-multiple cell walls. Now this invention have been employed as a prototype for routine work at Singha Beverage Company.

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Optimization of the Distribution Function of Fiber Spacing in the Epithelial Slit Diaphragm in a Hydrodynamic Model Simulation of Glomerular Capillary Wall

Author(s): Kittipitch Yooprasertchuti[1]

Co-author(s): Numpong Punyaratabandhu [2] ; Panadda Dechadilok [3] ; Sakuntam Sanorpim

[1] *Student*

[2] *Department of Physics, Faculty of Science, Chulalongkorn University*

[3] *Lecturer*

Corresponding Author(s): x-mingan@hotmail.com, sakuntam@gmail.com, panadda.d@chula.ac.th, a.pong.bandhu@gmail.com

The main function of kidneys is to remove metabolic waste while maintaining constant blood composition and volume. The first step of this process is a filtration through the glomerular capillary wall which has three different layers: the endothelium cell layer, the glomerular basement membrane (GBM) and the epithelial foot process with its interconnecting slit diaphragm. Photographs from electron microscopy have shown the epithelial slit diaphragm to be a planar arrangement of interconnected fibers with non-uniform spacing. With recent advancements in nanowire creation using lithography, in our work, the possibility of constructing an artificial epithelial slit is explored through a computer simulation. The slit diaphragm is modeled as a row of parallel cylindrical fibers with spacing between fibers following the normal distribution and the gamma distribution. The dimensionless flow resistance is calculated using the finite element method. Employing the Newton-Raphson's method, a standard deviation of spacing between fibers that yields appropriate hydraulic permeability can be obtained for given values of fiber radii and mean fiber spacing. The relationships between hydraulic permeability across the epithelial slit and various parameters such as fiber radii and standard deviation of sizes of spacing between fibers, are also obtained.

Summary:

Session XXIX / 25

Optimum Condition Coating of Semi-conducting layer in Low Cost Organic Solar Cells

Author(s): Anioat Paevongjeen[None]

Co-author(s): Wantana Koetniyom [1]

[1] *Department of Industrial physics and Medical Instrumentation, Faculty of Applied Science, King Mongkut's University of Technology North Bangkok, Bangkok 10800, Thailand*

Corresponding Author(s): fd3s340hp@hotmail.com, nu_ying19@yahoo.com

The objective of this research is to determine the optimum condition coating of semi conducting layer in low cost organic solar cells. We have already determined 5 conditions of coating thin films includes type of electron transporting solution, number of electron transporting layer, concentration of electron transporting solution, drop coating volume of electron transporting layer and speed coating of active layer. All of thin film layers on ITO glass have coated by convective coating technique and type of structure solar cell for this investigation is conventional structure solar cells. The results have shown that the optimum condition of coating from 5 conditions such as the optimum electron transporting layer solution is isopropanol (IPA). The optimum number of electron transporting layer is 1 layer, the optimum composition of electron transporting material with solvent of TiOx in IPA is 1:8. The optimum drop coating volume of electron transporting layer is 40 µl and the optimum speed coating of active layer between PCDTBT:PCBM is 2000 µm/sec, respectively. From the experiment, convective coating technique has performed to show efficiency of technique by low drop volume and give high transforming efficiency. Therefore, this coating technique has potential in manufacturing high scale.

Keywords: electron transporting layer; active layer; convective coating technique; low cost organic solar cells

Poster Session A / 236

P-V criticality and phase transition in dRGT massive gravity

Paichayon Tongsin[1]

[1] *IF NU*

Corresponding Author(s): paichayon.tongsin@gmail.com

We study thermodynamics of black holes in dRGT massive gravity. The dRGT massive gravity is a modified gravity theory in which graviton mass is given to the Einstein gravity theory while Einstein gravity theory corresponds to the theory of massless graviton. The P-V criticality and phase transition of the black hole are investigated in detail by comparing the results with the van der Waals system. Being treated as a thermodynamical system, the cosmological constant-like term is treated as a dynamical pressure. The consequent conditions on the parameters in the dRGT massive gravity for having such phase transition are explored.

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Paradox Effect due to Overdose 17alpha-methyltestosterone on Electrical Sex Reversal

Author(s): [illegible][1]

Co-author(s): Sittichai Bunchuai [2]

[1] *Faculty of Technology and Environment, Science of Physics, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

[2] *Biotechnology of Electromechanics Research Unit, Science of Physics, Faculty of Technology and Environment, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

Corresponding Author(s): sakshin.b@phuket.psu.ac.th, sakshin.bunthawin@gmail.com

On commercial fish farms male tilapia is the desired sex as they grow about 25% faster and divert less energy into reproduction: well-fed females turn most of their resources into egg production. For this reason, various methods have been employed to control unwanted reproduction by female tilapia. The traditional technique has been carried out by offering feed treated with a synthetic androgen hormone (male) of 17alpha-methyltestosterone (MT) by using 30-60 mg of MT/kg of diet (5 times/day) to tilapia fry before the primal gonadal cells of the females have differentiated into ovarian tissue. However it is a prolonged process of about 28-30 days to ensure that fry have developed to be 86%-92% male. In our research we proposed a novel method to enhance all-male of sex reversal using a rapid technique of transient pulse-electric fields inductions combined with immersion technique to reach 89.23% male. Nevertheless, with the realization of the MT effects on the environment and the inefficiency and cost of current techniques, our technique needs to verify to avoid the excess use of MT, lessen the duration of treatment and lower the cost of MT hormone used relative the traditional technique of sex reversal by the feed-fry hormone treatment. The present study examines the exact value of the optimized concentration of MT that should be the maximum dose for electrical sex reversal technique. In our experiments, Nile tilapia (Oreochromis niloticus L., Chitralada III) has off-spring ratio of male:female as 0.89±0.12 (mean ± SD) possessed the number of male as 47%. Tilapia's eggs were selected as the stage development during segmentation-pharyngula (2-3dpf) (day post fertilization) for electrical inductions with the induced voltage of 375 VDC, 5 square wave pulses, 50 μs pulse durations with 1:1 mark-space ratio. Variation of MT concentrations between 500-1,000-1,500-5,000-10,000-100,000-200,000-500,000 μg.l-1 were carried out to investigate for hatching, survival and sex reversal rates. The results showed that the induced eggs had hatching rates varied from 91.00%±2.65%, 79.33%±6.11%, 90.33%±2.08%, 81.67%±12.42%, 75.23%±2.52%, 73.87%±2.42% and 68.67%±1.74%, respectively. Increasing MT concentrations shifted survival rates of tilapia to the lower values as 83.33%±3.06% to 57.00%±1.41% ($P<0.01$) as for 1,000-10,000 μg.l-1 MT, respectively, and 52.43%±2.46% to 49.57%±1.40% ($P<0.01$) as for 100,000-500,000 μg.l-1 MT. It was interesting that sex reversal rates of using 1,000-10,000 μg.l-1 MT were increased from to 89.23%±1.16% (with immersion) and 81.25%±1.13% (without immersion) but for 100,000-500,000 μg.l-1 MT sex reversal rates decreased from 53.45%±3.25% to 48%±2.86% (approach to off-spring ratio of male) which was the paradox effect of using excessive androgen hormone of MT for electrical inductions.

Session XV / 246

Peer Instruction in Physics Recitation: A Case Study of Mechanics for Undergraduate Course

Sumalee Waiyarod[1]

[1] *Department of Education, Mahidol University*

Corresponding Author(s): sumalee.nak@mahidol.ac.th

This Study was to mainly explore how students' opinions toward Physics Recitation for Mechanics as undergraduate compulsory course by using Peer Instructiion. Aslo it was to study students' achievement on Mechanics Recitation test. The qualitative and quantitative research approach were used to collect the data in the fall semester of 2014 at University of North Texas, USA. Both decriptive and inferential statistics were used to analyz the quantitative data. Meanwhile, qualitative data were collected by classroom observation and interview protocol. These data were analyzed by using content analysis. The result showed that their opinions were mostly positively, however, there were some concerns and suggestions to improve the course. For students' Mechanics scores on recitation test were statistically significant different at 0.05 level.

Session X / 29

Performance Analysis of DEMO Plasmas in the Presence of Internal Transport Barrier

Author(s): Boonyarit Chatthong[1]

Co-author(s): Jiraporn Promping [2] ; Thawatchai Onjun [3]

[1] *Department of Physics, Faculty of Science, Prince of Songkla University*

[2] *Thailand Institute of Nuclear Technology*

[3] *Sirindhorn International Institute of Technologg*

Corresponding Author(s): thawatchai@siit.tu.ac.th, boonyarit.chatthong@gmail.com, ame026@gmail.com

This work investigates plasma performance of DEMO plasmas in the presence of internal transport barrier. The study is conducted based on the simulation results carried out using a BALDUR integrated predictive modelling code. In these simulations, a combination of a neoclassical transport model NCLASS and an anomalous transport model Mixed B/gB is used. The boundary condition is described at the top of the pedestal, which is calculated theoretically based on a combination of magnetic and flow shear stabilization pedestal width scaling and an infinite-n ballooning pressure gradient model. The toroidal flow calculation is based on NTV (neoclassical toroidal viscosity) toroidal velocity model. Time evolution of plasma temperature and density profiles of ITER- and DEMO-like (European PPCS and Chinese HCSB-DEMO) plasmas are simulated with internal transport barrier (ITB). Densities of impurity (Beryllium and Carbon) and particle are compared among all scenarios. The aim of this study is to identify the optimization point between plasma performance and impurity accumulation. Though transport barriers can improve plasma performance, the significant accumulation of impurity in plasma core can lead to an enhancement of radiation loss.

Poster Session A / 90

Period Change of Binary System V1799 Orionis

Author(s): Patapong Panpiboon[1]

Co-author(s): Ronachai Lakhom [2] ; Wijit Choawanklarng [2]

[1] *1**

[2] *1*

Corresponding Author(s): 100008366225860@facebook.com, ppanpiboon@gmail.com, ron_dong@hotmail.com

Period change of binary system V1799 Orionis in this work used 0.5 meter reflecting telescope with CCD photometric system in blue, visual and infrared bands. This research was observed at Thai National Observatory, Chiang Mai. A light curve of V1799 Orionis was analyzed using program Maxlm DL5 and its period change was also calculated. The results shown that its orbital period and a continuous weak increase at a rate are 0.29031 day and 6.43876 millisecond per year, respectively. Evolution of V1799 Orionis is corresponding to Thermal Relaxation Oscillation theory.

Keywords : Binary system: Period change: V1799 Orionis: Thermal Relaxation Oscillation

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Phase stability and mechanical properties of In(P,S) under pressure: first-principles calculation

Author(s): Prayoonsak Pluengphon[1]

Co-author(s): Thiti Bovornratanaraks [2]

[1] *Division of Physical Science, Faculty of Science and Technology, Huachiew Chalermprakiet University, Samutprakarn 10540, Thailand*

[2] *Extreme Conditions Physics Research Laboratory, Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand*

Corresponding Author(s): prayoonsak@gmail.com, thiti_bovornratanaraks@hotmail.com

A first-principles calculation based on density functional theory (DFT) was performed for studying high-pressure properties of In(P,S). For calculation method, the concentration of impurity sulfur atom (S) was studied at 6.25% into super cell size 2x2x2 of InP, which called In(P,S). Phase stability and mechanical properties of InP and In(P,S) were investigated up to 10 GPa, and compared between zinc blend and NaCl-like structures. The enthalpy change, between dope-S and undope, and elastic constant under pressure were compared. It was found that the enthalpy change decreases when pressure increasing. All of the elastic constants calculated from DFT with GGA-PBE functional satisfy the Born stability criteria that is the requirements for mechanical stability. Bulk modulus and ductility of InP are increased by adding S atom and pressure.

Session IV / 37

Photo Detection in Single-Walled Carbon Nanotube Field-Effect Transistors Assembled by AC Dielectrophoresis

Author(s): Mongkol Sapankaew[1]

Co-author(s): Charndet Hruanun [2] ; Naritchapan Penpondee [2] ; Weerapad Dumnernpanich [1] ; Yodchay Jompol [1]

[1] *Department of Physics, Faculty of Science, Mahidol University*

[2] *Thai Microelectronic Center*

Corresponding Author(s): weerapad@gmail.com, charndet.hruanun@nectec.or.th, m.sapankaew@gmail.com, yodchay.jom@mahidol.ac.th, naritchaphan.penpondee@nectec.or.th

Carbon nanotubes have long been attracted much consideration as novel materials that are potentially applicable for making a wide variety of nanoelectronic devices. Due to their remarkable electronic properties, carbon nanotubes have been considered to be intelligent material that could make revolution in optoelectronic science. In this research, we reported experimental results of photocurrent measurements in single-walled carbon nanotube (SWCNT) field-effect transistors (FETs) assembled by AC dielectrophoresis method. Our SWCNTs-FET devices were prepared from high purity SWCNTs dispersed in toluene and then aligned in 3 micron gaps of Pd/Pd and Pd/Al electrodes. By using high-frequency AC voltage, a sharp ended side of each pair of the electrodes was used to produce non-uniform electric field to contact a few individual SWCNTs to make conducting channel of FETs. I-V characteristics were taken in two different electrode contacts (Pd/Pd and Pd/Al) to create built-in bias potential due to metal contact work functions. The results showed that nonlinearity of I-V curves was found in Pd/Pd electrode. In contrast to Pd/Al electrodes, diode-like behavior was presented. Charge carriers in conducting channel can be tuned due to application of gate voltage and hence field effect mobility was calculated in order of 10^5 cm^2/Vs in individual SWCNT model. Photocurrent measurement was performed by using a board wavelength (200-2500 nm) light source. We found that photocurrent was increased by increasing light-source power up to 200 W due to electron-hole pair creation process in the semiconducting SWCNT (s-SWNTs). The relationship between photocurrent and light-source power was found to be exponential grow which is different from linearity in thin-film s-SWCNTs. Photoresponsivity of the detection was calculated up to 250 A/W while quantum efficiency was found as 380% at a fixed source-drain bias voltage. This study presents the fundamental fabrication along with the photoexcitation measurements in a semiconducting single-walled carbon nanotube field-effect transistor using simple and low cost technique. Our results indicate an important implication in future nanoelectronic devices.

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Photo-Seebeck effect in delafossite CuFeO2

Author(s): Chesta Ruttanapun[1]

Co-author(s): Prathan Buranasiri [1] ; Tawipon Prakobsang [1]

[1] *King Mongkut's Institute of Technology Ladkrabang*

Corresponding Author(s): chesta.ruttanapun@gmail.com, tawipon@hotmail.com, mayga1@gmail.com

In this work, we measure Seebeck coefficient with illuminating of light. Effect of photo-Seebeck on the wide-gap oxide CuFeO2 was investigated on the photo-induced carrier contribution for enhancing thermoelectric properties. In addition, the illumination light was considered the changes of the Seebeck coefficient. Blue, Red, Green and Violet LED were used for the photon energy of the illuminated light. The Seebeck coefficient from LED was compared to the results of white light and dark light. The mechanism of photo-Seebeck to enhance thermoelectric properties for CuFeO2 will be reported and discussed.

Session IV / **93**

Photocurrent measurement in thin-film single-walled carbon nanotube field-effect transistors

Author(s): Weerapad Dumnernpanich[1]

Co-author(s): Charndet Hruanun [2] ; Mongkol Sapankaew [3] ; Naritchaphan Penpondee [2] ; Yodchay Jompol [3]

[1] *Mahidol university*

[2] *Thai Microelectronic Center*

[3] *Mahidol University*

Corresponding Author(s): weerapad@gmail.com, yodchay.jom@mahidol.ac.th, charndet.hruanun@nectec.or.th, m.sapankaew@gmail.com, naritchaphan.penpondee@nectec.or.th

A thin-film single-walled carbon nanotube (SWCNT) has been fabricated as a field-effect transistor (FET) for a photodetector at room temperature. We used suspended SWCNTs in Toluene solution in order to assembly into a micrometer-gap size of Aluminum microelectrodes on SiO2/Si substrate by dielectrophoresis technique. The assembled SWCNTs form a layered SWCNTs network that bridged between the aluminum microelectrodes of up to 120 μm long, acting as a conduction channel of the transistor. We performed photoexcitation measurements of this SWCNT thin film by illuminating Quartz Tungsten Halogen light source with broad wavelengths (λ ~ 200 - 2500 nm). The measured current was as a result of electron-hole pair creations due to multi-subband energy absorptions of the nanotubes and could be detected by electrical transport measurement up to room temperature. The excited charge carriers in the SWCNTs by increasing light emission power up to 250 W was found linearly dependence of the power, whereas in the individual SWCNT-FET device it shows as a power-law dependence at a given source-drain bias. This linear growth of light intensity was contributed to electron-phonon scattering between bundles of nanotubes and heat dissipation among them. In a comparison with a single conductive FET channel, the measured parallel FET channels exhibit a higher trans-conductance. However, the measured current of both devices shows small increases with light powers when applying gate biases and saturates at a high power. We demonstrated that the carbon nanotube materials can be used for light sensor application or energy harvesting materials for low-power consumption technology. This research can be mostly conducted in Thailand

Session XIII / **187**

Photometric Monitoring of Active Galactic Nuclei for Short-term Variability

Author(s): Supharat Charoensiri[1]

Co-author(s): Malte Schramm [2] ; Wiphu Rujopakarn [1]

[1] *Chulalongkorn University*

[2] *National Institute of Advanced Industrial Science and Technology*

Corresponding Author(s): estrelalinda4991@gmail.com, malte.schramm@ipmu.jp, wiphu.r@chula.ac.th

Active Galactic Nuclei (AGNs) typically show variability on all time scales which can range from days to years. The purpose of this work is to study intra-year variability (i.e., months-timescale) of AGNs through photometric monitoring in order to determine candidates for a follow-up study for reverberation mapping techniques. Our sample of AGNs are drawn from a well-defined quasar sample from the Hamburg/ESO Survey or HES, which consists of 330 quasars with redshifts z < 0.3. We have used the robotic Thai Southern Hemisphere Telescope at Cerro Tololo Inter-American Observatory in Chile to observe the targets in optical broadband B, V and R filters. After standard image calibration, we use a custom-written pipeline based on publicly available software to produce light curves from our observation for future analysis. We analyze the light curves to determine whether the target quasar shows intra-year variability and compare our photometry with the original HES data which was taken about 25 years ago to further study decade-scale variability. Here, we present our current results of our light-curve analysis and show some particularly notable example, such as HE1309-2501 with significant variability over short timescales.

Session VII / **47**

Photometric reverberation mapping of Quasar HE0345+0056

Author(s): Bovornpratch Vijarnwannaluk[1]

Co-author(s): Malte Schramm [2] ; Wiphu Rujopakarn [3]

[1] *Chulalongkorn university*

[2] *National Institute of Advanced Industrial Science and Technology*

[3] *CU, IPMU*

Corresponding Author(s): rujopakarn@gmail.com, bovornpratch.v@gmail.com, malte.schramm@ipmu.jp

We have analyzed photometric and spectroscopic data of HE0345+0056 which is an AGN in our ongoing variability monitoring program. Our well defined parent quasar sample is drawn from the Hamburg/ESO survey and observed in several broad- (B,V,R) and narrow-band filters with the Thai Robotic telescope in Chile.Our aim is to use photometric reverberation mapping techniques to study the BLR of our AGNs. Data reduction was done using a python based pipeline we created using publicly available software to extract the photometry in order to create light curves used in our analysis. During our observation in 2014 we have found a change in HE0345+0056 magnitude of approximately 0.1 mag in broadband BVR over 40 days extending from late August to early October (MJD 56880-56920). A follow-up spectroscopy observation started at the same time at the Higashi-Hiroshima Observatory. Spectroscopic data of 8 epochs were obtained for analysis in order to confirm the photometric results
. Here we present the results of the photometric and spectroscopic analysis and also the results from our photometric reverberation mapping using NB filters.

Session VII / **96**

Photometric studies for Color magnitude diagram and Mass distribution of Globular cluster

Author(s): Piyamas Choochalerm[None]

Co-author(s): Suwicha Wannawichian [1]

[1] *Department of Physics and Materials Science, Chiang Mai University*

Corresponding Author(s): paksapak@gmail.com, suwichawan@gmail.com

We present BV Photometry for the globular clusters (GCs) M3 (NGC 5272), M 92(NGC 6341) and M107 (NGC 6171), which are analyzed by Aperture Photometry Tool (APT). All of optical images were taken by 2.4m Telescope at Thai National Observatory in Chiang Mai, Thailand. The magnitudes of stars in three globular clusters were determined. Furthermore, the luminosity of each star was converted based on its BV magnitude, which accordingly relates to color-magnitude diagram (CMD). CMD can describe range of Turn-off point and ages of cluster. In addition, we also use mass-luminosity relation for create mass distribution of three GCs. In this study, CMD of above clusters were analyzed and compared with the result from previous studies by Buonanno, R. et al. (1994), Stetson, Peter B. and Harris William E. (1988) and Ferraro, F. R. et al. (1999). The similar evolution was shown in CMD, although our studies have less point of data. In addition, we used mass-luminosity relation to create mass distribution of three GCs. For M3, M92 and M107 we found that most of stars' population has mass range between 3.81-4.45 solar mass, 0.98-1.59 solar mass and 1.31-2.50 solar mass respectively.

Keyword: Globular cluster, Color magnitude diagram, mass distribution

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Physical Properties of Rocks in Khao Chai Son Hot Spring

Author(s): Pitchpilai Khoonphunnarai[1]

Co-author(s): Murnee Daoh [1] ; Nawarat Setapong [1] ; Phayao Yongsiriwit [1] ; Wattana Dechana [1]

[1] *160 Moo 4 Kanjanawanich Road Tambon Khaoroopchang Faculty of Sciences and Technology Muang Songkhla 90000*

Corresponding Author(s): py.skru@hotmail.com, nawaratskru@gmail.com, de_chana@hotmail.com, pitchpilai@gmail.com, murnee_daoh@hotmail.com

Study the density, volume and radioactivity of outcrop samples at Khao Chaison hot spring, Songkhla lake basin. The objective of these physical properties of rocks. The results obtained from the present study the density of Permian limestone of 2,654 ± 80 kg/m3 and volume 706.48 ± 99.50 cm3. Radioactivity measurement by using a high – purity germanium (HPGe) detector and gamma spectrometry. It was found there radioactivity 238U, 232Th and 40K with average values 4.354 ± 0.025, 18.034 ± 0.481 and 235.882 ± 0.321 Bq/Kg respectively, which are lower than radioactivity limestone in Thailand.

Session X / **487**

Plasma investigations of high power impulse magnetron sputtering (HiPIMS) discharges

Phitsanu Poolcharuansin[None]

Invited Speaker

Summary:

Session XIII / **75**

Positions of the Moon in the Lunar Mansions related to the Buddhist holy days

Author(s): Adisak Sukwisoot[None]

Co-author(s): Arthit Laphirattanakul [1] ; Siramas Komonjinda

[1] *Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand*

Corresponding Author(s): alarthit@gmail.com, jedimax.max@gmail.com, siramas@gmail.com

The position of the moon in Thai culture is divided into 27 sections according to sidereal period using reference from fixed stars. These fixed stars have 27 groups, called the lunar mansions. The days of full moon in some lunar mansions were assigned to the Buddhist holy days such as Magha Puja, Visakah Puja and Asalha Puja. It was found that before the Adhikamasa year and in the Adhikamasa year, the events of full moon may not match with the Buddhist holy days on the Thai Lunar calendar. This is due to the fact that the Thai lunar calendar was adjusted to match the solar calendar and the real lunar month. This effects the position change of the full moon in the Lunar Mansions.

Keyword: Lunar mansions, Lunar month, Thai Lunar calendar, Adhikamasa year, Buddhist holy days

Session VIII / **118**

Predicting the High-Pressure Phases of Transition-Metal Tetraborides (TMB_4, TM = Fe, Ru, and Os) using Evolutionary Algorithm

Author(s): Komsilp Kotmool[1]

Co-author(s): Prutthipong Tsuppayakorn-aek [2] ; Rajeev Ahuja [3] ; Thanayut Kaewmaraya [4] ; Thiti Bovornratanaraks [2] ; Udomsilp Pinsook [2]

[1] *Department of Physics, Mahidol Wittayanusorn School, Nakhon Pathom 73170, Thailand*

[2] *Department of Physics, Faculty of Science, Chulalongkorn University, Bangkok 10330, Thailand*

[3] *Condensed Matter Theory Group, Department of Physics, University of Uppsala, Box 530, SE 75121 Uppsala, Sweden*

[4] *Institut d'Electronique Fondamentale Bât. 220 - Centre Scientifique d'Orsay - F 91405 Orsay cedex, France*

Corresponding Author(s): thanayut.kaewmaraya@gmail.com, prutthipong.tsup@gmail.com, thiti.b@chula.ac.th, pinsook@gmail.com, k.kotmool@gmail.com, rajeev.ahuja@physics.uu.se

Transition metal borides (TMBs) are currently the subject of intensive interest because of their superhard and ultra-incompressible features. Some TMBs are classified as superhard materials mainly due to the presence of strong boron-boron covalent bonding. To guide the experiment, employing density functional theory with evolutionary algorithm for crystal structure prediction, the high-pressure crystal structures of transition-metal tetraborides (TMB_4, TM = Fe, Ru, and Os) have been reported in this work. The ambient phases of all three materials exhibit metallic phases with space groups of *Pnnm*, $P6_3/mmc$ and *Pmmn* for FeB_4, RuB_4 and OsB_4, respectively. At elevated pressure, FeB_4 and OsB_4 undergo transition to tetragonal phases with space group $I4_1/acd$ and $P4_2/nmc$ at pressure of 53.7 and 11.0 GPa, respectively.

These high-pressure phases are semiconducting and they interestingly exhibit superhard character. Both dynamic and elastic stabilities are fully investigated to ensure the existence of the predicted phases. Electronic density of states is performed to clarify structure phase transitions and formation of the superhard phases. With the advantageous properties in these materials, they might potentially be the promising multifunctional materials for advanced applications such as cutting tools or wear-resistant coatings. Therefore, this finding should substantially induce further experimental investigation.

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Prediction of Bottom Baryons Mass Spectrum

Author(s): Nuttapon Sriphathoorat[1]

Co-author(s): Ruchipas Bavontaweepanya [1] ; Sujin Suwanna [1]

[1] *Department of Physics, Faculty of Science, Mahidol University*

Corresponding Author(s): n.sriphathoorat@gmail.com, ruchipas.bav@student.mahidol.ac.th, sujin.suw@mahidol.ac.th

In recent years, heavy baryons were almost completely discovered. The remaining baryons that have not been discovered are only bottom baryons Ω_b^{*-}, Σ_b^{*0}, Ξ_b^{*-}, Σ_b^0 , $\Xi_b^{'0}$, $\Xi_b^{'-}$ and $\Xi_b^{'-}$. This study is to predict mass spectrum of bottom baryons in s-wave using a constituent quark model with non-relativistic quantum mechanics and spin-spin interaction. The calculation results are compared with the experimental data of known heavy baryons using the absolute relative errors as an indicator of prediction accuracy. The seven-parameters optimization, including constituent quark masses, is adjusted to achieve the minimum of the absolute relative errors. We obtain the results of mass spectrum within 0.001 of experimental values. Consequently, the derived model can be used to predict the masses of six aforementioned bottom baryons.

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Preliminary study of cosmic radiation expose to aircrew during local flight in Thailand

Author(s): Prapat Mahapattanathai[None]

Co-author(s): Alejandro Saiz [1] ; Chanpeng Angchakan [2] ; David Ruffolo [1] ; Dumrongsak Rodphothong [2] ; Tanin Nutaro [2]

[1] *Mahidol University*

[2] *Ubon Ratchathani University*

Corresponding Author(s): alejandro.sai@mahidol.ac.th, chanp2010@gmail.com, jammyrodphothong@gmail.com, patmaha@gmail.com, tnutaro@gmail.com, david.ruf@mahidol.ac.th

We have measured the atmospheric secondary radiation due to cosmic ray showers along specific flight trajectories within Thailand. The secondary radiation at aircraft altitude is complex, with different types of particles over a large energy range. Using SEI Inspector detectors, the ionizing radiation dosage rate was measured at altitudes of 30,000, 33,000, and 36,000 feet to be 1.168 ,1.275 and 1.617 μSv/hr respectively.

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Preparation and Microstructure of CaCu3Ti4O12 /SrTiO3 Multilayered Thin Films grown on LaAlO3 (100) Substrates by a Sol-Gel Method

Author(s): Wiwittawin Sukmas[1]

Co-author(s): Satreerat K. Hodak [2]

[1] *student*

[2] *advisor*

Corresponding Author(s): kenny_sukmas@hotmail.com, satreerat.h@chula.ac.th

In this work, highly quality CaCu3Ti4O12(CCTO)/SrTiO3(STO) heterostructures were successfully synthesized on LaAlO3 (LAO) substrate via a sol-gel method. The annealing temperature was fixed at 800 °C. Our films were deposited with four layers; CCTO/CCTO/CCTO/CCTO, STO/STO/STO/STO, CCTO/STO/CCTO/STO and CCTO/CCTO/STO/STO. From X-ray diffraction patterns, it was concluded that the CCTO, STO films and their multilayers deposited on LAO(100) substrates tend to be predominantly (h00) oriented. Based on our analysis, CCTO films have a cubic structure with estimated lattice parameters of 7.376 Å (3.688 Å) and for STO with estimated lattice parameters of 3.888 Å, while LAO has a pseudo-cubic structure with a calculated lattice constant of 3.790 Å. Interestingly, the TiO2 (004) anatase which is commonly present as an impurity phase in CCTO films was suppressed in CCTO/STO multilayer films. The surface morphology and the interface layer of the films were characterized by FE-SEM technique.

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Preparation and Optical Properties of ZnO/rGO Nanocomposites

Author(s): Sasithorn Srirattanapibul[None]

Co-author(s): Sirikanjana Thongmee [1]

[1] *Department of Physics, Faculty of Science, Kasetsart University*

Corresponding Author(s): fscisjn@ku.ac.th, cynthia_freedom@hotmail.com

Zinc oxide-Reduced graphene oxide nanocomposites (ZnO/rGO) were successfully synthesized via hydrothermal method. This research synthesized graphene oxide by modified hummer method and varied concentration of zinc hydroxide. The structure and morphology were characterized by X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM). The optical property was investigated by UV-Vis spectrophotometer. XRD spectra confirmed that ZnO/rGO nanocomposites showed hexagonal wurtzite structure. SEM images showed that at low concentration of zinc hydroxide solution, ZnO nanorods had inserted into the rGO sheet. At higher concentration of zinc hydroxide solution, ZnO nanorods distributed on the rGO sheet. The result from UV-vis investigated that the GO sample has an absorption peak at 222 nm. The others ZnO/rGO nanocomposites showed the absorption peaks at 220, 260 and 385 nm, respectively. In addition, the band gap energy of ZnO/rGO nanocomposites showed the values between 2.2 – 2.4 eV.

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Preparation of Tablet Activated Carbon from Carbon Waste with Starch as Binder

kriangsak kraiwattanawong[None]

Corresponding Author(s): kkkkrai@hotmail.com

Chada Siriphattananon1, Siriporn Romjinda1, and Kriangsak Kraiwattanawong1*
1Department of Chemical Engineering, Faculty of Engineering, King Mongkut's Institute of Technology Ladkrabang, 1 Chalongkrung Rd., Ladkrabang, Bangkok, Thailand, 10520

*E-mail: kkkkrai@hotmail.com

Abstract
A powdered carbon waste derived from a combustion chamber in a pulp mill is eliminated by landfill. The purpose of this work is to add a value to the carbon waste by preparing a tablet activated carbon (TAC). TACs were prepared from the carbon waste with starch as a binder. The carbon waste and starch were blended and molded to form tablet composites. The mass ratio of a binder to a carbon waste (B/C) was ranged from 0.05 to 0.25 g/g. The tablet composite was carbonized at 700 oC for 90 min to become a tablet carbon (TC) and subsequently activated by CO2 at 700-900 oC for 30 min to be TAC finally. TC and TAC were characterized by nitrogen adsorption, scanning electron microscopy (SEM) and compression testing. The results show that the apparent density is decreased by the increase of B/C ratio. At B/C = 0.10 g/g, the modulus of TC is maximized at 0.25 MPa and its TAC is decreased to 0.22 MPa since the mass loss. The SEM images of TC and TAC reveal that the carbon structure from starch is spherical particles deposited on the surface of carbon wastes. The more starch addition, the smaller surface area and the smaller mesopore volume of TCs and TACs are obtained. It is possible that starch may act as film closing the pore and its carbon structure's starch has the low porous properties; therefore, the porous properties of TCs and TACs are decreased with the increase of B/C ratio.

Keywords : Activated carbon: Pulp waste: Starch: Porous properties

Summary:

Session XVI / 214

Preparation of glass-ceramic materials from glass powder compacted

Author(s): Nattawat Kulrat[1]

Co-author(s): Duangkhae Bootkul [2] ; Somsak Dangtip [1]

[1] *Department of Physics, Faculty of Science, Mahidol University, Bankok, 10400, Thailand*

[2] *Department of General Science, Faculty of Science, Srinakharinwirot University, Bangkok 10110, Thailand*

Corresponding Author(s): nattawat1729@gmail.com, duangkha@swu.ac.th, somsak.dan@mahidol.edu

Glass-Ceramics is known to have very good mechanical properties while combining good properties from glass or ceramics which otherwise having them separately. Such good mechanic properties allow machining to any desirable shape or form, which is important in ornamental or fashionable area. In this work, soda lime glass powder (SLG), combining with other precursor such as SiO_2, TiO_2, and pigment oxide powders, was prepared. Weight composition of SLG-SiO_2-TiO_2-Pigment oxide, prepared by conventional melt-quenching technique, was investigated. The thermal profile of glass transition and crystallization were studied by differential scanning calorimetry (DSC). The crystal structure of the sintered glass-ceramics was carried out by X-ray diffraction (XRD) and the microstructure studies performed by scanning electron microscopy (SEM). The results show that devitrification of this glass system leads to glass-ceramics material. Its application in artificial opal gemstone work is foreseen.

Keywords: Differential scanning calorimetry (DSC), Glass-Ceramics, Soda lime glass (SLG)

Session IX / 209

Projected Search for Physics Beyond the Standard Model in Proton-Proton Collisions with the Monojet Signature from the Future Circular Collider at $\sqrt{s}$ = 100 TeV

Author(s): Surapat Ek-In[1]

Co-author(s): David Ruffolo [1] ; Phat Srimanobhas [2]

[1] *Mahidol University*

[2] *Chulalongkorn University (TH)*

Corresponding Author(s): norraphat.srimanobhas@cern.ch, surapat.ek-in@cern.ch, david.ruf@mahidol.ac.th

We study the potential of the Future Circular Collider detector for hadron collisions to prospect the search for physics beyond the standard model at a centre-of-mass energy of 100 TeV. The study includes signals from large extra dimensions and dark matter production in events comprising a hadronic jet and an imbalance of transverse momentum. Background samples, including $W/Z + jets$, $t\bar{t}$, and QCD dijet, are obtained from "HepSim repository with Monte Carlo predictions for High Energy Physics experiments". Signal events are generated using the PYTHIA8 for the extra dimensions model and the MADGRAPH5 for the dark matter model. Detector simulation is produced by the DELPHES fast detector simulation. The data are normalized to an integrated luminosity of 1 ab^{-1} which corresponds to an expected operation of the Future Circular Collider in a year. Expected limits are placed on the new Planck's scale M_D for the extra dimensions model and the contact interaction Λ for the dark matter model.

Session III / **38**

QED Photon-Photon Scattering

Author(s): Suppanat Supanyo[1]

Co-author(s): Udom Robkob [1]

[1] *Mahidol University*

Corresponding Author(s): suppanatsupanyo@gmail.com, udom.rob@mahidol.ac.th

The QED scattering amplitude and cross section of $\gamma\gamma \to \gamma\gamma\gamma\gamma$ are calculated. The lowest order of this process appears in sixth order of the S-Matrix in which each photon interact with the other by creation of pair massive virtual fermions in the vacuum. This can be applied to calculation of the sixth-rank vacuum polarization tensor vector boson.

Session XXVII / **137**

Quantum Molecular Dynamics Simulation of Lithium Ion in Water Cluster

Author(s): Phadungkiat Kwangkaew[1]

Co-author(s): Teepanis Chachiyo [2]

[1] *Naresuan University*

[2] *advisor*

Corresponding Author(s): teepanisc@nu.ac.th, phadungkiatk53@email.nu.ac.th

We have implemented a computer code to perform quantum molecular dynamics (QMD) simulation. The motion of nuclei are treated with Newton's 2nd law of motion; whereas the electrons are treated quantum mechanically using Hartree-Fock approximation. The code has been applied to study a small cluster of water molecules, consisting of 28 H2O. The simulated radial distribution function is then compared to the experimental results. A lithium ion is placed adjacent to the water cluster; and an external electric field is applied in order to study how the ion interacts with its surrounding as the ion is accelerated by the external field, and moving through the water molecules. By tracking the speed of the ion, we can determine the mobility of the ion. QMD is a part a larger set of capabilities in Siam Quantum program.

Session XXVII / **94**

Quantum Molecular Dynamics Simulation of an Atom Encapsulation by Fullerene

Author(s): Somphoach Saichaemchan[1]

Co-author(s): Teepanis Chachiyo [2]

[1] *Naresuan University*

[2] *The Institute for Fundamental Study*

Corresponding Author(s): somphoachs58@email.nu.ac.th, teepanisc@nu.ac.th

We have implemented a computer code to perform quantum molecular dynamics (QMD) simulation. The motion of nuclei are treated with Newton's 2nd law of motion; whereas the electrons are treated quantum mechanically using Hartree-Fock approximation. The code has been applied to study how an atom is encapsulated by fullerene (C60). A helium atom is placed 3 Angstrom away from the C60 cage. An initial kinetic energy is then given to the atom, shooting it into the cage. If the initial speed is small, the atom bounces back. By increasing the initial velocity, we can determine the minimum energy required to push the atom inside the C60 cage. QMD is a part a larger set of capabilities in Siam Quantum program.

Session XXVIII / **154**

Raman Spectroscopy of GaN films on (001)- and (110)-oriented GaAs substrates

Author(s): Pitshaya Praigaew[1]

Co-author(s): Kentaro Onabe [2] ; Noppadon Nuntawong [3] ; Sakuntam Sanorpim [1]

[1] *Chulalongkorn University*

[2] *The University of Tokyo*

[3] *National Electronics and Computer Technology Center (NECTEC)*

Corresponding Author(s): sakuntam@gmail.com, kentaro.onabe@gmail.com, cliffex@hotmail.com, noppadon.nuntawong@gmail.com

Structural phases in the GaN films grown on the (001)- and (110)-oriented GaAs substrates were investigated by μ-Raman spectroscopy with the excitation wavelengths of 473, 532 and 633 nm. Raman spectra show a significant shift of phonon modes between the films on the (001)- and (110)-oriented substrates. For the films on the (001)-oriented substrates, phonon mode of cubic-TO was clearly observed at 553 cm^{-1}. On the other hand, the films on the (110)-oriented substrates showed a higher intensity of hexagonal-E_2-high localized at 568 cm^{-1}. Furthermore, Raman spectra, which measured using different excitation wavelengths of 473, 532 and 633 nm, show that the phonon mode observed at a higher wave number is significantly shifted from 736 to 739 cm^{-1} for the wavelengths of 473, 532 and 633 nm, respectively. It is well known that the phonon modes localized at 736 and 739 cm^{-1}

are attributed to hexagonal-A_1 (hexagonal-LO) and cubic-LO, respectively. While Raman shift of cubic-TO at 553 cm^{-1} is found to independence on the excitation laser wavelengths. These indicate that the cubic-LO phonon mode is sensitive to the excitation wavelength of 633 nm compared to other excitation wavelengths. Another possibility is due to the different of penetration depths of the laser wavelengths. It is interpreted that the GaN films exhibited more hexagonal phase in the region close to the GaN surface region. In contrast, the GaN films exhibited more cubic phase at the region near the GaN/GaAs interface.

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Rapid Technique of Sex Reversal of Commercial Fish using Various Pulse Waveforms

Author(s): Sakshin Bunthawin[1]

Co-author(s): Sittichai Bunchuai [2]

[1] *Biotechnology of Electromechanics Research Unit, Science of Physics, Faculty of Technology and Environment, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

[2] *Biotechnology of Electromechanics Research Unit, Science of Physics, Faculty of Technology and Environment, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

Corresponding Author(s): wachirawut_@hotmail.co.th, sakshin.b@phuket.psu.ac.th

The present study employs various transient electric fields of square pulses, exponential decay and combination of square pulses with arbitrary mark-space ratio (pulse width: negative half of period) to enhance sex reversal of the commercially important freshwater and marine fish in suspensions for monosex-male. The eggs of Nile tilapia (Oreochromis niloticus L.), blue-spotted coral trout (Plectropomus leopardus) and cobia (Rachycentron canadum) obtained from our parent breeding stocks were carefully selected for electrical inductions in pulsed-electric field strengths of 0.25-87.50 kVm-1 generated between narrow plate electrodes. The prototype of the electrode equipped with the sequential signal pulse-generator (SPG) for on-site inductions was fabricated which could induce 2,000 eggs/SPG unit at one time (to be patent). The electroporation medium (EPM) of tilapia was prepared using HEPES buffer with a minimized concentration of the androgen hormone of 17alpha-methyltestosterone (MT) and the medium for the marine fish contained PBS buffered (1M mannitol added to make the EPM medium isotonic to seawater, pH 7.5 adjusted with NaOH) with the minimized 1,500 µg.l-1 MT (to be patent). We experimentally optimized electroporation by adjusting the number of square wave pulses, pulse durations and the mark-space ratio. For tilapia, we found that 5 square wave pulses, 50 µs pulse durations with 1:1 mark-space ratio were the optimized conditions for sex reversal rate with the maximum values of 87.70%±15.13% (mean ± SD) hatching and 73.04%±6.15% (mean ± SD) survival rate. All male sex reversal rates of tilapia eggs treated with 1,500 µg.l-1 MT were achieved at 81.25%±1.13% with the induced voltage of 375 VDC. For the marine fish, 3 square-wave pulses of 50 µs duration with 2:1 mark-space ratio and 350-420 VDC were the optimized with sex reversal rate of 66.45%-72.51% (n=450), less than 30% egg death. It should be noted that stages of egg development (day post fertilization: dpf) during zygote (1dpf)-cleavage-blastula-segmentation (2dpf)-pharyngula (3dpf) could be employed for electrical sex reversal but pharyngula was the optimized phase. The prototype of the electrode equipped with the controlled SPG for on-site inductions could operate within 15 min for each induction with the rapid time consumption.

Session XXVII / **491**

Reconfigurable two-qubit gates for single photon polarization state

Pruet Kalasuwan[None]

Corresponding Author(s): don_calaio@hotmail.com

Invited Speaker

Summary:

Session IX / **213**

Reconstruction of Standard Model top and anti top quarks from simulated pp collisions with $\sqrt{s}$ = 13 TeV

Author(s): Vichayanun Wachirapusitanand[None]

Co-author(s): Burin Asavapibhop [1] ; Gurpreet Singh Chahal [1] ; Kittikul Kovitanggoon [1] ; Narumon Suwonjandee [1]

[1] *Chulalongkorn (TH)*

Corresponding Author(s): vichayanun@hotmail.com, snarumon@gmail.com, gurpreet.singh@cern.ch, kittikul.kovitanggoon@cern.ch, burin.asavapibhop@cern.ch

A reconstruction for the Standard Model top and antitop quarks is conducted via analysing simulated proton-proton collisions at centre-of-mass energy of 13 TeV. MadGraph Monte-Carlo event generator is used, along with DELPHES detector simulator, and recorded using ROOT data format. The generated events contain one million collision events, which contains $t\bar{t} \rightarrow WbWb$ decay channel, where each event is comprised of reconstructed and identified physics objects such as jets, muons, and electrons. For this project, hadronic and leptonic decay channels of W bosons are considered. The reconstructed objects are analysed in order to reconstruct masses of top and antitop quark.

Session XIV / **493**

Registration

Session XV / **51**

Rocket propulsion activity at Mahidol witthayanusorn School

Ratchanikorn Koomramyakul[1]

[1] *Mahidol Witthayanusorn School*

Corresponding Author(s): ratchanikorn@mwit.ac.th

Rocket propulsion is a complex and hard to understand content of Mechanics subject. For better understanding and learning perception, we established the problem solving activity called “Water rocket competition”. We assigned for every class, 10 classes and 240 students, in Grade 10 at Mahidol Witthayanusorn School for creating two home-made water rocket bottles for their class. The competition was held at the evening at February 18, 2016. The rule were the student have to launch rocket 2 time for aiming to target and got a score. After a competition, we assigned student for descripting their rocket by Physics perspective, the pros and cons of their rocket. The result showed that the average of the perception is 4.36 of 5 full scale. The students had fun about this completion and they can better explain the rocket propulsion.

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Room temperature ferromagnetism in Fe-doped LaTiO3 nanofibers

Author(s): wichaid ponhan[1]

Co-author(s): Kanthaluk Wongmali [2] ; Nattaya Srikhamwiang [2] ; Pornchai Chinnasa [2] ; Santi Maensiri [3]

[1] *1**

[2] *1*

[3] *2*

Corresponding Author(s): chinnasa@hotmail.com, nattayasrikhwiang3437@gmail.com, santimaensiri@g.sut.ac.th, wichaidponhan@gmail.com, virus202405@gmail.com

Perovskite Fe-doped LaTiO3 nanofibers were fabricated by simple electrospinning using a solution that contained poly(vinylpyrrolidone) (PVP), Lanthanum nitrate (La(NO3)3.6H2O) and Diisopropoxytitanium bis(acetylacetonate) solution. The Fe-doped LaTiO3 nanofibers with average diameters of 100 - 200 nm were successfully obtained from calcination of the as-spun Fe-doped LaTiO3/PVP composite nanofibers at 800 oC in argon for 2 h. The as-spun and Fe-doped LaTiO3 nanofibers were characterized by SEM, XRD, TEM, and VSM. The results of XRD and TEM with selected electron diffraction (SEAD) analysis indicated that the calcined samples of Fe-doped LaTiO3/PVP composite nanofibers had cubic perovskite structure. Room temperature magnetization results showed ferromagnetic behavior in the calcined samples having clear hysteresis ferromagnetism in the field range of ± 5000 Oe. The saturation specific magnetization (Ms) increased with increase in Fe proportion. The Ms and coercivity (Hc) values of the samples were in the ranges of 0.22 – 0.92 emu/g and 220 - 246 Oe, respectively.
Keywords : Electrospinning, nanofibers, lanthanum titanate, ferromagnetic and diluted magnetic oxide.

Session XI / 173

Rope Coiling on a Plane

Sitichoke Amnuanpol[1]

[1] *Physics department, Thammasat University*

Corresponding Author(s): sitichok@tu.ac.th

Feeding the elastic rope steadily from the height toward a plane with constant velocity results in the circular coiling which is a manifestation of the buckling instability. The axial compressive forces, responsible for the buckling instability, are the own weight of rope due to the gravity and the inertial force due to the momentum of rope. The coiling frequency and the coiling radius are studied as a function of height and feeding velocity. Remarkably, there exists a characteristic velocity v^* at which the coiling radius is largest. At feeding velocity faster than the characteristic velocity v^* the inertial force dominates over the gravitational force. This characteristic velocity v^* is experimentally found to increase with decreasing height h in qualitative agreement with the dimensional analysis argument which predicts the relationship $v^* \sim h^{-1}$.

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Rotating Black Hole Solution in dRGT Massive Gravity

Lunchakorn Tannukij[1] ; Pitayuth Wongjun[None] ; Ratchaphat Nakarachinda[2]

[1] *Mahidol University*

[2] *The institute for fundamental study, Naresuan University*

Corresponding Author(s): pitayuthw@nu.ac.th, tahpahctar_net@hotmail.com, lunchakorntannukij@gmail.com

It is well-known that most astronomical objects in nature are spinning. In general relativity, these objects correspond to the axially symmetric solutions, for example, the rotating solution of black hole which is called Kerr black hole solution. Even though the axially symmetric solution is useful, it is very difficult to obtain the analytic solution due to nonlinearity of Einstein equation. Fortunately, there is an interesting method to find a rotating solution which is called Newman-Janis trick. In this presentation, we examine this method by applying it to the static solution for obtaining the rotating solution in dRGT massive gravity. The dRGT massive gravity is a modified gravity theory in which graviton mass is given to the Einstein gravity theory while Einstein gravity theory is the theory of massless graviton. A detailed study in the rotating black hole solution of a modified gravity theory may provide us an ability to understand complicated gravitational objects in nature.

Session X / **477**

SHEAR-DRIVEN DYNAMO WAVES IN THE FULLY NON-LINEAR REGIME

Peera Pongkitiwanichakul[1]

[1] *Mahidol University*

Corresponding Author(s): peerious@gmail.com

P. Pongkitiwanichakul[1&2], G. Nigro[2], F. Cattaneo[2], & S.M. Tobias[3]

[1]Department of Physics, Mahidol University, Bangkok, Thailand,10400

[2]Department of Astronomy and Astrophysics, University of Chicago, Chicago IL, 60637, USA

[3]Department of Applied Mathematics, University of Leeds, Leeds, LS2 9JT, U.K.

Large-scale dynamo action is well understood when the magnetic Reynolds num- ber (Rm) is small, but becomes problematic in the astrophysically relevant large Rm limit since the fluctuations may control the operation of the dynamo, obscuring the large-scale behavior. Recently, Tobias & Cattaneo (2013); Cattaneo & Tobias (2014) demonstrated numerically the existence of large-scale dynamo action in the form of dynamo waves driven by strongly helical turbulence and shear. Their calculations were carried out in the kinematic regime in which the back-reaction of the Lorentz force on the flow is neglected. Here, we have undertaken a systematic extension of their work to the fully nonlinear regime. Helical turbulence, and large scale shear are produced self-consistently by prescribing body forces that, in the kinematic regime replicate the original velocity used by Tobias & Cattaneo. We have found four different solution types in the nonlinear regime for various ratios of the fluctuating velocity to the shear and Reynolds numbers. Some of the solutions are in the form of propagating waves. Some solutions show large-scale helical magnetic structure. Both waves and structures are permanent only when the kinetic helicity is non-zero on average.

Summary:

Session XIV / **494**

SLRI-01 Current status of the BL5.2: SUT-NANOTEC-SLRI XAS beamline

PINIT KIDKHUNTHOD[None]

Corresponding Author(s): p.kidkhunthod@gmail.com

Session XIV / **495**

SLRI-02 "Synchrotron Micro X-ray Fluorescence (μ-XRF)Spectroscopy and Imaging Beamline (BL6b) at Siam Photon Laboratory "

J. Chaiprapa[None]

Session XX / **497**

SLRI-03 Photoemission Spectroscopy (PES) at Siam Photon Laboratory

Narong Chanlek[1]

[1] *Suranaree University of Technology (TH)*

Corresponding Author(s): narong.chanlek@cern.ch

Session XX / **496**

SLRI-04 Small Angle X-ray Scattering beamline at Synchrotron Light Research Institute

Siriwat Soontaranon[None]

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STRUCTURAL, VIBRATIONAL AND OPTICAL PROPERTIES OF THICK GaPN FILMS GROWN ON GaP SUBSTRATE BY MOVPE

Author(s): Noppadon Toongyai[1]

Co-author(s): Kentaro Onabe [2] ; Sakuntam Sanorpim [1]

[1] *Chulalongkorn University*

[2] *The University of Tokyo*

Corresponding Author(s): tumz_toongyai@hotmail.com, kentaro.onabe@gmail.com, sakuntam@gmail.com

Structural, vibrational and optical properties of thick GaPN films with the N contents of 0.8, 1.8 and 5.4 at% on GaP (001) substrates have been investigated using high resolution X-rays diffraction technique (HRXRD), Raman spectroscopy and micro-photoluminescence spectroscopy (micro-PL). The GaPN films were grown by metalorganic vapor phase epitaxy (MOVPE) using Tertiarybutylphosphine (TBP) and dimethylhydrazine (DMHy) as Ga, P and N precursors, respectively. The thickness of the films with N contents of 0.8, 1.8 and 5.4 at% was reduced to be 347, 327, 317 nm, respectively. All the films were examined under tensile strain with a partial relaxation. Despite the fact that the GaPN films were incorporated with N as high as 5.4 at%, however, smooth surfaces and fairly flat interfaces are visibly observed by atomic force microscopy (AFM) and scanning electron microscopy (SEM). Raman spectra reveal the N-related vibrational modes (N-VMs) in range of 440 – 520 cm^{-1}, which is the first observation for the dilute GaPN alloy. The N-VMs intensity exhibits a linear relationship on the N content determined by HRXRD. This confirms that the incorporated N atoms are substituted at the P lattice, resulting in an isolated local vibrational mode and the NN_i

pairs related vibrational modes. Room temperature bandgap was obtained by micro-PL is dramatically reduced when the N content is increased. A huge bandgap bowing parameter of the GaPN is calculated to be 10 eV. The relationship between film relaxation and bandgap reduction is carefully concerned.

Session III / **121**

Search for a Narrow Resonance Produced in 13 TeV pp Collisions Decaying to Electron Pair or Muon Pair Final States

Author(s): Gurpreet Singh Chahal[1]

Co-author(s): Burin Asavapibhop [1] ; Narumon Suwonjandee [1]

[1] *Chulalongkorn (TH)*

Corresponding Author(s): gurpreet.singh@cern.ch, narumon.suwonjandeep@cern.ch, burin.asavapibhop@cern.ch

A search for a new narrow resonance decaying to an electron pair or a muon pair is performed using 13 TeV pp collision data collected by the CMS experiment at the CERN. The electron event sample used corresponds to an integrated luminosity of 2.6 fb^{-1} while the muon event sample used corresponds to an integrated luminosity of 2.8 fb^{-1}. No evidence for such a resonance is observed and limits are set at the 95% confidence level on a new massive narrow spin 1 boson decaying into electron or muon pairs. These limits exclude a sequential standard model Z'_{SSM} resonance with a mass lighter than 3.15 TeV and superstring-inspired Z'_{ψ} with a mass lighter than 2.60 TeV.

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Simulation and experimental analysis on the performance of PEMFC based on bipolar plate designs

Author(s): Pornchai Chinnasa[1]

Co-author(s): Ekaphan Swatsitang [2] ; Pattama Khamsuk [3] ; Sarunya Seechalee [3]

[1] *Program of Physics Rajabhat Maha Sarakham University*

[2] *Department in Physics Khon Kaen University*

[3] *Rajabhat Maha Sarakham University*

Corresponding Author(s): a_runya_406@hotmail.com, ekaphan@kku.ac.th, chinnasa@hotmail.com, pattama_7529@hotmail.com

A polymer electrolyte membrane fuel cell (PEMFC) shows different levels of performance analysis depending on the bipolar plate designs of the flow fields. The designs of the flow fields vary depending on the diffusion flux, which is the flow in a channel moving through a layer of gas diffusion to catalyst layers. However, flow fields that can suppress concentration loss in the area of high-current density have been suggested. The bottom of the cathode channel was fabricated in a parallel type and the anode channel was fabricated in a serpentines type to increase the velocity gradient of the flow from the gas diffusion layer. Experiments were conducted to compare the simulation results. It is demonstrated that the simulation results are in agreement with the experimental ones for bipolar plate, therefore the simulation model could be employed as a predictive tool to provide optimal parameters for better performance of a polymer electrolyte membrane fuel cell (PEMFC).

Session XXVII / **73**

Simulation of Double Quantum Dots Charge Qubit Manipulation with Electric Field Pulses

Author(s): Aniwat Kesorn[1]

Co-author(s): Asawin Sinsarp [1] ; Pruet Kalsuwan [2] ; Sujin Suwanna [1] ; Worrasak Sukkabot [3]

[1] *NECTEC-MU Collaborative Research Unit on Quantum Information, Department of Physics, Faculty of Science, Mahidol University, Bangkok 10400, Thailand*

[2] *Department of Physics, Faculty of Science, Prince of Songkla University, Songkhla 90110, Thailand*

[3] *Department of Physics, Faculty of Science, Ubon Ratchathani University, Ubon Ratchathani 34190, Thailand*

Corresponding Author(s): pruet.kal@gmail.com, kesorn_aniwat@hotmail.com, asawin.sin@mahidol.ac.th, w.sukkabot@gmail.com, sujin.suw@mahidol.ac.th

This study investigated the manipulation of a charge qubit by simulation for purpose of quantum computing. The charge qubit was constructed by modeling with InAs/GaAs double quantum dots (DQDs) based on sp3s* empirical tight-binding calculation. The manipulation concerned the evolution of the charge qubit, such as the state dynamics under the electric field pulses, and the leakage of probability to higher-order states of DQDs, called quantum leakage. The results demonstrated how the electric field pulses had influence on the state dynamics by determining the axes and frequency of rotation via specifying eigenstates and eigenenergies of the Hamiltonian. For quantum leakage, the pulse shapes with large changes and higher slope induce more quantum leakage than ones with smooth profiles. In addition, for the square electric field pulses, the simulations were also performed when the applied electric field pulses inherited uniform random fluctuation in amplitude and operating time. In this case, it was found that the precision of state measurement, quantified by the standard deviation (SD) of the occupancy probability in a dot, was proportional to the SD of the random fluctuation in amplitude. But for random fluctuation in operating time, such the proportionality does not exist. In both cases of random fluctuation, the accuracy of measurement, obtained by comparing the dynamics of the occupancy probability profile in a dot under pulses with no fluctuation, was shown to have non-monotonic relation with the fluctuation strength after some time.

Keywords: Double Quantum Dots; Gate Operation; Finite Electric Field Pulses, Quantum Leakage

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Size controlling of Nanoparticle for DNA detection

Author(s): thidarat wangkam[1]

Co-author(s): Kunwara Techasuksakul [1] ; Supaporn Kanjai [1]

[1] *KMUTNB*

Corresponding Author(s): thidarat.w@sci.kmutnb.ac.th, supapornkanjai@gmail.com, title-37@hotmail.com

The prevalence of new and current diseases is rising continuously. A high sensitivity and rapid detection are main concern for the development, especially in clinical diagnostic. Recently, DNA detection have been designed for higher precisely detection. One of DNA sensor is the DNA tagging with nanoparticles. It is widely used to apply in a variety of target including nucleic acids, small molecule and protein. This work would show the possibility of applying the nanoparticles in DNA hybridization detection. The characteristics of the nanoparticles were studied by transmission electron microscopy (TEM) and Ultraviolet spectroscopy in real serum solution by using a simple optical technique. The results was shown about the key parameters for size changing in nanoparticles and correlation to the capability of DNA detection. Some parameters such as time for seed growth, pH value and acids reagents were proved that there are effect on the size of nanoparticles. The UV-via signal were analyzed to show the size controlling of nanoparticles.

Session XVII / **113**

Solar Radiation Estimation in Thailand Using Angstrom-Prescott Model and Empirical Methods

Author(s): kulaya keawsang-in[None]

Co-author(s): Sujittra Ratjiranukool [1]

[1] *advisor*

Corresponding Author(s): suin99@gmail.com, kulaya_whan@hotmail.com

It is required equipment and technique for measuring of global solar radiation and its component in many regions. There are financial difficulties in limited solar radiation measurement especially in developing countries. In this study, Angstrom-Prescott model could be employ to estimate solar radiations for 11 stations in Thailand. The empirical coefficients have been determined by five empirical methods, i.e., Food and Agriculture Organization (FAO), Rietveld model, Glover Mc-Culloch model, Tiwari & Sangeeta model and least square model. The estimated solar radiation was determined with measured solar radiation by using statistical tests; mean percentage error, mean bias error, root mean square error and correlation.

Session VII / **202**

Solar and Lunar Eclipses Modeling by Using Minecraft for Elementary Students

Author(s): Sirithip Yingphaiboonsuk[None]

Co-author(s): Chanvit Junngam [1] ; Sukanya Nutaro ; Tawinan Rodhiran [2]

[1] *Ubon Ratchathani University*

[2] *Ubon Ratchathani Rajabhat University*

Corresponding Author(s): sukanya.vi@ubru.ac.th, snoobykak@gmail.com, sirithip.yed56@ubru.ac.th, pectploy@gmail.com

Solar and lunar eclipses are astronomical phenomena which is an excellent topic for introducing astronomy to primary school students. We have used Minecraft which is a popular game about placing blocks to construct anything and can make a simple model of the Sun, Moon and Earth easily. The background knowledge of Pratom 6 students (grade 6) has already had about the position of them on Earth and how they see the Sun and Moon. This article will show how students investigate the relationship between Sun, Moon and Earth and when will solar and lunar eclipses occur in their game situation. After class students should draw and write essay about solar and lunar eclipses concept journal. The result will be shown at the conference.

Session XXVI / **219**

Special Quasirandom Structures

Author(s): WIRUNTI PUNGTRAKOON[1]

Co-author(s): Thiti Bovornratanaraks ; Udomsilp Pinsook

[1] *Chulalongkorn University*

Corresponding Author(s): wirunti.p@gmail.com, thiti_bovornratanaraks@hotmail.com, pinsook@gmail.com

Substitutianal alloys are disorder crystalline structure. First-principles study of alloys is take a large supercell that equivalent to a pure random structure. Structural models used in calculations of properties of substitutional random A_(1-x) B_x alloys are usually constructed by randomly occupying each of the N sites of a large periodic supercell by A or B. However this method is not efficient. But there is a way that it is possible to design "Special Quasirandom Structures" (SQS) that simulate the small periodic supercell. It can be compared to structures that have large number of configurations or large cell sizes. The proposed method optimizes the supercell with the occupation of the atomic sites (A or B). Using the language of Ising models to define the product of spin variable for each atomic sites. Then calculate a lattice average to construct special periodic quasirandom structures that can be used in the calculating total energy, optical and thermodynamic properties.

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Specific energy consumption and drying kinetics of far-infrared dried

Author(s): Mali Nachaisin[None]

Co-author(s): Papassorn Pumniam [1] ; Wanida pharanat [1] ; Wanwisa Jansopha [1]

[1] *Program of Physics, Faculty of Education, Rajabhat Maha Sarakham University*

Corresponding Author(s): sanawong_14@hotmail.com, wanidapharanat@hotmail.com, nachaisin@gmail.com, mali_nachaisin@yahoo.com

This study was conducted to evaluate specific energy consumption in various drying systems including advantages of infrared assisted drying process. Tests were conducted using instant rice berry under various experimental conditions as follows: In far-infrared drying were 50 and 700C, air velocity levels 0.5 m/s and 2 intensity levels (1 and 2 kW/m2). Drying kinetics and qualities in terms of moisture content final moisture of 8% (d.b.), color, morphology and rehydration of the instant rice berry were experimentally investigated.
Experimental results showed that specific energy consumption at 2 W/m2 was 5.8 kWh/kg of water removed resulting in a 55% energy saving when compared to 1 kW/m2 of far-infrared intensity. The drying rate rapidly increased to a maximum value and then gradually decreased into the falling rate period. The increase in far-infrared power caused a rapid increase in the temperature at the surface of kernels, resulting in an increase of the water vapor pressure inside the kernels and thus in higher drying rate. The higher far-infrared intensity, however, resulted in the larger total color differences of the product. Increasing far-infrared intensity from 1 kW/m2 to 2 kW/m2 led to the dramatic increase in rehydration ratio by 30%.

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Spectroscopic studies of ruby and pink sapphire samples

Author(s): Punchanok Chompu[1]

Co-author(s): Wiwat Wongkokua [1]

[1] *Kasetsart University*

Corresponding Author(s): gam_sakura@hotmail.com, wiwat.w@ku.ac.th

X-ray fluorescent spectrometry, Fourier-transform infrared (FT-IR) and UV-vis spectroscopies are advanced techniques that can be used to characterize gem materials. Transition metal defects are causes of colors in corundum. Fe and Ti are the causes of the blue color in blue sapphire while Cr is the cause of the colors in ruby and pink sapphire. In this work, we investigated the differentiation

between ruby and pink sapphire samples. The amount of Cr, Ti, Fe and V were analyzed by x-ray fluorescent spectrometry. The concentrations of the defects were calibrated using NIST 610 standard reference material (SRM) and laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS). The vibrational and optical characteristics were analyzed by the FT-IR and UV-vis spectroscopic techniques respectively.

Session XIX / 112

Spectroscopic study of the RX Hya – an Algol-type system with pulsating, mass-accreting component

Author(s): Napaporn A-thano[1]

Co-author(s): David Mkrtichian [2]

[1] *National Astronomical Research Institute of Thailand, Chiang Mai 50200, Thailand*

[2] *National Astronomical Research Institute of Thailand, Chiang Mai 50200, Thailand and Crimean Astrophysical Observatory, Taras Shevchenko National University of Kyiv, Nauchny, Crimea, 98409, Ukraine*

Corresponding Author(s): napaporn.ath@gmail.com, davidmkrt@gmail.com

RX Hydrae is a short-period (2d.2815) Algol-type eclipsing binary system with a pulsating primary component. This system was discovered by H.S. Leavitt (Pickering, 1907), the first spectroscopic elements were determined by Struve (1946) and the absolute parameters of this system was derived by Vyas & Abhyankar (1989). Short-periodic pulsations in a light curve of a primary component were detected by Kim et.al (2002). We carried out the spectroscopic observations of this binary system in order to improve the binary system parameters and for spectroscopic study of pulsations in the primary component. Spectroscopic observations were acquired during 13 nights between 2014-2015 with the 2.4-meters telescope of Thai National Observatory (TNO) and fiber-fed medium resolution echelle-spectrograph. We obtained new accurate orbital radial velocities of two components of the binary system and search for pulsational variability of the primary component. Results of these investigations and new orbital parameters are presented.

Session XXVI / 241

Spin-polarized transport through ferromagnetic graphene microstructures with Fermi velocity modulation

Author(s): Chaiyawan Saipaopan[1]

Co-author(s): Wachiraporn Choopan [2] ; watchara liewrian [3]

[1] *Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangmod, Thungkru, Bangkok, Thailand 10140*

[2] *General Education Section, Christian University of Thailand, Donyaihom District Nakhonpathom, Thailand 73000*

[3] *Theoretical and Computational Science Center (TaCS), Science Laboratory Building, Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangmod, Thungkru, Bangkok, Thailand 10140*

Corresponding Author(s): chaiyawan78@gmail.com, choopan_7@hotmail.com, watchara.liewrian@mail.kmutt.ac.th

Chaiyawan Saipaopan 1, Wachiraporn Choopan 2 and Watchara Liewrian 1*

1 Theoretical and Computational Science Center (TaCS), Science Laboratory Building,
Department of Physics, Faculty of Science, King Mongkut's University of Technology Thonburi, Bangmod, Thungkru, Bangkok, Thailand 10140

2 General Education Section, Christian University of Thailand, Donyaihom District Nakhonpathom, Thailand 73000

*E-mail: watchara.liewrian@mail.kmutt.ac.th

Abstract
Theoretical and numerical modeling of a graphene-based spin-filter spintronic with Fermi velocity engineering are investigated. These graphene-based spintronic devices will open up new ways for creating a new generation of electronic devices which are smaller, faster and consumes less electric power. The spin filtering is a key issue for spintronic applications. The influence of velocity barrier (VB) on the spin transport of massless Dirac particles in ferromagnetic graphene are theoretically studied in a NG/FG/VB/NG junction. It consists of a ferromagnetic graphene region (FG) which is deposited by metallic gate and the velocity barrier is located on the left side of the ferromagnetic graphene where the propagation of massless Dirac fermion through a VB region of graphene with a position-dependent velocity. By biasing the FG region with the gate voltage (U), spin conductance is oscillating as function of Fermi velocity and its phase is shifted by varying U on ferromagnetic graphene. This system may be used as a tunable spin-polarized source.

Keywords : Graphene: Magnetic tunnel junction: Dirac equation: Spin polarization: Velocity modulation

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Spinnability of Polyacrylonitrile-based nanofibers by sol-gel electrospinning process: blend and composite fibers

Author(s): Tanissara Pinijmontree[1]

Co-author(s): Santi Maensiri [2] ; Sophida Thaingwiriya [3]

[1] *Devision of Chemistry, Faculty of Science and Agricultural Technology, Rajamangala University of Technology Lanna Tak, Tak 63000 Thailand*

[2] *School of Physics, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 40000 Thailand*

[3] *School of Chemistry, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 40000 Thailand*

Corresponding Author(s): sophida007@hotmail.com, arassinat@gmail.com, santimaensiri@g.sut.ac.th

Polyacrylonitrile (PAN)-based electrospun nanofibers were attracted significant attention during the last several years as a simple and straightforward method to produce nanostructures, which are of interest in many applications. Such as filter materials, composite materials, biomedical applications (tissue engineering, scaffolds, health care, drug release systems), protective clothing, photoelectronic devices, photonic crystals and flexible photocells . The PAN-based nanofibers were prepared with series of polymer blend and polymer composite. 10 wt% PAN was prepared by dissolving PAN in DMF and stirring at room temperature for 12 h. A series of PAN/PVP blend and PAN/TiO2 composite were prepared with 1-50 wt% of fillers (PVP and TTIP). The electrospinning process was performed by using a 10 mL syringe having a capillary tip which 0.2 mm inner diameter, the voltage is 7 kV, flow rate 1 mL/h and the distance between tip and collector is 15 cm. The morphology of PAN-based nanofibers was investigated by SEM and found the different between blend and composite fibers. Thermal properties such as thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC) also show the decreased thermal stability with increased fillers. Similarly, X-ray diffraction (XRD) and Fourier transform infrared (FTIR) measurements confirmed the decrease in crystallinity with the increase in fillers content.

Session XIII / 48

Starobinsky Model in Rainbow Gravity

Auttakit Chatrabhuti[None] ; Phongpichit Channuie[1] ; Vicharit Yingcharoenrat[None]

[1] *co-researcher*

Corresponding Author(s): dma3ac2@gmail.com, channuie@gmail.com, vicharit.yingcharoenrat@gmail.com

In this work, we study the Starobinsky's model of inflation in the context of gravity's rainbow theory. We assume that the rainbow function can be written in the power-law form of the Hubble parameter. In addition, we clearly formulate the expressions of the spectral indices, the power spectra, and the tensor-to-scalar ratio associated with both scalar and tensor perturbations and we also compare the results of our model to Planck 2015 data. Finally, it turns out that the values of the number of e-folds N_k and the rainbow parameter λ are constrained to be $42 \leq N_k \leq 87$ and $\lambda \leq 6.0$ respectively in order to be well consistent with the Planck data up to 2σ C.L..

Session XIX / **95**

Statistical Properties and Optical Followup of Fast Radio Bursts

Author(s): Jompoj Wongphecauxson[1]

Co-author(s): Phrudth Jaroenjittichai [2] ; Siramas Komonjinda [3] ; Utane Sawangwit [2]

[1] *Chiang Mai university*

[2] *National Astronomical Research Institute of Thailand (Public Organization)*

[3] *Chiang Mai University*

Corresponding Author(s): phrudth@gmail.com, u.sawangwit@gmail.com, jompoj.bjstp@gmail.com, siramas@gmail.com

Fast radio bursts (FRBs) are intense transient millisecond radio signal with large dispersion measures (DM). Radio signal, which propagates through cold plasma, is dispersed as frequency square. After subtracted from the effect from galactic interstellar medium, the FRB's DMs are still large. This can be interpreted as FRBs have an extragalatic origin.As DM is related to the free electron content along the line of sight, FRBs are expected to be use as a universe probe. Until now, only 17 FRB have been detected. Only FRB 150418 has been proposed with an optical counterpart by Subaru telescope (Keane, 2016). FRB121102 has been found to be repeating 10 times since 2012. In this work, we have calculated luminosity function from current FRB population, and result from the optical follow up of FRB 150418 by Thai National Telescope.

Keywords:Cosmology, Radio Astrophysics.

Session XXII / **255**

Structural and magnetic properties of single crystal (311) plane of Co0.3Zn0.7Fe2O4 ferrite by ceramic method.

Anuwat Hassadee[1]

[1] *bansomdejchaopraya rajabhat University, Bangkok, 10600*

Corresponding Author(s): anuwat8652@hotmail.com

Anuwat Hassadee1*, Kedsarin Meemon1, and Tippavan Hongkachern1
1Department of Science, Faculty of Education, Bansomdejchaopraya Rajabhat University, Bangkok, 10600

*E-mail: anuwat8652@hotmail.com

Abstract
Co0.3Zn0.7Fe2O4 ferrites were prepared by ceramic process and sintered 1250oC, 1300oC and 1350oC. The crystal structural, morphological and magnetic properties of ferrite were determined by X-ray diffractometry (XRD), scanning electron microscopy (SEM), and vibrating sample magnetometer (VSM) respectively. The result of samples show that cubic spinel ferrite and the crystallite size increases from 6.80 Å to 9.08 Å with the increase sintering temperature from 1250oC to 1350oC. The magnetization and cocercivity of samples were found to be ~22 emu/g and 29 Oe, respectively which independent of sintering temperature. The single crystal Co0.3Zn0.7Fe2O4 ferrite can be prepared at temperature 1350oC (rate 3oC/min) for 2 h. It was found that single crystal (311) plane.

Keywords : Co0.3Zn0.7Fe2O4: single crystal: ceramic method

Session XV / 72

Students' Alternative Conception in Vector Components with and without Physical Context

Umporn Wutchana[1]

[1] *Ramkhamhaeng University*

Corresponding Author(s): peak_um@hotmail.com

2 open ended problems designed based on research instruments used in physics education research had been used to explore students' conceptual and procedural understanding of vector components. With and without physical context, we asked students to find out magnitude and graphical form of vector components. The problems were given to 211 first year students of faculty of science during the third semester in 2014 academic year. The students spent approximately 15 minutes of their General Physics I course to complete the open ended problems. Consequently, their responses were classified based on the similarity of errors performed in the responses. The study results showed that without physical context, 53% of the students provided correct numerical magnitude of vector components while 10.9% of them punctuated the magnitude of vectors in x- with y-component. Others 20.4% provided just symbols and there was no answer of the last 15.6%. When asking to draw graphical form of vector components, only 10% of the students made corrections. A majority of them produced errors and revealed alternative conceptions. 46.5% drew longer and/or shorter vector components. 43.1% drew vectors in different form or wrote down other symbols. With physical context, only 6.6% of the students made corrections in numerical magnitude while 6.2% drew longer and/or shorter vector components. Almost all of them drew other force vectors in any axis instead. It indicated that many students did not develop a strong foundation of understanding in vector components and could not apply those concepts to such problems with physical context.

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Studies of water hyacinths's residues by X-ray spectroscopy techniques.

Author(s): Kanokrat Singnui[1]

Co-author(s): Nakarin Kamonkul [2]

[1] *Princess Chulabhorn's college Nakhon Si Tammarat*

[2] *Princess Chulabhorn Science High School Nakhon Si Tammarat*

Corresponding Author(s): skanokrat208@gmail.com, phu.nakharin@gmail.com

The purpose of this study were to study the heavy metal residures in aquatic plant, hyacinth, by using X-ray spectroscopy technique. The samples were collected from Somdet Phra Srinagarindra 84 (Thung Talad) park, Nakhon Si Thammarat Province. It was found that the relative abundances of Fe, Mn, Zn, Pb, Br, Rb and Sr with respect to Ga (internal standard) decreased with the distance from the landfill waste, while Ni and Cu did not show the decrease.

Poster Session A / 52

Study of Orbital Elements of Asteroids in Cometary Orbits Using 2.4 m and 0.7 m Diameter Telescopes

Sittiporn Dueantakhu[1]

[1] *191 floor 3 siriphanis building huaeykew Road Sutep Muang Ching mai 50200*

Corresponding Author(s): sittiporn666@gmail.com

Classification criterion for identifying asteroid and comet has been developed continually for several decades. However the main concepts for the criterion remain unchanged. Comet has gas, which vaporizes from its surface when it travels into inner solar system (about 2 astronomical units). On the other hand, an asteroid does not emit gas anywhere in its orbit. The discoveries of asteroids and comets have increased for the past few years. Therefore, new classification methods of asteroid and comet based mainly on their orbital elements, which are used to calculate the Tisserand's parameter of Jupiter (Tj). In this work, the orbital elements of asteroids in cometary orbits are studied by using 2.4 m and 0.7 m diameter telescopes based on celestial coordinates from images of asteroids. The study uses astrometry technique to find the real position of asteroid in space and calculate its orbital elements. This work focuses on asteroids with high variation in position by selecting asteroids, which have Tj < 3 and are disturbed by the gravity of Jupiter. Orbital elements and the Minimum Orbit Intersection Distance (MOID) are calculated and compared with astrometry result of other observations, which is acquired from Minor Planet Center database.

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Study of bremsstrahlung photon in bulk media with 1 GeV electrons using MCNP

Author(s): Wichita Tuisakda[1]

Co-author(s): Siriyaporn Sangaroon [1]

[1] *Department of Physics, Faculty of Science, Mahasarakham University, Kantarawichai District, Mahasarakham, 44150, Thailand*

Corresponding Author(s): wichita.tuisakda@gmail.com

The aim of this research is to study the bremsstrahlung photon production in the different targets bombarded by 1 GeV electrons. The calculations were performed by the Monte Carlo code MCNP. The model consists of the electron beam with the Gaussian distribution with the full width a half maximum 0.90 MeV and the target. The six material of the target with the density between 2 to 20 g/cm3 were studied. The high bremsstrahlung photon scattered shows in the high density material as well as the photon flux is increasing. The copper shows a high performance due to high photon flux production, low scattered photon, and low electron flux. In addition, the copper target was varied with the difference thicknesses between 0.01 cm to 2.5 cm. The photon flux significantly increases when the target thickness increase from 0.01 cm to 1.5 cm while the electron flux is constant. Moreover, the angular distribution of the bremsstrahlung photon with angle between 0 to 120 degrees was carried out for the copper target thickness 0.01, 0.05, 0.25, 0.75 and 2.5 cm. The maximum angle of the photon scattered is about 20 degree.

Keywords: bremsstrahlung, electron beam, MCNP

Summary:

Session XI / **33**

Study of chaotic motion in double rod pendulum

Author(s): Phum Siriviboon[None] ; Wichapol Dendumrongsup[None] ; Yotawee Subthira[None]

Co-author(s): Somporn Buaprathoom

Corresponding Author(s): sp_phys@hotmail.com, phum.gene@gmail.com, camera_1998@hotmail.com, wichapol261298@hotmail.c

Chaotic system is the system that normally occurs in the nature, and it is really sensitive to initial conditions. This makes chaotic system be unpredictable after the "critical time". Most physics experiments are chaotic and, therefore, the experimental results should be collected before reaching critical time otherwise the experiment will be under chaotic condition which makes experimental results be meaningless. This research is conducted to find the factors which affect on the critical time for double pendulum. The motion of the double rod pendulum was tracked by using high speed camera and tracking program. The initial angle of the double physical pendulum to the vertical axis was varied. The critical time of each initial angle is determined by considering when the trajectories of the double physical pendulum released at the same initial angle start to diverge from each other. The results show that when the initial angle is very small, the critical time will approach infinity. On the other hand, when the initial angle is large, the critical time will reach zero. Moreover, there is some initial angles that critical time increase abruptly; meaning that the system suddenly become orderly. Furthermore, it is found that there is a good correlation between the result from the experiment and from the theory.

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Study of structure and particle size of PbTe thermoelectric material prepared by Hydrothermal method

Author(s): PHITSAMAI KAMONPHA[1]

Co-author(s): Somkid Pencharee [2]

[1] *Department of physics,Factulty of Science,Ubon Ratchathani University,Thailand*

[2] *Department of physics,Faculty of Science,Ubon Ratchathani University,Thailand*

Corresponding Author(s): phitsamai.own1993@gmail.com, spencharee@gmail.com

The purpose of this research is to study structure and particle size of PbTe thermoelectric material prepared by hydrothermal method. Thermoelectric AgPb18SbTe20 alloy were prepared from compounds of AgNO3, Pb(NO3)2, SbCl3 and TeO2 by hydrothermal method with different heating temperature and time. Then, the samples were dried in vacuum furnace for 6 h. After that the structure and particle size were characterized by XRD and SEM, respectively. The observed XRD peaks for (111), (200), (220), (311), (222), (400), (420) and (422) can be indexed to FCC rock-salt structure of PbTe. The most suitable condition for hydrothermal process is 200 oC of heating temperature and 20h of heating time due to the cube shape grains with the size of ~100-200 nm and shaped into a cube.

Keywords: Hydrothermal, Thermoelectric material, Lead Telluride

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Study of the banknote deterioration factors by absorption

Author(s): Chatthip Eaksittipong[1]

Co-author(s): ratchapak chitaree

[1] *272 Department of Physics, Faculty of Sciences, Mahidol University, Rama VI road, Phyathai, Bangkok 10400*

Corresponding Author(s): rachapak.chi@gmail.com, feelwork.scpy@gmail.com

A banknote has been considered to be a prime medium of payment from past to present. The use of the banknote in daily life unavoidably cause more or less deterioration to its properties. An optical property of banknotes especially in the areas of security printing in of interest in this study. Hundred bath Thai banknotes are used became of their unique security features. A number of deterioration factors such as folding to several shapes, washing with different liquids and sacking with adhesive tapes are applied to the chosen banknotes. The optical method for investigations is the measurement of visible absorption using forensic light sources and spectrometer. The investigation reveals many interesting results such as which factor causing the most degradation to the security feature of banknotes.

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Study of the correlation between a number of splines from honey drop and liquid properties

Author(s): Nattakrit Kritmanorot[1]

Co-author(s): ratchapak chitaree

[1] *272 Department of Physics, Faculty of Sciences, Mahidol University, Rama VI road, Phayathai Bangkok 10400*

Corresponding Author(s): rachapak.chi@gmail.com, n.kritmanorot@gmail.com

In fluid mechanics, the stains of liquid drop serve us much information such as impact direction, impact velocities or liquid properties, through their mechanisms. In the perpendicular impact, splines, the spreading mechanism of the liquid out of the circumference, can be observed. There are a number of research studies demonstrating the generation of the splines and determining the spread factor along with Reynold and Weber numbers of a particular liquid drop. In this study, a number of splines generated by honey perpendicularly dropped to a porous surface are also investigated in terms of its relation to Reynold and Weber numbers. Honey is a common liquid which can be kept for a long time and also easy to vary liquid properties. The impact surface is porous become its offers a clear observation of the splines. Stains of honey drop are captured by a camera and the captured images are then analyzed by ImageJ program to count the splines. Finally a number of splines are plotted as function of Reynold and Weber numbers to reveal their correlation.

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Surface Plasmon Resonance Refractometers Based on Smart Phone Platforms

Author(s): Sawanya Boonchuay[1]

Co-author(s): Pakorn Preechaburana [1] ; Supaluck Amloy [2]

[1] *Department of Physics, Faculty of Science and Technology, Thammasat University*

[2] *Department of Physics, Faculty of Science, Thaksin University*

Corresponding Author(s): mosawanya90@gmail.com, pakornpr@gmail.com, supaluckam@gmail.com

Abstract

Herein we demonstrate the surface plasmon resonance (SPR) refractometers based on smart phone platforms. The optical element used in this system is a single disposable device, which is configures to use conditioned illumination and optical detection from smart phone cameras. The SPR sensing element is fabricated by a soda lime glass slide coated with 50 nm gold film covered by the custom made epoxy resin flow cell. The performance of the smart phone-base SPR refractometers was evaluated by detecting the ethanol/water solutions with different concentrations ranging from 0% to 40% with 10% interval. The results demonstrate that our smart phone-base SPR refractometers is feasible to measure the refractive index of liquid sample and offer an attractive possibility in many applications such as health and environment monitoring.

Keywords: Surface plasmon resonance, Sensor, Optical sensing, Refractometer, Mobile Phone

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Synthesis and Acetylene Sensing Properties of Zinc Oxide Nanostructure-Gold Nanoparticles Composites

Supab Choopun[1] ; Wasupon Luijantuek[2] ; pichitchai pimpang[2]

[1] *Department of Physics and Materials Science, Faculty of Science, Chiang Mai University*

[2] *Faculty of Science and Technology, Pibulsongkram Rajabhat University*

Corresponding Author(s): supab99@gmail.com, p.pimpang@gmail.com, dod_love4@hotmail.com

In this work, acetylene sensing property of zinc oxide (ZnO) nanostructures-gold nanoparticles (Au NPs) composites were investigated and compared to ZnO nanostructures. Firstly, ZnO nanostructures were prepared by thermal oxidation of zinc films at oxidation temperature of 700□C for 5 hours. Au NPs were then assembled onto the surface of ZnO nanostructures via photoreduction of 1x10-4 M HAuCl4 solution with deposition time 10, 20, and 30 minutes. The morphology of ZnO nanostructures were comprised of nanowires branched into their ZnO bases. Diameter of ZnO wires were measured approximately 200 nm. After photodeposition, Au NPs were assembled onto their ZnO nanoswire and ZnO base with diameter less than 50 nm. In addition, an amount of Au that to be load onto ZnO increased with increasing of deposition time. Finally, ZnO nanostructures and ZnO nanostructures-Au NPs composites were applied as acetylene gas sensors. Therefore, gas sensing properties of sensors will be investigated at operating temperatures in the range of 150-450□C.

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Synthesis and Characterization of titanium nitride by RF magnetron sputtering

Author(s): Wasin Nupangtha[1]

Co-author(s): Chanchai Umongno [1] ; Dheerawan Boonyawan [1]

[1] *Chiang Mai University*

Corresponding Author(s): por_77sushi@hotmail.com, dheerawan.b@cmu.ac.th, beekboyz@gmail.com

Titanium nitride coatings have been used very successfully in a variety of applications because of their excellent properties, such as hard and decorative coatings and also diffuse barriers in semiconductor technology. This paper aim to find optimize deposition conditions of Titanium nitride thin film on the glass substrate and focuses on characterization by RF magnetron sputtering technique. The proper plasma conditions used to deposit Titanium nitride film were carried out by the optical emission spectroscopy (OES).The film physical properties will be analyzed by X-ray diffraction (XRD)

Keyword: titanium nitride,thin film,RF magnetron sputtering

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Synthesis and Structure of Titania Nanotube Arrays by Anodization for H2 Production

Udom Tipparach[1]

[1] *Ubon Ratchathani University*

Corresponding Author(s): udom.t@ubu.ac.th

The synthesis of highly ordered titania nanotubular arrays as working photoanodes for H2 Production cells by anodization of Ti metal foils in different electrolytes is presented. Data analysis of X-ray diffraction (XRD) conforms that the titania nanotubular arrays are mainly anatase. Scanning electron microscope (SEM) analysis indicates that the titania composed of nanotubes have a high porous tubular morphology. UV-Vis spectra analysis indicates that the band gap of the titania nanotube arrays is about 3.0 eV. The maximum hydrogen generation of the titania nanotube arrays at an illumination of 100 mW/cm2 for 1 h is 0.34 mL/h-cm2.

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Synthesis and characterization of Calcium oxide as catalyst for biodiesel production

Author(s): Juthamas Inthanont[1]

Co-author(s): Kittisakchai Naemchanthara [2] ; Pichet Limsuwan [2] ; Weeranut Kaewwiset [3]

[1] *King Mongkut's University of Technology Thonburi*

[2] *King Mongkut's University of Technology Thonburi*

[3] *Kasetsart University, Kamphaeng Saen Campus*

Corresponding Author(s): poisonjz3651@gmail.com, opticslaser@yahoo.com, puri_kit@hotmail.com, fasswnka@ku.ac.th

The catalyzer for biodiesel production in this work was prepared from cockle shell. The cockle shell was heated in the air at different temperature from 200 to 1300 C for 4 h. The cockle shell before and after heated was characterized by X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR). Nuclear magnetic resonance spectroscopy (NMR) was used to determine yield of biodiesel from cockle catalyze. The results shown that the natural phase of cockle shell was

aragonite phase and changed to calcite phase after heated at 400 C. The calcite phase of cockle shell was completely transformed to calcium oxide (CaO) after heated at 900 C. The yield of biodiesel from CaO from cockle shell after heated at 1100 to 1300 C had higher than other were compered. The results from this research indicated that the CaO from cockle shell could be used as a catalyst for biodiesel production.

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Synthesis of Natural Dye Sensitizer Local for Dye-sensitized Solar Cell (DSSC) Application

Author(s): Wijit Choawunklang[None]

Co-author(s): Tanachai Ponken

Corresponding Author(s): ponken_t@hotmail.com, wijit34@gmail.com

The DSSC has been the attractive for third generation of photovoltaic. Natural dyes were synthesized from the Turmeric, the saman bark, Bai-ya-nang, the Butterfly pea and Black rice, respectively. Molecules of natural dye were distilled from ethanol, butanol and acetonitite which are solvent. The concentration of natural dye were fixed by ratio of weight of natural dye powder: solvent volume (1 g:10 ml). Characteristic color and light absorption of natural dye were analyzed by digital camera and UV-vis spectroscopy (wavelength of 290 – 1100 nm). The complete cell was fabricated from the molecule of dye insert in porous TiO2 working electrode (P25), electrolyte (iodide/tri-iodie liquid) and platinum (Pt) counter electrode, respectively. The photon light conversion to photocurrent was measured by solar simulator (under light intensity of 100 mW/cm2, AM 1.5). Results, the characteristic color of natural dye show yellow, brown, green, light green and opaque white for the turmeric, saman bark, Bai-ya-nang, butterfly pea and black rice, respectively. Light absorption of Bai-ya-nang and the turmeric sensitizer can be seen higher than the saman bark, the Butterfly pea and Black rice, respectively for wavelengths of 500 – 700 nm. However, the maximum cell efficiency of 0.2% was achieved from the turmeric dye due to adhesion of turmeric dye with porous TiO2 occurred several more than other natural dye. Although, absorption spectra of Bai-ya-nang dye obtains the highest but molecule cannot adhered with porous TiO2. Our results show that this simple preparation of the natural dye local cab be applied as a dye sensitizer for DSSC.

Session XVII / 161

Synthesis of Nitrogen-Rich Carbonaceous with High Porous Volume for Supercapacitor Application

Author(s): Thanyathorn Sangprasert[1]

Co-author(s): Lapporn Vayachuta [2] ; Nurak Grisdanurak [3] ; Paisan Khanchaitit [2] ; Pongtanawat Khemthong [2] ; Thitikorn Boonkoom [2]

[1] *Center of Excellence in Environmental Catalysis and Adsorption, Thammasat University, Pathumthani 12120, Thailand, Department of Chemical Engineering, Faculty of Engineering, Thammasat University, Pathumthani, Thailand*

[2] *National Nanotechnology Center (NANOTEC), National Science and Technology Development Agency (NSTDA), Pathumthani, Thailand*

[3] *Center of Excellence in Environmental Catalysis and Adsorption, Thammasat University, Pathumthani 12120, Thailand, Department of Chemical Engineering, Faculty of Engineering,Thammasat University, Pathumthani 12120, Thailand.*

Corresponding Author(s): lapporn@nanotec.or.th, paisan@nanotec.or.th, thitikorn@nanotec.or.th, pongtanawat@nanotec.or.th, ss.thanyathorn@gmail.com, gnurak@engr.tu.ac.th

The nitrogen (N)-rich carbonaceous material has gained remarkable interest fueled by their potential use as high energy density materials for electrical storage. Using this materials as primary components in supercapacitor electrode gives a superior ability to form double-layer charge coupling, therefore capacitance increase significantly. In this work, we introduce a novel method to convert biowaste into carbonaceous materials, in this case, spent coffee ground. The raw material is selected due to their naturally containing of high amount of nitrogen. The synthesizing process is composed of two major steps, hydrothermal and chemical activation using KOH. The effect of chemical ratio between N-rich biochar and KOH on surface area and specific capacitance significant was investigated from 1:1 – 1:4. The resulted carbon structure obtained the nitrogen content as high as 1.8 wt.%. The best condition to produce a high porous N-rich carbonaceous was 1:4 (Biochar: KOH) with BET surface area of 1,115 m2/g and porous volume of 0.53 cm3/g. The carbonaceous was used to fabricate high efficiency electrodes for supercapacitor and provided the specific capacitance of 165 F/g at scan rate 0.05 V/s in 6 M KOH electrolyte.

Summary:

Session XVI / **489**

Synthesis, Structural, Crystallization Kinetics and Electrical Properties of Granular BT-NZF Nanocrystals in Silicate Glass

Kamonpan Pengpat[None]

Invited Speaker

Summary:

Session XV / **119**

Teaching Two-Dimensional Collision Using Momentum Vector Diagrams

Author(s): Trai Unyapoti[1]

Co-author(s): Kwan Arayathanitkul [1] ; Narumon Emarat [1]

[1] *Department of Physics, Faculty of Science, Mahidol University, Bangkok,10400, Thailand*

Corresponding Author(s): trai.uny@gmail.com, kwan.ara@mahidol.ac.th, narumon.ema@mahidol.ac.th

Multiple representations are valuable tools used to help students learn how to think like physicists and understand physics concepts. Generally, in case of teaching students' understanding of collisions, one of the available options is using the momentum bar charts. They can clearly represent the magnitude of the momentum before and after collision but they cannot be used to represent directions. This work shows a new but conventional and important representation—the momentum vector diagrams—teachers can use to help students apply conservation of momentum in two-dimensional collision. The momentum vector diagrams were used to teach grade-10 students at a school in Bangkok in 2015. The other group of students at the same school was taught traditionally using conservation of momentum equations without drawing any momentum vectors. The post-test results revealed that the former group performed better in solving two-dimensional collision problems. In addition, students who learned with momentum vector diagrams realized more that the situation in the problem was two dimension.

Keyword: momentum vector diagram, two-dimensional collision, conservation of momentum.

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Temperature effect on Zinc substituted hydroxyapatite investigated by XRD, FTIR and SEM technique

Author(s): Chutharat Paikaew[1]

Co-author(s): Kittisakchai Naemchanthara [1] ; Pichet Limsuwan [1] ; Weeranut Kaewwiset [2]

[1] *King Mongkut's University of Technology Thonburi (KMUTT)126 Pracha Uthit Rd., Bang Mod, Thung Khru, Bangkok 10140, Thailand*

[2] *Kasetsart University, Kamphaeng Saen Campus, 1 Malaiman Rd., Kamphaeng Saen, Kamphaeng Saen Nakhon Prathom, 73140, Thailand*

Corresponding Author(s): puri_kit@hotmai.com, faaswnka@ku.ac.th, chutharat.pk@gmail.com, opticslaser@yahoo.com

The aim of this work is investigate characteristic of zinc substituted hydroxyapatite after heat treatment. Zinc substituted hydroxyapatite was synthesized from calcium oxide (CaO) of waste eggshell by precipitation method. The concentration of zinc nitrate was substituted hydroxyapatite at various from 1 to 25%wt. The zinc substituted hydroxyapatite was heated at different temperature from 200 to 1300 C with an increment of 100 C. The crystal structure, function group and morphology of sample were analyzed by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and scanning electron microscopy, respectively. The XRD results show that the zinc substituted hydroxyapatite was hexagonal phase after heated from 200 to 800 C. The hydroxyapatite phase of zinc substituted hydroxyapatite was changed to zinc containing β-tricalcium phosphate phase and higher crystalline after heated from 900 to 1300 C. The crystalline of β-tricalcium phosphate was increased with increasing zinc concentration. The zinc substitution and phase change of zinc substituted hydroxyapatite was confirmed with FTIR and SEM results.

Session V / 247

Temporal change in flatness of flat surface due to optical mounting and gravity

Author(s): kitti wirotrattanaphaphisan[1]

Co-author(s): Jariya Buajarern ; suthep butdee [2]

[1] *kibuya@gmail.com*

[2] *Department of Production Engineering, Faculty of Engineering, King Mongkut's University of Technology North Bangkok 1518 Pracharat 1 Road,Wongsawang, Bangsue, Bangkok 10800*

Corresponding Author(s): kibuya@gmail.com, suthep.butdee@gmail.com, jeriya@hotmail.com

In the process of measuring flatness, there are many parameters that affect accuracy of the measurement. This paper investigated temporal change in flatness of flat surface due to optical mounting and gravity. Flatness and topography of flat surface diameter range from 60 mm to 300 mm were recorded and evaluated by using Fizeau interferometer. Differences in mounting and geometry of the optical flat lead to difference in stabilization time. The experiments were carried out from the beginning of optical flat mounting vertically while the optical flats were initially kept in horizontal orientation. The temporal study was evaluated from 8 positions along X-axis and Y-axis. The experiment results show that with three-points mounting, stabilization time required is longer than the sling type. Moreover, large (heavy) optical flat also presented bigger temporal change which is not only come from size but also environmental condition.

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The 3D Modeling of Heat Transfer in Soil

Author(s): Thanun Chunjaemsri[1]

Co-author(s): Pimpunyawat Tummuangpak [1]

[1] *Department of Physics, Faculty of Science, Khonkean University, Muang district 40002*

Corresponding Author(s): gst_golf@hotmail.com, pimptu@kku.ac.th

We present 3-D numerical models developed for heat transfer under soil with different shape pots in order to determine the influence on the temperature and the evolutions of temperatures at different depths with time over a day. The governing differential equations of heat transfer are solved by Explicit Method and Crank-Nicolson Method in Cartesian coordinate. The models ware validated in comparison to the experimental results from the conditions of southern Thailand. We then applied the model to the cylindrical concrete tank which is commonly used in plant growing. The results are in good agreements with the experiments suggesting that the model can be efficiently used for determining the conditions under soil in different shape pots.

Session III / **45**

The Calculation of Transition Amplitudes of Some Interactions among Electrons, Positrons, and Photons

Kitinan Pongsangangan[1]

[1] *Department of Physics, Khon Kaen University, Thailand*

Corresponding Author(s): kitinan1231@hotmail.com

This project aims to study the possibility of some interactions among three types of particles, i.e., electrons, positrons, and photons, from quantum perspective. The transition amplitudes of which the squares are occurring probability for some interactions are investigated. Despite having a simple method of Feynman diagram and Feynman rule, in this work, the transition amplitudes are calculated from foundational assumptions of quantum field theory (QFT) by mean of the quantum electrodynamics interaction operator, S operator, expansion. It is found that the second order S operator predicts the existence of interactions with non-vanishing transition amplitude, for example, electron-position scattering, electron-position annihilation and pair-production, electron-photon scattering, and positron-photon scattering.

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The Comparative Effect of Reliability to Integrated Circuit (IC) Package between Conventional Oven Cure and Pressure Oven Cure Process.

Ameena Noinongyao[None]

Corresponding Author(s): nuna_zaa23@hotmail.co.th

This research studied about the efficiency of conventional oven and pressure oven of epoxy curing after die attach process to integrated circuit (IC) packaging reliability. Epoxy curing process is so important to make a completed epoxy due to cross linking to enhance microstructure of epoxy stiffness. This experiment, the samples were tested for two types of non conductive die attach screen print and were cured for conventional oven cure and pressure oven cure. In general process of oven cure to dry epoxy is using a conventional oven but a void can still occur in the layer of epoxy. Therefore, pressure oven cure used for reduction the void that has effect to the reliability of IC package. For

analysis, 5x5 mm2 of QFN packages were analyzed by die shear test and were also tested by moisture sensitive level (MSL) to observe void inside the packages. The results showed that the pressure oven cure can be reduced void inside the package and improved IC packaging reliability.

Keywords: Integrated circuit (IC) packaging, Non conductive epoxy, Die attach screen print, Conventinal oven cure, Pressure oven cure

Session XXI / **262**

The Developing of Scientific Advances of Liquid Lens use the Concept STEM Education

Netnapha Limphaiboon[None]

Corresponding Author(s): netnapha.phy@mail.kmutt.ac.th

The objective of this research was to developing of scientific advances of liquid lens use the concept STEM education. The samples of this research were 40 grade 11 students at Ratanaratbumrung School. In this research, students can learn about the liquid lens by demonstrations and design the experimental apparatus for study a contact angle, a focal length and a magnification of the lens witch STEM education is a curriculum based on the idea of educating students in four specific disciplines science, technology, engineering and mathematics. The measurement and evaluation is the test by scanning QR-code from Google Form program. This research found that the class average normalized gain was high gain and the learner can design base for placing this glass slide on the camera of a mobile phone, this will enhance the imaging ability of the camera to similar to an optical microscope. Furthermore, this research can integrated scientific knowledge of lens to solving problem in daily life.
Keywords: Liquid Lens, STEM Education

Summary:

Session XXI / **251**

The Development of Innovation of The Force from Magnetic Fields Acting on the Wire with an Electric Current Flowing Through in Physics for Undergraduate Students

Nuntanut Wattanasupinyo[1]

[1] *Bansomdejchaopraya Rajabhat University (BSRU)1061*

Corresponding Author(s): nuntanut.bsru@hotmail.com

The researcher has succeeded in creating innovative learning of "The Force from Magnetic Fields Acting on the Wire with an Electric Current Flowing Through" using for teaching and learning in Physics for Science Teachers 2 subject. The objectives of this research were (1) to study the efficiency of innovative learning. (2) to identify the learning achievement and (3) to measure the level of saticfaction of innovative learning. The respondents are63 second year students of the Faculty of Education of Bansomdejchaopraya Rajabhat University. The findings revealed that the innovative learninghas efficiency higher than a defined criteria 95/85.The posttest is significantly higher than the pretest scores at .01 level of significance. The level of satisfaction in terms of students interest in innovation and knowledge understanding is 4.26 which is interpreted as Good.
Students remarked that the innovation feature is interesting, novelty, easy to use, comprehensible, inexpensive and conveniently available.

Session XXII / 64

The Effect of copper and iron dopants on TiO2 nanotubes structure

Author(s): Ramida Chaiyarat[1]

Co-author(s): Somkuan Photharin [2] ; Udom Tipparach [1]

[1] *Department of Physics, UbonRatchathani University, Warinchamrab,UbonRatchathani, 34190, Thailand*

[2] *Department of Physics, Kasetsart University Chalermphrakiat Sakon Nakhon Province Campus, Muang Sakon Nakhon 47000, Thailand.*

Corresponding Author(s): por_chai@hotmail.com, sky_ubu@hotmail.com, udom.t@ubu.ac.th

We have synthesyzed Cu and Fe- doped TiO2 nanotubes by an anodization method. The electrolyte was composed of ethylene glycol (EG), ammonium fluoride (0.3 % wt NH4F) and deionized water (2% vol H2O) with concentration of the dopants Cu and Fe of 0.5 mM. A constant DC power supply of 50 V was used during anodization with anodizing times of 2 hours. X-ray diffraction (XRD) was used to examined the microstucture and scanning electron microscopy (SEM) was used to viewed the surface morphology of the samples. The results show that TiO2 nanotubes are are anatase phases and the nanotubes are arraged in highly ordered arrays. The transition metal ion dopants may be incorporated into the TiO2 structure.

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The Quality Improvement of Biogas by Air Mixing

Author(s): Wasan Pinate[1]

Co-author(s): Duangkamol Dangphonthong [2]

[1] *1**

[2] *2*

Corresponding Author(s): kaapplied@hotmail.com, d.dungphontong@gmail.com

The primary objective of this study is to design and optimize air insertion Components for biogas system widely implemented in swine farms. The experiment is performed with a small-scale 2.5 m3 operating on Controlled swine waste. The result shows that an optimum ratio of injected air per volume of biogas production is approximately 4.5 %. In this condition, measurement of H2S trace can be reduced from an average level of 644 ppm to undetectable amount within 48 hours. Another Significant Finding is the methane content of biogas produced from digester with air supplement is decreased by maximum of 3.5 % to the lowest level of 77 % which is still acceptable by all utilization equipment. Finally economic analysis suggests that an investment in air mixing equipment and operating costs results in an average payback period of 1.32 years benefiting from utilization equipment maintenance cost reductions. And long Life cycle Period.

Keywords: Biogas, Air Mixing

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The capture efficiency of magnetic drug targeting in artery blood vessel

Author(s): Adulvit Chuaephon[None]

Co-author(s): Theerapong Puangmali [1]

[1] *Khon Kaen University*

Corresponding Author(s): bike.forever.000@gmail.com, theerapong@kku.ac.th

In magnetic drug targeting (MDT), magnetic nanoparticles (MNPs) coated by biocompatible materials and loaded with drug are injected into blood vessels and are specified to the target by the external magnetic field. Magnetic nanoparticles exhibit superparamagnetic properties when their sizes are smaller than the critical size. They show high saturation magnetization and no remanence at room temperature. The advantages of magnetic drug targeting are: (i) the ability to target specific location in the desired area; (ii) the reduction of the quantity of drug needed to attain a particular concentration in the vicinity of the target; and (iii) the reduction in the concentration of the drug at non-target sites minimizing severe side effects. The objective of this study is to computationally model in 2D, by using COMSOL Multiphysics 4.4 for studying parameters including (i) blood velocity; (ii) particle trajectory; and (iii) capture efficiency of magnetic drug targeting. The range of the studied nanoparticle diameters was 10-1000 nm. Blood vessel in this study is artery. According to our simulation, it was found that bigger nanoparticles have higher capture efficiency than smaller nanoparticles. This is due to the higher magnetophoretic force of bigger nanaoparticles.

session II / **6**

The characterization of the liquid scintillator detector for the PG-NAA system at TRR-1/ M1 with MCNP

Author(s): Ploypailin Leelanoi[1]

Co-author(s): Siriyaporn Sangaroon [1]

[1] *Faculty of Science, Mahasarakham University, Kantarawichaia District, Mahasarakham 44150 Thailand*

Corresponding Author(s): ploy.leelanoi@gmail.com

The aim of this work is to optimize and characterize the liquid scintillator detector, that will use for the mixed n/ radiation field at the Prompt Gamm-ray Neutron Activation Analysis System (PGNAA) at the Thai Research Reactor (TRR-1/M1). The study was carried out using the Monte Carlo N-Particle code (MCNP). The model of the liquid scintillator consists of the aluminum housing, thick 0.085 cm, and the scintillation material. The scintillation layers were varied with the difference thicknesses between 1 cm to 5 cm and the surface area of 20.09 cm2. The neutron and photon response functions for a mono-energetics energies were obtained. The results show that the detection capability depends on the scintillator thickness. In addition, the resolution function of the scintillator was reported and folded to the response function. The neutron detection efficiencies were calculated and compared to the theoretical one. The results show that the detection efficiencies were affected by the detector thickness and the energy threshold. The detector diameter (e.g. thickness, radius) will be suggested and purposed to the experimental at the PGNAA system in the future.

Keywords: liquid scintillator, MCNP, response function, detection efficiency

Summary:

Session XXI / **117**

The conceptual understanding survey of undergraduate physics students and pre-service physics-teacher students about twinkle light from celestial objects

Author(s): Watcharawuth Krittinatham[1]

Co-author(s): Kreetha Kaewkong [2]

[1] *Department of Physics, School of Science, University of Phayao*
[2] *Department of curriculum, instruction and learning, Faculty of Education, Chiang Mai University*

Corresponding Author(s): kreetha.ka@cmu.ac.th, watcharawuth.kr@up.ac.th

This research describes the results from the conceptual survey of 37 first-year undergraduate physics students (12 student of B.Sc. in Physics and 25 students of dual-degree B.Ed. in Education and B.Sc. in Physics), School of Science, University of Phayao, 15 pre-service physics teacher students, faculty of education, Chiang Mai University and 21 first-year pre-service teacher students, faculty of education, Chiang Rai Rajabhat University. The series of open-ended questionnaires involved twinkle light from a celestial object are used to investigate students' understandings.
The results from all groups reveal that although most of them can give a meaning of twinkle light in general, but they cannot explain how light propagating from stars is twinkling. Some misconceptions such as the variation of stellar light intensity, some intensive or extensive properties of the light source etc. are detected. The results from this research will be used to design the instruction which engages students to have a better understanding in twinkle light from celestial objects.

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The development process of compressed sawdust from fuel rods cool

Author(s): Siriporn Phunphet[1]

Co-author(s): Thitipong Unchai [2]

[1] *Program physics, Fculty of science, Ubon Ratchathani Rajabhat University*
[2] *Ubon Ratjabhat University*

Corresponding Author(s): siripondphunphet@gmail.com, thitipongunchai@mail.com

Abstract
The objective of this study was to develop and produce fuel rods from compressed sawdust with the cold. And the thermal efficiency of the fuel rods from sawdust. By testing the efficiency of the fuel rods made from wood sawdust of the third kind See also wainscot wood eucalyptus. And timber The technical feasibility study of the properties of the fuel, the fuel rodsThe heat, humidity, compression ignition timing and temperature of the flame . The fuel rods are made from sawdust and wood species. In this research, the fuel rods use adhesive tag binder is mixed with water in the sawdust of wood species and determine the appropriate ratio to produce fuel rods. The most qualifie, extrusion billet is then compressed by cooling pipes using PVC 2 sizes. The width of the inside diameter of 2 inches and a width of 6 inches outside diameter of the same length is 40 cm. The fuel properties of briquette were analyzed according to ASTM standards. Production of fuel rods from the sawdust with a cold compression process reduces energy use of forest resources in nature. The material can be used in the agricultural and industrial waste to produce renewable energy at a low cost, easy to find ingredients. The conservation of forest resources and nature.
Keywords: sawdust, fuel rods cool,renewable
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The effects of cathodic arc parameter on color and hardness of ZrN thin films decorative coating

Author(s): Yotsathorn Pholrong[1]

Co-author(s): Chumphon Luangchaisri [1] ; Jutha Liammukda [2] ; Panita Chityuttakan [1]

[1] *King Mongkut's University of Technology Thonburi*

[2] *Salamander Jewelry Co., Ltd*

Corresponding Author(s): lchumphon@yahoo.com, lovehuna@hotmail.com, naiyots60@gmail.com, panita.chi@kmutt.ac.th

This research presents the effects of deposition parameter on zirconium nitride (ZrN) thin film coated on stainless steel by cathodic arc technique. For the jewelry applications, the ZrN films must have the high hardness with high gold color. The deposition parameter in this work consists of input voltage supplied to substrate, percent of duty cycle, flow rate of nitrogen gas and deposition time.The as grown ZrN thin films characterized using several techniques. The structural properties was analyzed by x-ray diffraction method. The color of films were analyzed by CIE-L*ab measurement. The morphology and hardness were characterized using scanning electron microscope (SEM) and nano-indentation respectively. The results revealed that all ZrN thin film showed color shade in yellow gold obtained from deposition conditions of the flow rate of nitrogen 50-250 sccm, the input voltage 250-550 V, deposition time of 5-25 minutes and percent of duty cycle in rang of 30%-70%. However, in this work we found two optimum condition. The first condition is the flow rate of nitrogen of 250 sccm, input voltage 450 V, 50% of duty cycle with deposition time of 15 minutes. The ZrN films presented by using the 1st condition showed that the hardness of films were 15 GPa, brightness 77.2%, The red rate – 2.3%, the yellow rate 24.96% in CIE-Lab.* The second condition is the flow rate of nitrogen 250 sccm, input voltage 350 V, 50% of duty cycle and deposition time 25 minutes. The ZrN films grown by 2nd condition shows the hardness of 15.04 GPa, the brigthtness of 68.2%, the red rate – 2.3%, the yellow 24.96% in CIE-L*ab* condition.

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The growth of ZnO nanostructures prepared by anodization in combination with hydrothermal method on the Zn sheet

Author(s): Vatcharinkorn Mekla[1]

Co-author(s): Kannika Joongpo [1]

[1] *Ubon Ratchathani Rajabhat University*

Corresponding Author(s): chokekana14@gmail.com, choke-kana@hotmail.com

ZnO nanostructures prepared by anodization in combination with hydrothermal method using Zn metal plate in water vapor were invitigated. In the first step, the Zn nanoporus were fabricated by electrochemical anodization in a HF/Methanol/H2O electrolyte system. Ultrasonic wave was used to clean the surface of ZnO nanoporus in the medium of water after the completion of the anodization. After drying in air, in the second step, the nanostructures were converted by hydrothermal. The ZnO nanostructures were characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM). XRD patterns show the ZnO hexagonal wurtzite structure. SEM images indicate that the ZnO structures depend on preparation temperatures. The density of ZnO nanostructures increase as the times increases. The growth of ZnO nanostructures was observed to be times dependence
Keywords: ZnO, nanostructure, anodization,hydrothermal

Poster Session A / 135

The probability of finding Earth-like planets that can not transit by its inclination.

Panida Cen[None] ; Suyada Setakornnukul[None]

Corresponding Author(s): suyada.set@hotmail.com, panida_cen@hotmail.com

The objective of this work is to determine the probability of finding Earth-like planets orbited around Sun-like star under the condition that its inclination is not appropriate for eclipsing. The method

was done by analysis of the database of transiting planets discovered by NASA's Kepler Mission. We determined that Earth-like planet requires the following properties; Earth Similarity Index (ESI) in the range of 0.8-1.0 and remain in the system of Sun-like star which mass between 0.8-1.2 Solar mass, effective temperature between 5,000-6,000 Kelvin and spectrum type G0V-G9V. According to the database, there were 3 planets followed all of these conditions. Then calculate the inclination interval that is suitable for eclipsing of any planetary systems which has 1.0-2.0 Earth radius, orbited around 1.1 Solar radius star with 0.5-2.0 AU orbital semi-major axis. The results reveal that the inclination interval is 88.94-91.06 degree. Since the inclination of any planetary systems can be randomly occur, so that the ratio of the inclination that can be able to transit to all possible inclination is 0.01175. According to 3 Earth-like planets that followed all conditions, there are totally 255 planets which can be able to detect. So, there were 252 Earth-like planets which never found yet since their inclinations are not suitable for transit. Therefore the probability of finding Earth-like planets that can not transit by its inclination is 0.9882.

session I / **43**

The study of Jupiter's aurora : bright spot variation in active region

Author(s): Kamolporn Haewsantati[None]

Co-author(s): Suwicha Wannawichian [1]

[1] *Department of Physics and Materials Science, Chiang Mai University*

Corresponding Author(s): linkamolporn@gmail.com, suwichawan@gmail.com

Jupiter' polar emission is a part of Jovian's aurora features that still receives debates about its origin and behavior of brightness which seem to be unstable. In this work, we study Jupiter's polar emissions on May 13th 2007 observed by Advanced Camera for Surveys (ACS) camera on board the Hubble Space Telescope. We found that active region, which is a section of the polar region, appeared to have a bright spot at time of observations. After the detection of bright auroral spot, the auroral emission in active region became very faint, while reappeared again within about 20 minutes. This reappearing of auroral emission is similar to the behavior of Earth's aurora. The bright spots from two consecutive observations occurred at the same location corresponding to system III longitude, about 62 degrees latitude and 174 degrees longitude. The field line tracing from the ionosphere to magnetosphere based on VIP4 model, which was used to map the auroral emission in ionosphere to the origin of auroral particles in magnetosphere, showed that the mapping region ranging approximately between 80-90 RJ. Moreover, the Michigan Solar Wind Model, MsWim, which is developed at the University of Michigan, showed that on May 13th 2007 solar wind speed built up nearly at the time we found a bright spot. As a result, the possible explanation for this behavior could be the effect by the increasing of solar wind dynamic pressure. In addition the brightening cycle of bright spot suggests the possibility of growth and relaxation states similar to the behavior of Earth's aurora.

Keywords : Jupiter's aurora, active region, solar wind

Session XIX / **141**

The study of scaling relations of massive galaxy clusters using weak gravitional lensing technique

Author(s): Anirut Phriksee[1]

Co-author(s): Eric Jullo [2] ; Giovanni Covone [3] ; Mauro Sereno [4] ; Siramas Komonjinda [1]

[1] *Chiang Mai University*

[2] *Aix-Marseille University*

[3] *University of Naples "Federico II"*

[4] *University of Bologna*

Corresponding Author(s): mauro.sereno@unibo.it, phriksee@gmail.com, eric.jullo@lam.fr, giovanni.covone@gmail.com, siramas@gmail.com

Weak gravitational lensing of galaxy cluster provides a direct method
to probe their mass distribution. We report our preliminary results on the
analysis of a complete sample of ~ 50 massive galaxy clusters,
in the redshift range 0.1 - 0.6, in the Canada France Hawaii Telescope Legacy Survey (CFHT-LS), drawn from the large sample built by Covone et al. (2014). For each galaxy cluster, we determined the mass distribution from the radial shear profile, the mass-to-light ratio and the optical richness,in order to study how the galaxy population in clusters
trace mass as a function of scale. We have studied the scaling relation of mass with optical luminosity and richness for massive clusters. Moreover, by assuming that the average mass-to-light of galaxy clusters is very close to the cosmological values, we can determined the mass density of the universe.

Keywords: weak gravitational lensing : galaxy cluster

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The study of sugar solution concentration using laser refraction technique.

Author(s): Kruaimai Liengswangwong[None] ; Veerin Urairat[None] ; Woramon Sawasdee[None]

Co-author(s): Ratchanikorn Koomramyakul [1]

[1] *Mahidol Wittayanusorn School*

Corresponding Author(s): fern_woramon@hotmail.com, cherryveerin@hotmail.com, quantum_komphy@hotmail.com, kruaimai@hotmail.com

Nowadays, the measurement of sugar solution concentration has a big impact in both industrial and medical works. The high cost apparatus of spectrophotometer has been applied to study the sugar solution concentration before. We expect to apply the low cost measurement for this kind of work. Thus in this work, we aim that to use laser refraction technique to study the sugar solution concentration. This experiment was performed by using He-Ne laser emitted perpendicularly to the glass container which contain some amount of water, and then pouring the different concentration of sugar solution into the container and record the bending angle of laser beam. The experimental results show that the bending angle increases when the concentration of sugar solution increases. Finally the calibration ensures the relation between the bending angle and the concentration of sugar solution can be presented.

Session XXVIII / **259**

Theoretical Study of Gas Diffusion through Porous Graphene under Pressure

Yuwadee Suwan[None]

Corresponding Author(s): y.suwan09@gmail.com

Yuwadee Suwan, Sirichok Jungthawan, and Sukit Limpijumnong

1 School of Physics and NANOTEC-SUT Center of Excellence on Advanced Functional Nanomaterials, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand 2 Synchrotron Light Research Institute, Nakhon Ratchasima 30000, Thailand 3 Thailand Center of Excellence in Physics (ThEP), Commission on Higher Education, Bangkok 10400, Thailand

The gas separation properties of porous graphene (PG) membrane on SiO2 substrate for simple molecules (H2, O2, and CO2) under pressure have been investigated by using first-principles density functional theory. The van der Waals interaction was taken into account by using Grimme's force field (PBE-D2) approach 1. For the clamped circular membrane subjected to a pressure difference between both sides of the membrane, the deformation of the membrane can be described by Hencky's solution 2. The deformation of the membranes lowers the diffusion barriers for H2, O2 and CO2 but by different amounts. This effectively increases the diffusion rate of H2, O2, and CO2 by up to 4, 8, and 12 orders of magnitude, respectively (in the pressure range of 0-5 MPa). The selectivity or relative diffusion rate of PG for the diffusion of H2, O2, and CO2 molecules at Deltap = 5 MPa relative to the CO2 diffusion rate at Delta p = 0 MPa are 1024, 1019, and 1012, respectively. The results suggest that the gas separation properties of PG can be tuned by applying a pressure different across the membrane.

1 S. Grimme, J. Comp. Chem. 27, 1787 (2006).
2 W. B. Fichter, NASA Technical Paper, 3658 (1997).

Contact: y.suwan09@gmail.com

Summary:

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Theoretical study of interactions between single-walled carbon-nanotubes and polyethyleneimine

Author(s): Phongnared Boontueng[1]

Co-author(s): sittipong komin [1]

[1] *Ubonratchatani University*

Corresponding Author(s): p.boontueng@gmail.com, sittipong.komin@gmail.com

Polymeric materials are widely used to cover on a carbon nanotube for producing the n-type semiconductor. However, understanding of structural polymerization of polyethyleneimine (PEI) warped on carbon nanotubes is poor. To approach the structural, all of calculations are treated with the package based on Density Functional Theory correcting with vdW correction. As a result, the functionalized carbon nanotube coated with PEI explicitly leads to n-type when such PEI performs as trans-trans-trans conformer and number of unit of polymer is over 3. Increasing of number of polymers in interacting process also dramatically improves the irreversible absorptions.

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Thermoelectric concrete block

chaiwat phrompet[1]

[1] *Thermoelectric Lab Department of Physcis, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Ladkrabang,Bangkok, 10520, Thailand*

Corresponding Author(s): wat_tsu@hotmail.com

Abstract
In this work thermoelectric concrete block merge between thermoelectric modules and brick. The block can use with high temperature (1273 K). Based on the temperature difference occurs during the bottom and top of the concrete blocks, it can be create electrical power.

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Thermoelectric modules

Singkarn Chanprateep[1]

[1] *King Mongkut's Institute of Technology Ladkrabang*

Corresponding Author(s): nicesingkarn@hotmail.com

The main objectives of this project were to design and devise thermoelectric modules, it can be converted temperature difference to electrical power or reversion. These thermoelectric materials were prepared by the solid state reaction method. The material is aluminium oxide doped zinc oxide (Zn0.96Al0.04O) to sinter at 1473 K and 20 hrs, it showed the best thermoelectric activity. The efficiency of thermoelectric modules was related temperature difference and using the multimeter to collect data.

Keyword : thermoelectric modules

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Thermoluminescence properties of recycled window glass doped some of transition metal oxides (TiO2, V2O5, CrO3, MnO2, Fe2O3, Co2O3, NiO and Cu2O) as radiation dosimetry materials

Author(s): Thanaporn Thumsa-ard[1]

Co-author(s): Cherdsak Bootjomchai [1] ; Jintana Laopaiboon [1] ; Oruethai Jaiboon [2] ; Raewat Laopaiboon [1]

[1] *Glass Technology Excellence Center, Ubon Ratchathani University, Ubon Ratchatani, 34190, Thailand*

[2] *Department of Physics, Faculty of Science, Ubon Ratchathani University, Ubon Ratchathani 34190, Thailand*

Corresponding Author(s): cherdsak_per@hotmail.co.th, raewatl@yahoo.com, oruethai.jaiboon@googlemail.com, boombimthana_25@hotmail.com, 2502jin@gmail.com

Thermoluminescence properties of Thai commercial window glass provided by Guardian Industries Corporation (denoted as WG) were studied. WG was doped with varying concentrations of different transition metal oxides (TMOs). The composition of glass is 90WG-10Na2O-xTMOs (where TMOs = TiO2, V2O5, CrO3, MnO2, Fe2O3, Co2O3, NiO , Cu2O and x = 0.000, 0.001, 0.010, 0.100, 1.000 mol%). Glass samples were recycled by using melt quenching technique and cut into the dimensions of 6×6×1 mm3. After irradiated glass samples with X-ray at photon energy 160 keV in absorb dose rang 0-14 mGy, the glow curve structure, TL sensitivity, linearity and minimum detectable were investigated. The results of this work demonstrated that the opimum type and concentration of TMOs is Cu2O at 0.010 mol%, because this glass sample showed single peak at 225 ⍰C , the highest sensitivity, the best linearity of the dose responses and the lowest minimum detectable compared to all of the glass samples in this work.

Keywords: Thermoluminescence glass, Thai window glass, transition metal oxides

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Thin layer drying model of squid

Author(s): warisa pancharoen[1]

Co-author(s): niroot lamlert [1]

[1] *Physics and general science program, Faculty of science and technology, Phetchaburi Rajabhat University, Phetchaburi*

Corresponding Author(s): root_229@hotmail.com, kaew_riisa@hotmail.com

In this paper thin layer drying of squid is presented. Thin layer drying of squid was conducted under controlled conditions of temperature levels of 40 ℃, 50 ℃ and 60 ℃ and relative humidity ranging 10% - 30%. Drying air temperature has great influence on the drying rates of squid and drying time decreases with the increase in drying air temperature. Eight different thin layer models were fitted to the experimental data of squid. The drying parameters of squid were function of air temperature and relative humidity. Page model was found to be the best and Logarithmic model was found to be next to the best. The agreement between the predicted and experimental values for Page model is excellent. The predictions of Page model, Logarithmic model and Henderson and Pabis model were very close. Either one of these three can be used to provide design data and for simulation and optimization of the dryer for efficient operation.

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Threshold of Electric Fields for Sex Reversal of O.niloticus Considered through Hatching and Survival Rates

Author(s): [illegible][1]

Co-author(s): Sittichai Bunchuai [2]

[1] *Faculty of Technology and Environment, Science of Physics, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

[2] *Biotechnology of Electromechanics Research Unit, Science of Physics, Faculty of Technology and Environment, Prince of Songkla University, Kathu, Phuket 83120, Thailand*

Corresponding Author(s): sakshin.b@phuket.psu.ac.th, sakshin.bunthawin@gmail.com

In order to achieve electrical sex reversal technique of tilapia's egg (O.niloticus) with androgen hormone delivery, the induced transmembrane potential (TMP) for electropermeabilization of the egg's membrane is the first priority to evaluate through theoretical analysis. Previously, the closest available model to calculate TMP of tilapia's egg was a shelled symmetrical prolate-spheroid. However, such model gave the large error to calculate the volume and surface of the egg then was improved to complete with our novel model as "hen-egg model" to analyze the implicit value of TMP. In practical, the values of TMP of the model has to be determined through experiments to confirm that there has no any impact on hatching and survival rates after electrical inductions with high-intensity electric fields. In principle, membrane thicknesses in real biological systems are very uniform because they are made up of lipid bilayers. This affects TMP directly and nonuniform thickness of the membrane leads to anomaly of its electrical capacitance, the thicker membrane at the equatorial plane than the two poles of the tilapia egg results in decreasing the membrane capacitance. For this case, our model revealed that the value of TMP depends on dielectric properties of the shell, directly correlated with the external electric field strengths and inversely affected by the depolarization factor. The latter term varied with the egg geometry depending on the values of semi-axes which depends on egg geometry. Both the characteristic capacitance and conductivity of each compartment of the egg are the main factors which determine TMP with the non-linear relation. However, variations of TMP depend on the given position of the egg surface dealing with the local position where the external field could induce a large value of TMP at the polar pore of the egg. At the polar, TMP has the maximum. This case is only applicable to the spheroid oriented in the field direction with one of its principal axes (the longest semi-major axis). When TMP reaches the critical value it causes

electroporation. Experimental results showed that tilapia's eggs suspended in EPM with the induced voltages ranged of 300-330-350-380-400-450 VDC had hatching rates of 92.00%±2.15%, 90.43%±3.11%, 94.73%±4.08%, 96.73%±3.25%, 60.58%±5.11%, and 68.16%±3.22% (±SD), respectively. Increasing the induced voltages affected survival rated as 89.33%±3.06%, 87.20%±7.00%, 88.52%±4.35%, 92.52%±4.35%, 68.20%±7.00% and 63.33%±3.06%, respectively. The critical limit of the induced voltages was at 350-380 VDC (threshold) which was the maximum value used to prevent cell damage with 5 square wave pulses, 50 μs pulse durations and 1:1 mark-space ratio.

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Time Evolution of Gaussian Wave Packets under Dirac Equation with Fluctuating Mass and Potential

Author(s): Atis Yosprakob[1]

Co-author(s): Sujin Suwanna [1]

[1] *MU-NECTEC Collaborative Research Unit on Quantum Information, Department of Physics, Faculty of Science, Mahidol University, Phayathai, Bangkok 10400*

Corresponding Author(s): s.suwannasarn@gmail.com, yosprakob2@gmail.com

Localization of relativistic particles has been of great research interest over many decades. We investigate the time evolution of a Gaussian wave packet governed by the one dimensional Dirac equation. The research methodology consists of analytical approach and numerical simulations employing the Chebyshev polynomial expansion of the propagation operator. For the free Dirac equation, we obtain the evolution profiles analytically in many approximation regimes, and numerical simulations consistent with other numerical schemes. Interesting behaviors such as Zitterbewegung and Klein paradox are exhibited. In particular, the dispersion rate as a function of mass is calculated, and it yields an interesting result that the super-massive and massless particles both exhibit no dispersion in free space. For the Dirac equation with random potential or mass, we obtain the probability profiles of the displacement distribution when the potential is uniformly distributed. We observe that the widths of the Gaussian wave packets decrease approximately with the power law of order $o(r^{-1/2})$ as the randomness strength r increases. This suggests an onset of localization, but it is weaker than Anderson localization

Poster Session A / **207**

Time uncertainty between Thai lunar calendar and tropical solar calendar

Arthit Laphirattanakul[None]

Corresponding Author(s): alarthit@gmail.com

The difference between Thai lunar calendar and tropical solar calendar was investigated in this study. Phases of the moon regarding to Thai Lunar calendar appear to be different from the tropical solar calendar by a day in 2016. Each 19-year cycle, which is called Metonic cycle, the nearly same periods of both calendars were used to estimate the uncertainty of the time prediction for lunar phases in the past. Accordingly there was a day shift of moon phase in Thai lunar calendar over 219.4448968 tropical solar years. The result will be further investigated for the correlation with the actual phases of the moon.

Session XXVIII / 160

Tunable and Simple Fabrication of CuO/Nitrogen Functionalized Graphitic-Rod Electrode via Electrochemical Deposition

Author(s): Chanita Katavut[1]

Co-author(s): Duangkamon Viboonratanasri [2] ; Lapporn Vayachuta [2] ; Nurak Grisdanurak [3] ; Panida Prompinit [2]

[1] *Department of Chemical Engineering, Faculty of Engineering, Thammasat University, Pathunmthani 12120, Thailand*

[2] *National Nanotechnology Center (NANOTEC), NSTDA, 111 Thailand Science Park Phahonyothin Road Khlong Nueng, Khlong Luang, Pathumthani, 12120, Thailand*

[3] *Center of Excellence in Environmental Catalysis and Adsorption, Thammasat University, Pathumthani 12120, Thailand, Department of Chemical Engineering, Faculty of Engineering, Thammasat University, Pathunmthani 12120, Thailand*

Corresponding Author(s): lapporn@nanotec.or.th, duangkamon@nanotec.or.th, panida@nanotec.or.th, gnurak@engr.tu.ac.th, tahloktoktak@gmail.com

This study aims to develop a new method for capacitive improvement of 2 black (2B) (74% graphite, 20% clay and 5% wax; diameter 2.0 mm 1) pencil graphitic rod through nitric acid treatment followed by CuO deposition via electrochemistry. After acid treatment, oxygen- and nitrogen- containing species were generated on the PR surface, which confirms by x-ray photoelectron spectroscopy (XPS), Fourier transform infrared spectroscopy (FT-IR), and the presence of redox peaks in cyclic voltammogram (CV) measured in 0.5 M Na2SO4 electrolyte with a scan rate of 10 mV/s. This causes an increasing in areal capacitance (Ca) from 3 mF/cm2 (original PR) to 76 mF/cm2. Subsequently, electrochemical deposition of CuO was performed via two conditions, at potential of 0.4 V (for electrolyte pH 10) and 0.9 V (for electrolyte pH 9) in ammonia solution system. N1s spectra indicate the presence of pyridinic (-N=C-) and pyrrolic (-CH-NH-) nitrogen on the samples prepared from both conditions. A mixture of CuO and Cu(OH)2 was observed in all samples. However, the electrode prepared at 0.4 V shows higher CuO content than that prepared from 0.9 V. This results in different redox peaks and Ca values, where the electrode prepared at 0.4 V provides higher Ca (170 mF/cm2) than that prepared at 0.9 V (88 mF/cm2). It can be concluded that the presence of oxygen species, pyridinic and pyrrolic nitrogen, and high CuO content play an important role in capacitive enhancement for supercapacitor application and they can be easily altered using our developed method.

Summary:

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Two-Photon Interference in An Optical Gating Michelson Interferometer

Author(s): Ekkarat Pongophas[1]

Co-author(s): Wisit Singhsomroje [2]

[1] *Collaborative Research Unit on Quantum Information*

[2] *Collaborative Research Unit on Quantum Information, Department of Physics, Faculty of Science, Mahidol University*

Corresponding Author(s): wisit.sin@mahidol.ac.th, e.pongophas@gmail.com

We investigate the interference of two photons in an optical gating Michelson interferometer both theoretically and experimentally. Theoretically, the phenomenon is studied using two different representations of photons, the space-time domain and a step-by-step two-photon state evolution. Both representations lead to identical results. The evolution analysis describes the result by the interference of four two-photon traveling states, whereas the space-time domain analysis reveals that the classical interference of the high-intensity light source is identical to a two-photon interference in the quantum regime, except for a multiplicative factor of nC2, where n is the number of photons. Experimentally, the picosecond pulse with a 808-nm wavelength is used as a photon source and a second harmonic generation (SHG) process in BBO crystal as an optical AND gate. Then, the two-photon interference is measured through the SHG signal. The interference pattern agrees with the theoretical prediction.

Poster Session A / 222

Umbra and Penumbra Areas of Sunspot from the Solar and Heliospheric Observatory image

Thawatchai Sudjai[1]

[1] *Mahidol Wittayanusorn School*

Corresponding Author(s): thawatchai.sudjai@gmail.com

Umbra and Penumbra Areas of Sunspot from the Solar and Heliospheric
Observatory image
Thawatchai Sudjai
Department of Physics, Mahidol Wittayanusorn School, Salaya, Phuttamonthon, Nakorn Pathom, 73170

E-mail: thawatchai@mwit.ac.th

Abstract
The areas of umbra and penumbra of sunspots can indicate the magnetic field of the Sun, and the development of the sunspot group. As the size of umbra and penumbra areas depend on the intensity of the magnetic field, recorded of these areas are very important. The pair of sunspot members from opposite magnetic polarity relate to the extension of the areas of umbra, penumbra and group of sunspot areas. In this study, a pixel count in the sun digital imaging from observatory of the solar and heliospheric, NASA, is used. The umbra and penumbra are different level of light intensity. The image processing program can identify the intensity of the black color of the sun digital image. In mode of grey scale, the percentage of the black color is measured. The increase and decrease between the areas of umbra and penumbra are very obvious. The relative of its to the magnetogram data are very distinctly correlation. Both of the pair sunspot and other.

Keywords : Sunspot : Umbra : Penumbra

Session XV / 155

Using 3-axis accelerometer sensor to determine pendulum motion and gravitational field

Author(s): Pisut Thanthong[1]

Co-author(s): Dusit Ngamrungroj [2] ; Kanchaya Honglertkongsakul [3] ; Wuttichai Putchana [4]

[1] *lecture*

[2] *lecturer*

[3] *Lecturer*

[4] *Engineer*

Corresponding Author(s): wuttichaip@kmutnb.ac.th, kanchaya@buu.ac.th, pisut_2511@hotmail.com, liew_cu@yahoo.com

This research use 3-axis accelerometer sensor with a signal wirelessly, to study of the motion of a pendulum clock and calculated gravitational field. The 3-axis accelerometer sensor and wireless transmitter will pack into pendulum clock. In experimental using to variance length of wire of pendulum clock at 20 cm, 40 cm, 60 cm, 80 cm and 93 cm. The signal send from 3-axis accelerometer sensor pass wireless transmitter to computer by hypothermal program and analytic data by space sheet program. This experiment measure the time period from 3-axis accelerometer sensor are 0.939 s, 1.320 s, 1.580 s, 1.841 s, and 1.959s respectively. The gravitational field of the earth calculate by the time period are 8.955 m/s2, 9.063 m/s2, 9.488 m/s2, 9.318 m/s2, and 9.567 m/s2 and error are 8.624%, 7.520%, 3.179%, 4.914% and 2.378% respectively with length of wire. From the result data, the short wire the error of gravitational field is higher than long length. Because time period is short so clock frequency time to send data of wireless transmitter do not enough.

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Using ultrasonic waves for cleaning edible bird nest

Author(s): Worakrit Thida[1]

Co-author(s): Sorasak Danworaphong [2] ; Sutarat Rattana [2]

[1] *Shcool of science Walailak university*

[2] *School of science Walailak university*

Corresponding Author(s): sutaratkrong270238@gmail.com, w.woakrit@gmail.com, dsorasak@gmail.com

Edible bird nest is one of high economic value agricultural product in southern Thailand. Wild and farmed swallows are used to produce such a product. Nevertheless, both wild and farmed nests are subject to elaborate cleaning processes. Unfortunately, such processes require human labor. Typically, eight hours of tedious work are necessary to handpick feathers and dusts coagulated with the nest. In this work, we explore a possibility of using ultrasonic waves for cleaning the nest. A dual frequency—37 and 80 kHz—ultrasonic bath of 5.75 liter is employed. Stained nests are submerged in the water-filled ultrasonic bath and exposed to acoustic field. After designated periods, the cleaned nests are imaged with a digital camera without any post processes to the nest. The taken images are then analyzed using the brightness level of the photos in comparison to those taken before being acoustically radiated. As a result, we find that after acoustical exposure the nests are considered to be cleaner.

Poster Session A / 223

Vainshtein mechanism in disformal gravity

Khamphee Karwan[1]

[1] *The Institute for Fundamental Study*

Corresponding Author(s): khampheek@nu.ac.th

In this work, we investigate the Vainshtein mechanism in the alternative theory of gravity induced by the general disformal transformation on Einstein action. This theory of gravity is the disformal gravity. We find that the Vainshtein mechanism works well in this theory of gravity. Based on this result, we compute the post-Newtonian parameters and study the bound on these parameters.

Poster Session A / 88

Validity of the separate universe approach in the scalar-tensor theories of gravity

Sakdithut Jitpienka[1]

[1] *The Institute for Fundamental Study, Naresuan University*

Corresponding Author(s): sajib55@hotmail.com

The separate universe approach is the one of the important tools for study primordial cosmological perturbations on large scales. Since it is constructed without using of any particular theories of gravity, it is expected to valid for any covariant theories of gravity. However, recently, there is a study showing that it is valid only for some theories of gravity. In our research, we have found that this approach is valid for most forms of the scalar-tensor theory of gravity.

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Variability Study of Active Galactic Nuclei at Visible and X-ray Wavelength

Author(s): Pakawee Surarittikul[1] ; Tinn Thongmeearkom[1]

Co-author(s): Malte Schramm [2] ; Wiphu Rujopakarn [1]

[1] *Chulalongkorn*

[2] *National Institute of Advanced Industrial Science and Technology*

Corresponding Author(s): pakawee.stk@gmail.com, rujopakarn@gmail.com, 01tinn.th@gmail.com, malte.schramm@ipmu.jp

Active galactic nuclei (AGNs) are signposts of accreting supermassive black holes at the center of active galaxies. They often have large and rapid variation in brightness, whose investigation can provide us with insights on the innermost environment of the accretion disk. To study their variability, we conduct photometric monitoring of a sample of nearby AGNs at visible and X-ray wavelength; these AGNs are selected from the Hamburg/ESO Catalog, whose parent sample comprise 330 quasars at redshift < 0.3. We obtain visible wavelength data for our AGN sample in Johnson B, V and R filters with the robotic Thai Southern Hemisphere Telescope at Cerro Tololo Inter-American Observatory, Chile. At X-ray wavelength, we obtain archival data in 2.0 – 6.0 keV band from the Monitor of All-Sky X-ray Image (MAXI) on board the International Space Station. Using these data, we then construct light curves of each AGN at both wavelength. Here, we present early result from the study that indicates marginal variabilities in X-ray and optical. We will discuss the implications of variability limits on the fluctuation of power output of these AGNs in optical and X-ray.

Session XVII / **153**

Variation in Cosmic Ray Count Rate at Doi Inthanon with Atmospheric Water Vapor

Author(s): Pradiphat Muangha[None]

Co-author(s): Alejandro Saiz Rivera [1] ; David Ruffolo ; Pierre-Simon MANGEARD

[1] *Mahidol University*

Corresponding Author(s): ruffolo.physics@gmail.com, psmangeard@gmail.com, pure_blood_prince@windowslive.com, asaizrivera@gmail.com

The Princess Sirindhorn Neutron Monitor at Doi Inthanon, Thailand provides important information about high-energy cosmic rays from space. Both the neutron monitor (NM) and Bare (lead-free) neutron counters detect the variation of intensity in the interplanetary cosmic rays. In addition, the bare detector to neutron monitor count rate ratio (Bare/NM) provides information on the particle spectrum. We found that variation in Bare/NM is strongly anti-correlated with atmospheric water vapor (Ew) as inferred from the Global Atmospheric Data Assimilation (GDAS). In the present work, we develop a correction to Bare/NM for water vapor pressure. The results of comparison of the Ew from the GDAS database with another database will be discussed.

Session XV / **126**

Wireless Ticker as a Learning Tool in Physics

Author(s): Kanokwan Chongcharoen[1]

Co-author(s): Amarin Ratanavis [1] ; Mongkon Deeudom [2] ; Sompote Im-erb [2] ; Wuttichai Putchana [2]

[1] *Department of Industrial Physics and Medical Instrumentation, Faculty of Applied Science, Lasers and Optics Research Group (LANDOS), Science and Technology Institute. King Mongkut's University of Technology North Bangkok, Bangkok, Thailand*

[2] *Department of Industrial Physics and Medical Instrumentation, Faculty of Applied Science, King Mongkut's University of Technology North Bangkok, Bangkok, Thailand*

Corresponding Author(s): amarinphysics@gmail.com, chong.kanokwan@gmail.com, sit@kmutnb.ac.th, wuttichaip@kmutnb.ac.th, mongkond@kmutnb.ac.th

This paper presents a further development of a so-called Ticker, a device supporting "hear and see" activity in classroom or laboratory exercises. While the original version of Ticker performs as a timing device, a new version of Ticker is improved in the sense of fast and wireless timing device. This wireless version provides the flexibility of measurements in various physics problems. The wireless ticker composes of a photodiode, a simple circuit, a wireless transmitter and a buzzer. The photodiode is equipped to enable the fast rise time. The ticker is operated by the change of intensity of the detected light on its photodiode. The simple circuit sends the signal through the transmitter while the wireless receiver is connected to a personal computer. Our developed software can be used to analyze the received signal. This new features of the ticker are meant to fulfill challenges in various teaching environments. The wireless ticker can also generate the ticking sound that aims to accommodate students with visual impairments. The experiments on simple harmonics, simple pendulum and acceleration have been performed as examples to show the capability of the wireless ticker. The demonstration shows the promise of the wireless ticker as a new teaching tool. This economic device allows a huge room for creativity with simplicity of reliable measurements.

Poster Session A / **87**

Wormhole Solution in dRGT Massive Gravity

Lunchakorn Tannukij[1] ; Nopadhol Kamma[2] ; Pitayuth Wongjun[None]

[1] *Mahidol University*

[2] *the Institute for Fundamental study*

Corresponding Author(s): i_am_new_einstein@hotmail.com, lunchakorntannukij@gmail.com, pitayuthw@nu.ac.th

In general relativity, there exists a wormhole solution which is a region connected between two asymptotically flat spacetime regions. The wormhole solution may be obtained in a modified gravity theory and also possibly give non-trivial corrections to the one in general relativity. In this presentation, we investigate the wormhole solution in a modified gravity theory. One of interesting modified gravity theories is a massive gravity in which a non-zero mass is given to a graviton in Einstein gravity theory. One of theoretically consistent models of massive gravity is known as dRGT massive gravity. The general solution of wormhole in dRGT massive gravity is then analyzed and the resulting quantities are compared with ones in general relativity. The results of this research might be a progressive step in the study of Traversable wormholes.

Session XIII / **188**

Young stellar population and star formation in and around HII regions

Ram Kesh Yadav[1]

[1] *National Astronomical Research Institute of Thailand (NARIT)*

Corresponding Author(s): ram_kesh@narit.or.th

We present a multiwavelength investigation of the young stellar population and star formation activities in the HII region Sharpless 311. Using our deep near-infrared observations and archival *Spitzer*-IRAC observations, we have detected a total of 125 Young Stellar Objects (YSOs) in an area of $\sim$86 arcmin^2. The YSO sample includes 8 Class I and 117 Class II candidate YSOs. The mass completeness of the identified YSO sample is estimated to be 1.0 $M_\odot$. The ages and masses of the majority of the YSOs are estimated to be in the range $\sim$0.1$-$5 Myr and $\sim$0.3$-$6 $M_\odot$, respectively. The 8 μm image of S311 displays an approximately spherical cavity around the ionizing source which is possibly created due to the expansion of the HII region. The spatial distribution of YSOs reveals that a significant number of YSOs are distributed systematically along the 8 μm emission with a majority clustered around the eastern border of the HII region. Four clumps/compact HII regions are detected in the radio continuum observations at 1280 MHz, which might have been formed during the expansion of the HII region. The estimated dynamical age of the region, main-sequence lifetime of the ionizing source, the spatial distribution and ages of the YSOs indicate triggered star formation in the complex.

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Z-Boson Mass Reconstruction

Author(s): Jittrathep Sukultanasorn[1]

Co-author(s): Kittikul Kovitanggoon [1] ; Narumon Suwonjandee [1]

[1] *Chulalongkorn University*

Corresponding Author(s): sukultanasorn.j@gmail.com, snarumon@gmail.com, kovitang.cern@gmail.com

Measurement of Standard Model Z-boson productions in the muon and anti-muon decay channel is presented. The data are collected from proton-proton collisions by the Compact Muon Solenoid (CMS) experiment at the Large Hadron Collider (LHC) in 2012, at the center-of-mass energy 8 TeV and integrated luminosity of 19.70 fb^{-1}. The kinematic variables e.g. transverse momentum, rapidity and azimuthal angle, of the reconstructed Z-bosons and their masses will be presented. The result shows a good agreement between the data and the Standard Model prediction. This study can provide the insight of perturbative Quantum Chromodynamics and can be used to constrain a major background for the Standard Model and beyond Standard Model searches.