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The Dc bias voltage effect on dielectric properties of Ni-doped TNTs prepared by hydrothermal route

Ni-doped TNTs with a nominal composition of NixTi3-xO7 (Na0.96H1.04·3.42H2O) (where x = 0, 0.05 and 0.1) were synthesized by hydrothermal route at temperature of 130 ℃ for 24 h. The synthesized samples were characterized by X-ray diffraction (XRD), transmission electron microscopy (SEM), UV-vis spectroscopy and vibrating sample magnetometry (VSM). Magnetic measurements by VSM indicate that undoped-TNTs sample is diamagnetic. The dielectric properties of Ni-doped TNTs samples were measured by using an Keysight E4990A Precision LCR Meter over wide ranges of frequency (100 Hz - 1 MHz) and temperature (-60 –200 ℃) with the oscillation voltage of 0.5 V. The Ni-doped TNTs samples exhibited giant dielectric behavior with dielectric constant of 104 at 100 Hz at room temperature. The dc bias voltage effect on dielectric properties of the prepared TNTs were also investigated. It was found that the dielectric constant of the sample decreased with increasing dc bias voltage due to the decrease of the total resistance, resulting from the internal interface between grains. Moreover, the effect of Ni doping on the structure and electrical properties of TNTs was studied and discussed.

Primary author: Dr KASIAN, Pristanuch (School of Physics, Institute of Science Suranaree University of Technology)

Presenter: Dr KASIAN, Pristanuch (School of Physics, Institute of Science Suranaree University of Technology)

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