Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **4118** Type: **Poster Competition (Graduate Student) / Compétition affiches (Étudiant(e) 2e ou 3e cycle)**

(G*) (POS-49) Photodetector for biosensing: Dye sensitized solar cells for hemoglobin quantification

Tuesday 28 May 2024 17:55 (2 minutes)

Blood disorders, such as low iron anemia, affect almost one-third of Canadians. The symptoms range from extreme fatigue to shortness of breath. Considering these situations, early detection is paramount. A common diagnostic test for anemia is red blood cell count, but this process must be done at a lab and does not have an immediate turnaround time. High costs and less availably of equipment and doctors in poorer countries make such a test a luxury. Our proposed research aims at addressing these challenges by creating a rapid, reliable, sensitive, and specific point-of-care device that would be affordable for quantifying hemoglobin (Hb) levels in real time using a photodetector. The significance of this research lies in its potential to revolutionize Hb disorder diagnosis by leveraging photodetector technology.

In this study, we use lab-built Dye-sensitized solar cells and characterize it for their current response at a fixed voltage. In order to determine the Hb levels in blood, we converted the photodetector's transmission response into quantifiable current readings based on Hb concentration. This process included the development of a calibration curve of Hb concentration vs current at a set voltage. From preliminary responses, we found a linear relationship between the current and the concentration of hemoglobin present in glass. Hb concentration exhibit a distinct optical absorption property, which can be distinguished and measured using a photodetector. However, this device does not make it specific to Hb detection, hence further studies will involve fabricating a test strip that will adsorb only Hb onto it which will enable the quantification of Hb concentration in blood.

Keyword-1

Hemoglobin sensing

Keyword-2

Diagnostic tool

Keyword-3

Photodetector

Primary author: Mr MAJLUF SUAREZ, Sergio (Nano-imaging and Spectroscopy Laboratory, Faculty of Science, University of Ontario Institute of Technology)

Co-authors: Mr CUSIMANO, Alberto (CNR-Istituto per i Processi Chimico-Fisici); Ms BALASUBRAMANIAN, Janani (Nano-imaging and Spectroscopy Laboratory, Faculty of Science, University of Ontario Institute of Technology); Ms SPADARO, Donatella (CNR-Istituto per i Processi Chimico-Fisici); Ms CITRO, Ilaria (CNR-Istituto per

i Processi Chimico-Fisici); Dr TRUSSO, Sebastiano (CNR-Istituto per i Processi Chimico-Fisici); Dr CALOGERO, Giuseppe (CNR-Istituto per i Processi Chimico-Fisici); Dr AGARWAL, Nisha (Nano-imaging and Spectroscopy Laboratory, Faculty of Science, University of Ontario Institute of Technology)

Presenter: Mr MAJLUF SUAREZ, Sergio (Nano-imaging and Spectroscopy Laboratory, Faculty of Science, University of Ontario Institute of Technology)

Session Classification: DAMOPC Poster Session & Student Poster Competition (10) | Session d'affiches DPAMPC et concours d'affiches étudiantes (10)

Track Classification: Technical Sessions / Sessions techniques: Atomic, Molecular and Optical Physics, Canada / Physique atomique, moléculaire et photonique, Canada (DAMOPC-DPAMPC)