Abstract ID: P33

SYNTHESIS AND CHARACTERIZATION OF PbS QUANTUM DOTS FOR 1200 nm INFRARED WAVE DETECTION

P.H.P.D. Madhushika*, K.L.C.N.S. Perera, T. Jaseetharan

Department of Physical Sciences, Faculty of Applied Sciences,
South Eastern University of Sri Lanka, Sammanthurai , SriLanka.

**dilhanimadhushika58@gmail.com*

Abstract

Semiconductor quantum dots are attractive nanomaterials to be used in numerous research areas and device fabrication such as detectors, light-emitting diodes, transistors, and solar cells due to their unique optoelectronic properties. Tuneable energy gap by quantum confinement effect and multiple exciton generation are the most important unique properties of the quantum dots. PbS quantum dot – based Schottky type IR detectors have been fabricated and characterized for the detection of 1200 nm radiation. PbS quantum dots were deposited on the electrode by successive ionic adsorption and reaction SILAR) Technique. Suitable size of quantum dots for 1200 nm photon detection was optimized by controlling the SILAR parameters. Au and Al were used as the top contacts of the detectors separately. Detector fabricated with Au metal contact shows a maximum current of 454 µA while detector with Al contact shows 386 µA. Both types of IR detectors show better current corresponding to 14 SILAR cycles. However, Au is an expensive material compared with Al. Therefore, PbS/Al junction detector is a best low-cost device and it shows 37.79 μAW^{-1} responsivity which is similar order of PbS/Au detector.

Keywords: *quantum dot, successive ionic layer adsorption and reaction (SILAR), IR detector, quantum confinement effect, multiple exciton generation*