

Investigation of PbS Quantum dot Sensitized ZnO Nanorods - Photo Anode for Solar Cell Applications

D. Vinoth Pandi ¹, N. Muthukumarasamy ¹, M.R. Venkatraman ¹, S. Agilan ¹,
P. Balraju ¹, Dhayalan Velauthapillai ²

¹*Department of Physics, Coimbatore Institute of Technology, Coimbatore*

²*Faculty of Engineering and Business Administration, Western Norway University of Applied Sciences,
Bergen, Norway*

E-mail: vinod.phys@gmail.com

Abstract

Sol gel dip coating method has been used for preparing ZnO nanorods (NRs). PbS quantum dots (QDs) have been synthesized by successive ionic layer adsorption and reaction (SILAR) method. The structural and optical characteristics of the ZnO NRs, PbS QDs and PbS QDs sensitized ZnO NRs films have been studied using X-ray diffraction method and UV absorption studies. From the x-ray diffraction analysis, it is observed that the ZnO NRs based sample exhibits hexagonal structure. The optical absorption peak was found to be around 365 nm for ZnO nanorods and the band gap value has been calculated and is 3.27 eV. PbS quantum dots thin film is found to exhibit good absorption of light in the visible region. The surface morphology of the prepared thin film has been analyzed by using FESEM. The image showed the presence of PbS QD in ZnO nanorods based sample. Further quantum dot sensitized solar cells were fabricated using the prepared material as photo anode and its performance has been studied.

Keywords: Quantum dot, SILAR method, XRD and FESEM.