Development of A Photosensor Based on Photo Dielectric Effect of Cadmium Sulphide

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A photosensor is an electronic component that detects the presence of visible light, infrared transmission (IR), and/or ultraviolet (UV) energy. A photosensor which changes its electrical capacitance in the presence of visible light was developed based on the photo-dielectric effect of Cadmium Sulphide (CdS). This photosensor was fabricated by depositing a CdS thin film on Fluorine-doped Tin Oxide glass (FTO glass). FTO acts as the front electrical contact and an aluminum sheet acts as the back contact, where a 2.0μm – 3.0μm thick CdS thin film acts as the photo-dielectric material. Chemical bath deposition method was used for CdS fabrication and the CdS thin film with optimum photovoltaic and microstructural properties was obtained at a bath temperature interval of 40 - 45 ºC, annealing temperature of 180-220 ºC. Film thickness was varied by adjusting deposition time and the number of coatings. Thickness variations were determined using a Scanning Electron Microscope (SEM). The transmittance and absorbance spectra are recorded in the range of 200 nm - 1100 nm. CdS thin film fabricated under optimum conditions resulted in a bandgap in the range of 2.30 eV-2.40 eV, which is closely agreeing to the theoretical value of 2.42eV. The photo-capacitance and photoconductivity were measured in a frequency range of 1 kHz to 5 MHz in dark and illuminated conditions. The Cole-Cole plots were analyzed to identify the most sensitive operational frequency for the device.

Keywords: *Chemical Bath Deposition, Cadmium Sulphide (CdS), Bandgap and Dielectric Study*