E1-04: Dye-sensitization of cadium sulphide prepared by the chemical bath deposition technique

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Cadmium sulphide has been widely studied as a photocatalyst as well as for Solar Energy Conversion since it absorbs appreciably in the visible region of the solar spectrum. However its photocorrosion is a major problem and various methods have been devised to overcome this, including use of colloidal particles, sacrificial agents and dye-sensitization. Although the charge injection from excited dye molecules from a dye solution in contact with CdS single crystals have been attempted, studies to prepare composite films where the dyes are chemically adsorbed to the CdS surface have not been made. This study reports the charge injection of photoexcited carriers via chemically adsorbed dyes on CdS.

Chemical bath deposition of CdS to produce particles with an average size of 40 A° was prepared on ITO glass plates. The adsorption of the dye was carried out by immersing these plates in either with sulphide or the salicylates in solution forms of the dyes, rhodamine B, methyl violet and crystal violet. Photoelectrochemical measurements were carried out using a standard 3 electrode assembly using monochromatic light. The photocurrent spectra in the case of the crystal violet dye showed 2 maxima at 485 and 615 nm where the latter peak is caused by the injection of electrons to the conduction band by the photoexcited dye. Quantum efficiencies of around 7-8% have been observed for the above process while the cadmium sulphide films were stable for relatively long period of time.