ABSTRACT

The photocurrent quantum efficiency of p-type, β-CuCNS and CuI photocathodes sensitized with different dyes are measured as a function of the surface concentration of the dye and concentration of the electron acceptor in the solution. Deposition of trace quantities of platinum on top of the dye layer is found to increase the stability and the photocurrent quantum efficiency. Also the results are in agreement with the calculations based on kinetics of charge transfer and photophysical processes of the sensitized interface.

It is shown that if a thin layer of a solid substrate having large interstitial cavities is deposited on a semiconductor surface it can be made to absorb dyes without formation of aggregates. Consequently a photoelectrode made by this technique gives higher photocurrent quantum efficiencies owing to a reduction in the rate of concentration quenching. Observations on p-type β-CuCNS photocathode sensitized after deposition of a thin layer of Cuprous Cobalticyanide ($Cu_3\{CO(CN)_6\}$) are presented to illustrate the phenomenon.

Impurity energy band structures of p-type, β-CuCNS are found. The n-type is seen to be sensitive to the visible spectrum. The solid state photovoltaic cells and photoelectrochemical cells are found based on this materials.

Investigating photochemical oxidation and reduction of Mn^{iv} Oxide, it is found that in principle a water cleavage process consisting of two photosystems can be based on this material in the presence of a sensitizer. Here, TiO_2 acts as the sensitizer.