E1-14 Sensitized photoelectrochemical cell with an ordered molecular arrangement

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Dye sensitization of wide band gap semiconductors has become an object of attention as it is a technique that might be adopted for use in solar energy conversion devices at low cost. The Langmuir-Blodgett (LB) technique is extremely attractive as a tool in making ordered molecular arrangements.

Here the deposition technique minimizes the formation of dye aggregates and the dye derivatives related to LB films are almost insoluble in the water medium.

This paper describes the behaviour of PECs with p-CuSCN on conductive glass plates sensitized with double dye systems of Rhodamine-C_{18} and Methyl Violet-C_{18} ordered molecular arrangements of dye molecules prepared by LB techniques. The remarkable photocurrent enhancement is considered to be due to energy transfer processes between Methyl Violet-C_{18} and Rhodamine-C_{18} LB films. The number of LB-dye monolayers is 4 in this study, since photocathodes with 4 monolayers of R-C_{18} on 4 monolayers of M-C_{18} on p-CuSCN exhibited the most remarkable photocurrent enhancement. These photocurrents are measured at rest potential (-0.25V vs AgCl/Ag) in (2×10^{-3}M) KI + (1×10^{-5}M) I_2 redox couple containing (0.2M)KCl and (1×10^{-2}M) $Na_2H_2PO_4$ buffer solution at pH6. The quantum efficiency reached was ~ 45% as a maximum.