E2-37 Application of interlocked Langmuir-Blodgett films on p-CuSCN with sensitized photocurrent

C A N Fernando[1], W T C Priyankara[1], A Kitazawa[2], M Suzaki[2]
([1]*Dept of Physics, University of Ruhuna, Matara,* [2]*Faculty of Technology, Kanazawa University, Japan*)

Surface pressure isothoms of M-C_{18}, R-C_{18}, M-C_{18} + R-C_{18} on the water surface confirm that Rhodamine double chain -C_{18} dyes interlock Methyl Violet-C_{18} dye molecules. The area occupied by one molecule (nm^2) for R-C_{18} is similar to that of the area of (R-C_{18}+M-C_{18}) mixture. Polarized absorption spectra and photocurrent spectra reveal that the vibration planes of excited electrons in the Methyl Violet-C_{18} chromophore are perpendicular to the vibration planes of Rhodamine having double -C_{18} chain. The interlocked monolayer, sensitizes p-CuSCN in an interesting way. The mechanism of the sensitization is believed to be radiative energy transfer between Rhodamine and Methyl Violet:

$$R \xrightarrow{h\nu} R^*$$

$$R^* \longrightarrow h\nu^1 \text{ (Fluorescence)}$$

$$h\nu^1 + M \longrightarrow R + M^*$$

$$M^* \longrightarrow M + h \text{ (VB p-CuSCN)}$$

$$M + A \text{ (Electron acceptor)} \longrightarrow M + A^-$$

The fluorescence of R-C_{18} is absorbed by M-C_{18} in order to excite M molecules. It is known that the emitted photon due to fluorescence is polarized. In this experiment this polarized plane is perpendicular to the electron vibration planes in the M-C_{18} molecules. The excitation of the electrons in the M-C_{18} molecules is possible due to the absorption of the re-emitted photon from Rhodamine -C_{18}. The absorption spectrum of M-C_{18} LB films overlaps with the R-C_{18} emission spectrum. Photocurrent for the double dye systems are higher in comparison to that of single dye systems.

Financial assistance from NARESA, Ruhuna University Research fund, UGC Hiran Thilakarathna Research fund, Center for Theoretical Physics Italy, University of New Delhi and Kanazawa University Japan are acknowledged.