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MOLECULAR ORGANIZATION AND EFFECTIVE ENERGY TRANSFER IN IRIIDIUM METALLOSURFACTANT–PORPHYRIN ASSEMBLIES EMBEDDED IN LANGMUIR–SCHAEFER FILMS

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Air–water interface is an ideal model for the assembly of organized ultrathin films containing different molecules with various functions and well-defined architectures by using the Langmuir trough technique [1,2]. Mixed Langmuir monolayers and Langmuir–Schaefer (LS) films containing the cationic metallosurfactant bis(2-phenylpyridine)(4,40-diheptadecyl-2,20-bipyridine)-iridium(III) chloride (Ir-complex) and the anionic tetrakis(4-sulfonatophenyl)porphyrin (TSPP) in 4 : 1 molar ratio have been successfully prepared by the co-spreading method at the air–water interface. The presence of both luminescent species at the interface, as well as the organization of the TSPP underneath the Ir-complex matrix in Langmuir and LS films, is inferred by surface techniques such as π -A isotherms, reflection spectroscopy, Brewster angle microscopy (BAM) and UV–visible absorption spectroscopy. A red-shift in the absorption band of the porphyrin under the compression of the mixed monolayer suggests the J-aggregation of the TSPP under the Ir-complex matrix. Furthermore, the intermolecular energy transfer between Ir-complex and TSPP molecules in solution and in transferred mixed films has been investigated through steady-state fluorescence and lifetime measurements. These results indicate that effective intermolecular energy transfer occurs from the Ir-complex to the TSPP molecules in LS films. The influence of the spatial proximity of donor and acceptor molecules has been studied by the insertion of lipid spacers among them.

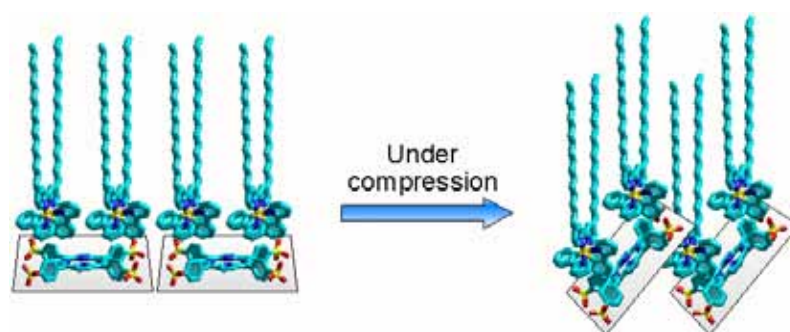


Figure 1. Schematic illustration of J-aggregate formation in the mixed Ir-Complex:TSPP 1:4 monolayer at high surface pressure.

[1] H. Kuhn, *Pure Appl. Chem.*, **1981**, 53, 2105.

[2] S. Di Bella, S. Sortino, S. Conoci, S. Petralia, S. Casilli and L. Valli, *Inorg. Chem.*, **2004**, 43, 5368.