

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

**Cristina Roldán-Carmona,<sup>a</sup> Antonio M. González-Delgado,<sup>a</sup> Andrés Guerrero-Martínez,<sup>b</sup> Luisa De Cola,<sup>c</sup> Juan J. Giner-Casares,<sup>a,d</sup> Marta Pérez-Morales,<sup>a</sup> María T. Martín-Romero<sup>a</sup> and Luis Camacho<sup>a</sup>**

<sup>a</sup>*Department of Physical Chemistry and Applied Thermodynamics, University of Cordoba, Campus Rabanales, Edificio Marie Curie, Cordoba, E-14014, Spain.*

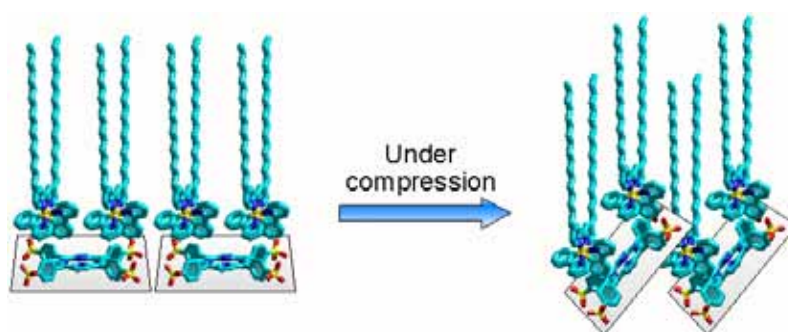
<sup>b</sup>*Department of Physical Chemistry, University of Vigo, Campus Universitario, Vigo, E-36310, Spain.*

<sup>c</sup>*Physikalisches Institut, Westfälische Wilhelms Universität Münster, Mendelstrasse 7, D-48149 Münster, Germany.*

<sup>d</sup>*Max Planck Institute of Colloids and Interfaces, Interfaces Department, Science Park Golm, D-14476 Potsdam, Germany*

*E-mail: q22rocac@uco.es*

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  $\pi$ -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.