Rationale design of interfacial supramolecular assemblies containing organic dyes

J. J. Giner-Casares¹ ², A. González-Delgado¹, C. Roldán-Carmona¹, M. T. Martín-Romero¹, G. Brezesinski², and L. Camacho¹

¹Department of Physical Chemistry, University of Córdoba, Campus de Rabanales, Córdoba, E-14014, Spain
² Interfaces Department, Max Planck Institute of Colloids and Interfaces, Science Park Golm, 14476 Potsdam, Germany

The aim of supramolecular chemistry is the formation of well-defined molecular structures. The construction of molecular devices as thin films of self-assembling molecules is of a high interest for different fields. As functional building blocks for supramolecular assemblies, photoactive molecules are of maximum relevance. Organic dyes have been used for studies involving energy transfer in biophysics, being also fundamental in organic electronics. The controlled manipulation and tuning of the molecular arrangement of the organic dyes is highly desirable for the supramolecular design.

The Langmuir technique allows for the preparation of a monomolecular layer at the air/water interface. The Langmuir technique offers an accurate control of the molecular. Therefore, the design and study of Langmuir monolayers containing organic dyes are interesting options for gaining new insights on supramolecular assemblies. The most relevant information offered by the dye-containing Langmuir monolayers concerns the molecular arrangement of the organic dyes at the air/water interface.

In our current project, several molecular architectures have been tested. An amphiphilic derivative of the Acridine Orange dye has been spread at the air/water interface with a common anionic surfactant, stearic acid. A transition to a multilayer structure has been studied by X-ray reflectivity at DESY. [1] An inclusion complex of fullerene (C₆₀) in a calixarene derivative has been used as the main component in monolayers adsorbing porphyrins at the air/solution interface. [2]

In a parallel study, the first experimental proof of ordering of a Langmuir monolayer arising from the interactions of polar heads has been published using data obtained at HASYLAB. [3]

![Figure 1: Ordering of polyoxometalate polar heads of new inorganic-organic surfactants](image)

References