## Enhance fluorescence efficiency of dye/clay hybrid films by the co-adsorption of surfactants.

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The encapsulation of photoactive molecules in constrained media is of a great technological interest. The matrix not only increases the thermal and photo-stability of the organic guest but also can modify the final photophysical properties of the organic guests embedded. Moreover, many of the photonic and optoelectronic applications of photofunctional host/guest materials require also the development of macroscopic ordered arrangements. In this sense, layered clay minerals are attractive host materials a well-organized 2D multilayer structure can be easy obtained by elaborating supporting films [1].

In this contribution, Pyronine Y (PY) dye is intercalated at different loadings in supported thin films of Laponite clay (Lap), a synthetic clay mineral with a very small particle size (≈ 30 nm). The intercalated dye molecules are with a preferential orientation respect to the normal axis of clay film providing a macroscopic ordered system. The orientation of dye molecules respect to the normal to the clay surface can be determined by means of the anisotropic response of the hybrid films to the plane of the polarized light [2].

However, experimental results suggest that as the dye loading increase, molecules tend to aggregate in H-type geometry (face-to-face stacking) in the interlayer space of the clay. Generally, these aggregates are characterized by blue-shifted absorption band respect to the monomer (Figure 1) but also they are efficient quenchers of the fluorescence reducing drastically the emission efficiency of the final hybrid system [3].

Surface modifications of clay (organophilic clays) with surfactant alkylammonium ions (C12TMA) is a good strategy to improve the general fluorescence capacity of dye molecules in clay systems, maintaining the macroscopic orientation of the dye [4]. Thus, systematic varying surfactant concentrations and the procedure to co-incorporate with the PY dye into the clay interlayer space, dye aggregation on the Lap films was reduced. In those cases an increase of around 6 times in the fluorescence efficiency has been detected (Figure 2).

### References

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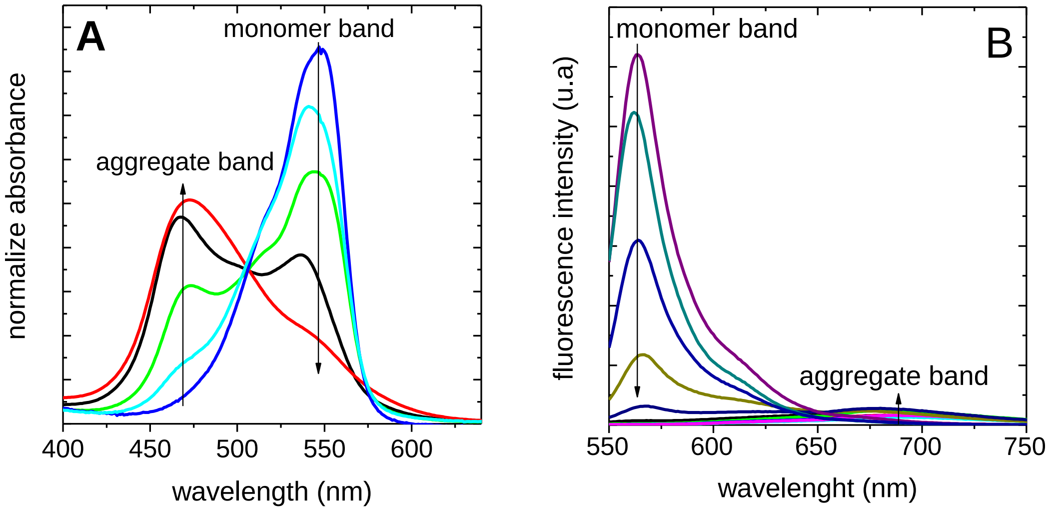
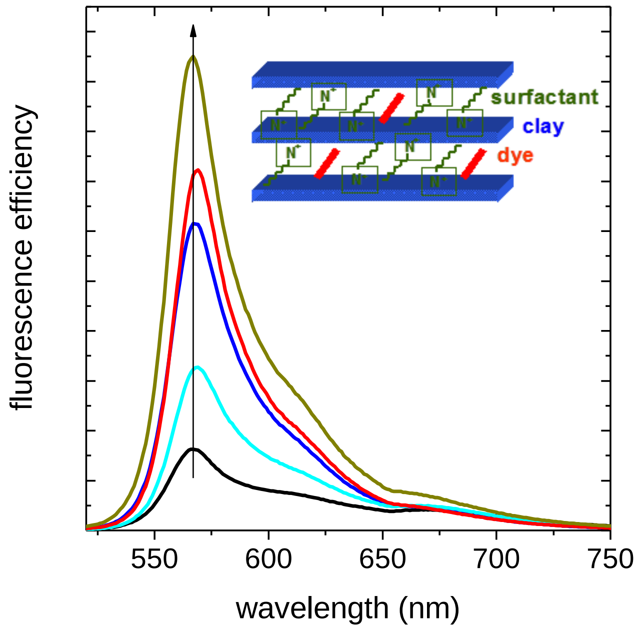
**Figures**




[Figure 1]. a) Absorption b) Fluorescence spectra of Py/Lap films at different loadings.




[Figure 2]. Fluorescence efficiency of a Py/Lap films with different surfactant loading.