## "Physico-chemical nanomaterials science"

# Bending elastic modulus of adsorbing polymer-containing lyotropic lamellar mesophases

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The properties of self-assembled aggregates consisting of amphiphilic molecules in solution may be modified by the addition of macromolecules such as polymers. In particular, the lamellar phase, which consist of a periodic stack of membranes separated by solvent and interacting by means of short-range (hydration, screened electrostatic) or long-range (van der Waals, unscreened electrostatic, undulation) forces has been widely used as an attractive host for the guest components. These systems allow interesting situations to be created, such as polymer coil confinement, for instance. In addition, the properties exhibited by polymer-doped lamellar phases have led to important industrial applications (coatings, paints, detergency, pharmacology, food industry, etc.) but also are of great interest for understanding the interactions between surfactant membranes and polymers. One of the keys to obtain information about such structures is to study the elastic properties of the membranes which gives a better insight into the intermembrane interactions mediated by the macromolecule.

In the presented work the bending elastic modulus of the membranes has been studied in the lyotropic lamellar mesophases composed of SDS (sodium dodecylsulfate) / octanol / water / PEG (polyethylene glycol). Those phase diagram exhibits a critical point signaling the coexistence of two lamellar phases with different periodicities. The effect of the incorporation of the adsorbing polymer PEG onto the membrane bending modulus is thus studied as the critical point is approached. It is obtained from the measurement of quadrupolar splittings by deuterium solid state NMR of the deuterated cosurfactant molecule (octanol) embedded in the membrane and by means of small angle X-ray scattering.