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Magnetic Colloids Adsorbed At Fluid Interfaces Acting As Interfacial Swimmers And Colloid Adsorption Probes

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Due to the large surface energy reduction linked to the adsorption of colloids at a fluid interface, these micrometer particles are often used as stabilizing units in the formation of highly stable complex interfacial fluids, Pickering emulsions, foams and colloidosomes. In addition, they act as probes in the characterization of interfacial microrheological properties or as model systems in the study of different phenomena, ranging from the study of 2D phase transitions to transport in the low Reynolds number regime under confined geometries. In this presentation, we will show how magnetic microparticles suspended in aqueous solutions can be accurately transported at the fluid interface by developing Stokesian and non-Stokesian strategies. In Stokesian designs, magnetic particles are dynamically assembled on interfacial micromotors or conveyor belts, which are driven by remotely controlled generation of local hydrodynamic flows, while in non-Stokesian counterparts, adsorbed and non-adsorbed particles are driven by itinerant magnetic potentials generated by lattices or rails of adsorbed colloids. In the last part of this talk, we will show how tracking the rotational-translational mechanism undergone by these particles, when under the influence of a rotating field, yields information on the kinetics and dynamics of particle adsorption in the presence of electrolytes or anionic and cationic surfactants.

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