Magnetic particles at fluid interfaces as actuated units for the construction of Stokesian and non-Stokesian carriers.

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Due to the large surface energy reduction linked to the adsorption of colloids at a fluid interface, these particles are often used as stabilizing units in the formation of highly stable complex interfacial fluids, Pickering emulsions, foams and colloidosomes, as well as in the characterization of interfacial microrheological properties or 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 used in accurate and directed transport at a 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 the remotely controlled generation of local hydrodynamic flows[1], while in non-Stokesian counterparts, adsorbed and non-adsorbed particles are driven by traveling magnetic potentials generated by lattices or rails of adsorbed colloids [2]. 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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[1] F. Martnez Pedrero, A. Gonzlez-Banciella, A. Camino, A. Mateos-Maroto, F. Ortega, R.G. Rubio, I. Pagonabarraga and C. Calero, *Static and Dynamic Self-Assembly of Pearl-Like-Chains of Magnetic Colloids Confined at Fluid Interfaces*, Small **17**, 2101188 (2021).

[2] F. Martnez Pedrero, F. Ortega, R.G. Rubio, and C. Calero, *Collective Transport of Magnetic Microparticles at a Fluid Interface through Dynamic Self-Assembled Lattices*, Advanced Functional Materials **30**, 2070333 (2020).