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Catalytic particles induced Marangoni flow: motion, pumping and self-assembly PAOLO MALGARETTI, Max Planck Institute Stuttgart, ALVARO DOMINGUEZ, Universidad de Sevilla, MIHAIL N POPESCU, SIEGFRIED DIETRICH, Max Planck Institute Stuttgart — When catalytic particles, such as Janus particles, or enzymes are in the vicinity of a fluid-fluid interface, their behavior can be strongly modulated by the presence of the interface and/or by the inhomogeneity in the transport properties of the two fluid phases. Hence, the effective interaction with the interface can lead to novel dynamical regimes absent in homogeneous fluids. For example, if the by-products of the catalysis are surface active their spatial distribution will affect the local value of the surface tension. In such a scenario, when a catalytic particle approaches a fluid-fluid interface a Marangoni flow will set up as a response to the inhomogeneity in the surface tension induced by the byproducts of the catalysis. The onset of such a flow will attract the catalytic particle towards the interface. Interestingly the strength of such an effective attraction is strongly affected by the affinity of the byproduct to the interface as well as by the transport properties of the two fluid phases. In particular, for water-oil interfaces such an effect overwhelms other means of active transport such as self-diffusiophoresis and makes it suitable to enhance particle accumulation close to fluid-fluid interfaces. Finally I will discuss the onset of collective behavior.

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