**Propulsion of particle laden droplets in electric fields**

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Propelling nano- and microrobots have potential to perform multiple tasks and are highly desirable in fields such as biology, medicine, environmental science and material science. This includes the use for targeted drug delivery, cargo transport, conducting operations in cells, driving nanomachines, removing toxic materials from water or human bodies, or actively controlling material behavior [1-3]. Here we demonstrate propulsion methods of particle laden droplets suspended in fluids that are based on electrostatic and electrohydrodynamic effects.

Particle laden droplets are usually covered by nano-and micrometer sized particles that are energetically trapped at the droplet interface. When suspended in a weakly conductive liquid, the dynamics of such droplets, for instance particle structuring, droplet deformation and rotation, can be controlled by an external electric field [4-6]. The applied electric field exerts electric stress on the surface particles and the droplet, and electrohydrodynamic flows inside and around the droplet can be induced. We show that these effects can be utilized to break time-invariance symmetry and propel particle covered droplets.

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