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Self-propelled Metallic Microrods by Ultrasonic Standing Waves MAURICIO HOYOS, BNRS-ESPCI, SUZANNE AHMED, WEI WANG, THOMAS MALLOUK, Penn State University, DEPT OF CHEMISTRY TEAM, LAB PMMH UMR7636 CBRS TEAM — Particulate materials like rigid particles, cells, bacteria, vesicles, or metallic micro rods can be manipulated in a resonator by ultrasonic standing waves. In a resonator, an acoustic force makes species to migrate either toward the nodes or antinodes depending on the acoustic properties of particles. The acoustic force depends on particles volume, acoustic energy and on the acoustic contrast factor. The latter is a function of particle and fluid acoustic impedances. Acoustic impedance is defined as the product between the density and the sound velocity of a material. The acoustic manipulation has been accomplished mostly in microfluidic devices for separating blood cells from lipids, for driving air bubbles or for generating micro-aggregates of cells. The range of frequencies used is between 0.5 and 10MHz. In this presentation we shall focus on a new phenomenon we called self-acoustophoresis consisting on generating very high speed displacements of metallic microrods (gold, ruthenium) suspended in water; we shall s show how ultrasonic standing waves can be used for generating high speed rotation ofindividual as well as micro rod aggregates.this manipulation opens new possibilities to drug delivery using micro rods as conveyers.

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