

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Active surfaces: Ferrofluid-impregnated surfaces for active manipulation of droplets KARIM KHALIL, SEYED REZA MAHMOUDI, Massachusetts Inst of Tech-MIT, NUMAN ABU-DHEIR, KFUPM, KRIPA VARANASI, Massachusetts Inst of Tech-MIT — Droplet manipulation and mobility on non-wetting surfaces is of practical importance for diverse applications ranging from micro-fluidic devices, anti-icing, dropwise condensation, and biomedical devices. The use of active external fields has been explored via electric, acoustic, and vibrational, yet moving highly conductive and viscous fluids remains a challenge. Magnetic fields have been used for droplet manipulation; however, usually, the fluid is functionalized to be magnetic, and requires enormous fields of superconducting magnets when transitioning to diamagnetic materials such as water. Here we present a class of active surfaces by stably impregnating active fluids such as ferrofluids into a textured surface. Droplets on such ferrofluid-impregnated surfaces have extremely low hysteresis and high mobility such that they can be propelled by applying relatively low magnetic fields. Our surface is able to manipulate a variety of materials including diamagnetic, conductive and highly viscous fluids, and additionally solid particles.

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Date submitted: 01 Aug 2014

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