

Abstract Submitted
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Self Propelled Droplet on Shaped-Liquid Surfaces¹ GARY WELLS, GABY LAUNAY, RODRIGO LEDESMA-AGUILAR, GLEN MCHALE, Northumbria University, UK, MUHAMMAD SADULLAH, HALIM KUSUMAATMAJA, Durham University, UK, SMART MATERIALS AND SURFACES LABORATORY COLLABORATION, DEPARTMENT OF PHYSICS, DURHAM UNIVERSITY COLLABORATION — Moving droplets on flat surfaces has many practical applications in microfluidics, bio-assay and analytical chemistry. Doing this easily, and over long distances, requires the combination of a driving force and a highly mobile droplet. Here, we show droplet propulsion using a dual length scale roughness [1,2] and wettability gradient in a slippery surface. The micro-structured gradient in roughness creates a directional force via an imbalanced contact angle [3]. High mobility is due to a liquid surface, created using a nano-scale roughness imbibed with oil [4] which prevents contact with the solid surface. These surfaces propel droplets by several times their diameter and against gravity. They also allow impacting droplets to be captured, even when the substrate is inverted and the impacting droplets become hanging droplet. REFERENCES: 1. Dai X. et al. ACS Nano, (2015), 9: 926067. 2. Zheqin Dong. et al., Advanced Materials (2018), 30, 1803890 3. Shastry A. et al. Langmuir, (2006), 22: 616167. 4. Wong T.S. et al. Nature, (2011), 477: 44347.

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