Electronic Supplementary Material (ESI) for Soft Matter.
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Supporting Information:

Wetting, Meniscus Structure, and Capillary Interactions of Microspheres Bound to a Cylindrical Liquid Interface

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Preparation of substrates (silicon oxide lines/perfluorocarbon background)

The surface lines needed for creating liquid cylindrical segments on a solid substrate were made by photolithography as described by Cheng et al.[1] The method's photomask, a polyester film patterned at 10,160 DPI resolution, was custom-made by International Phototool, and the silicon wafers (100-mm diameter, 550-μm thickness, 2500-Å wet thermal oxide layer) were obtained from International Wafer Service. The wafers were first cleaned for 20 min in a 120 mTorr, 30 W oxygen plasma created in a RF plasma chamber (Harrick Plasma Cleaner, PDC-001). Microposit S1813 positive photoresist was then spun onto the cleaned wafers at 3000 rpm and soft-baked at 115 ˚C for 60 s. Wafers and mask were tightly contacted by vacuum using a Karl SUSS MA6 mask aligner before exposure to UV light (400-nm wavelength, 150 mJ/cm^2). After light exposure, wafers were stirred gently in developer solution (Microposit MF-321 in deionized water, 1:4 vol:vol mixture) for 45 s before rinsing in water for 60 s. S1813 lines at this stage were surrounded by a silicon oxide background. Application of the same oxygen plasma stripped the oxide without etching the lines. After the stripping, substrates were placed in a polypropylene container alongside a a vial containing 0.1 ml of (tridecafluoro-1,1,2,2-tetrahydrooctyl) dimethylchlorosilane (Gelest, $CF_3(CF_2)_5CH_2CH_2Si(CH_3)_2Cl$) and heated at 70 ºC for a week to create a perfluorinated background. Product substrates were then cut into pieces and stored until use. Just prior to liquid spreading, substrates were sequentially rinsed with hexane, acetone, and isopropyl alcohol before driying in a nitrogen stream. The hexane removed any non-anchored perfluorocarbon, and the acetone removed S1813, thereby uncovering the oxide lines.

Ionic liquid purification and storage

Bis(hydroxyethyl)dimethylammonium methanesulfonate ($[C_6H_{16}O_2N][CH_3SO_3]$, abbreviated BH-DAMS, was received as a gift (TEGO IL 2 MS; Evonik Goldschmidt). The received clear but amber-colored liquid was stirred for 48 h with activated charcoal (Norit CA1, Sigma-Aldrich) and methanol before filtration, first through a column packed with diatomaceous earth (Celite 545, Sigma-Aldrich) and then through a PTFE 0.2-μm membrane (Whatman). After removing methanol at reduced pressure, the product liquid was dried in a vacuum oven at 60 °C for a week before storage in a nitrogen glove bag.

1. Cheng, D. F.; McCarthy, T. J., Using the Fact that Wetting Is Contact Line Dependent. *Langmuir* **2011,** *27* (7), 3693-3697.