Abstract Submitted
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Morphology of air nanobubbles trapped at hydrophobic nanopattened surfaces[1] ANTONIO CHECCO, TOMMY HOFMANN, ELAINE DIMASI, CHARLES BLACK, BENJAMIN OCKO, Brookhaven National Laboratory, Upton NY USA — By using wettability and X-ray scattering measurements we study the trapping of air nanobubbles at the interface between water and a hydrophobic silicon surface patterned with 20 nm-wide cavities. Hydrophobic cavities of various depths were fabricated over a large area of the substrate using diblock-copolymer lithography followed by silane functionalization. We have found that the contact angle of millimiter-sized water drops wetting the nanostructured surfaces increases with the cavity's depth eventually reaching a plateau. This behavior results form the stable trapping of air in the cavities consistent with Small-angle X-rays scattering (SAXS) measurements. The latter also show that water always penetrates slightly in the cavities independent on their depth which can be rationalized considering the geometry of the cavities. The ability to form high-density arrays of nanobubbles of well-defined morphology at the water/solid interface is relevant to the fabrication of surfaces with reduced liquid slippage for integration in micro- and nano-fluidic devices.

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