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Reversible Transitions on Electrically-Tunable Nanostructured Superhydrophobic Surfaces TOM KRUPENKIN, J. ASHLEY TAYLOR, PAUL KOLODNER, MARC HODES, JOANNA AIZENBERG, Bell Labs, Lucent Technologies — Recently demonstrated electrically tunable nanostructured superhydrophobic surfaces provide a promising new way of manipulating liquids at both micro and macro scales. Dynamic control over the interaction of liquids with the solid substrate is of great interest to many research areas ranging from biology and chemistry to physics and nanotechnology. In this work the reversibility of the electrically induced superhydrophobic – hydrophilic transition on nanostructured surfaces is addressed. Recently demonstrated approach based on momentarily induction of film boiling in a very thin layer of liquid adjacent to the solid-liquid interface is discussed. The dependence of the hydrophilic – superhydrophobic transition on the topography of the nanostructured layer, as well as on the energy and duration of the electrical pulse is investigated. Several emerging applications of these surfaces, including lab-on-a-chip, chemical microreactor, and on-chip power sources are discussed.

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