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Surface acoustic wave driven wetting transition. SUDEEPTHI A, ASHIS KUMAR SEN, Indian Institute of Technology Madras, LESLIE YEO, RMIT University, Australia — Water drop deposited on a nanostructured superhydrophobic surface undergoes wetting transition from Cassie-Baxter state to Wenzel state upon excitation by MHz frequency acoustic waves (surface acoustic waves). The wetting transition is governed by the competition between the input acoustic energy supplied to the drop via the surface acoustic waves (SAWs) and the energy barrier associated with the transition. The kinetic energy gained by the drop due to the transfer of energy from SAWs drive the liquid into the hydrophobic grooves to overcome the energy barrier associated with the replacement of low energy solid-gas interface with the high energy solid-liquid interface. As the liquid comes in contact with the substrate due to the filling of nanogrooves, boundary layer acoustic streaming assisted by the capillary flow in the hydrophilic bottom walled nanogrooves displaces the drop contact line giving rise to drop spreading. The transition is irreversible since the drop attains minimum energy state in the Wenzel condition.

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