Abstract Submitted
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Launching droplets from a super-hydrophobic surface using electrowetting[1] ZHANTAO WANG, DIRK VAN DEN ENDE, ANDREA CAVALLI, DANIEL WIJNPERLE, FRIEDER MUGELE, Physics of Complex Fluids, Faculty of Science and Technology, University of Twente — Electrowetting (EW) on super-hydrophobic surfaces in ambient air has been reported to be mostly irreversible due to the transition from the Cassie to the Wenzel state. By applying short voltage pulses using interdigitated electrodes, embedded in the substrate we demonstrate a reversible contact angle variation up to 70 degrees on a single-tier super-hydrophobic surface, which is much higher than previously reported. For a range of voltages and pulse durations the droplet can be launched from the substrate due to conversion of interfacial energy to kinetic energy of the center of mass. We have studied the jumping height as a function of the applied voltage and pulse duration and identified the parameters to maximize this height. The energy dissipation during the droplet detachment and subsequent bouncing was also analyzed by analyzing the drop shape and position from the side and bottom view recordings of the jumping drop. We also investigate the role of the ambient phase by considering the EW-actuated detachment of water drops in oils of different viscosities.

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