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How to make sticky surfaces slippery? Contact angle hysteresis in AC electrowetting FRIEDER MUGELE, ADRIAN STAIKU, FAHONG LI, University of Twente, PHYSICS OF COMPLEX FLUIDS TEAM — Pinning of contact lines at surface heterogeneities, the origin of contact angle hysteresis, is a major obstacle in micro- and nanofluidic systems involving moving three-phase contact lines giving rise to finite threshold forces. We studied the contact angle hysteresis of aqueous drops on various polymer surfaces in the presence of electric fields in an electrowetting configuration. We demonstrate the contact angle hysteresis decreases linearly with the electrostatic force applied to the contact line in the case of AC voltage at frequencies in the kHz range. In contrast, the hysteresis is essentially unaffected by a DC voltage giving rise to the same decrease in contact angle. The experimental observation is explained in terms of an instantaneous balance of surface tension forces, pinning forces, and time-dependent electrostatic forces at the contact line. To illustrate the power of the effect, we demonstrate that the threshold force required for actuating drops sandwiched between two parallel surface indeed almost vanishes for sufficiently high AC voltage.

Prefer Oral Session
 Prefer Poster Session

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