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Dynamics of electrowetting-driven spreading and receding of a droplet ANNE JUEL, University of Manchester, UK, PALLAV KANT, University of Twente, NL, PAWIN IAMPRASERTKUN, University of Manchester, UK, ABD-ALMALIK HALFAOUI, Ecole Normale Supérieure de Cachan, France, BRUNO ETCHEVERRY, Ecole Normale Supérieure de Lyon, France, ROBERT DRYFE, University of Manchester, UK — Electrowetting is a powerful method to achieve external wetting control, by exploiting the potential-dependence of the liquid contact angle with respect to a solid substrate. We study the effect of electrolyte concentration c_0 on electrowetting-induced spreading and receding of a droplet on the basal plane of graphite, a very smooth conducting substrate. We find that for positive applied potentials, the static electrowetting contact angle is independent of c_0 over three decades of concentration but that the spreading time to reach this final state varies as c_0^{-1}. In contrast, for negative potentials, the electrowetting angle varies as $c_0^{1/2}$ and the spreading time varies as $c_0^{-1/2}$. We show that both spreading and receding times are governed by the formation of the electrical double layer (EDL) on the substrate, and that electrowetting can be used as a macroscopic probe into the structure of the EDL.

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