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AC Electrowetting of Polymer Aqueous Drops on Parallel Electrodes LU ZHANG, NISHANT CHETWANI, HSUEH-CHIA CHANG, YINGXI ELAINE ZHU, Department of Chemical and Biomolecular Engineering, University of Notre Dame — We have recently observed the strong field dependence of AC-electrowetting of simple electrolyte aqueous drops on parallel gold electrodes, yet the detailed dynamic process of AC-field induced surface wetting remains unclear. In this work, we use fluorescence labeled DNA aqueous solution as a model system to directly visualize the wetting process of aqueous drops under varied AC electric fields by using combined fluorescence microscopy and contact angle goniometer. The electrowetting behavior of DNA aqueous drops is observed at AC-field frequency greater than the reciprocal of the RC time scale for electrode screening. And the onset of AC electrowetting is accompanied by the observed oscillation in drop contour shape and contact line. In addition, the ejection of nanodrops from the parent aqueous drop is observed when the threshold AC-field amplitude is exceeded. A scaling theory based on electrode interfacial screening is developed to quantify the AC-electrowetting behavior with the dependence of AC-field frequency, strength and medium conductivity.

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