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Levitation of oil droplets over an electrode in oscillatory electric fields SCOTT BUKOSKY, WILLIAM RISTENPART, Dept. Chemical Engineering and Materials Science, University of California Davis — Application of an oscillatory electric field causes immiscible oil droplets in water to aggregate, a phenomenon believed to result from induced electrohydrodynamic (EHD) fluid flows. Recently it has also been shown that rigid colloids exhibit a distinct bifurcation of their equilibrium height over the electrode in response to low frequency electric fields. Here we report that oil droplets also exhibit a bifurcation in their equilibrium height in response to oscillatory fields. Optical and confocal microscopy observations show that at low applied frequencies (< 100 Hz) a large fraction of droplets levitates up to several microns away from the electrode. We investigate the impact of the electric field properties and droplet size on the levitation, and we discuss the implications of this height bifurcation phenomenon for separation of emulsified oils from solution via a contactless electrostatic precipitation process.

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