

Electronic Supplementary Material for

Particle-covered drops in electric fields: Drop deformation and surface particle organization

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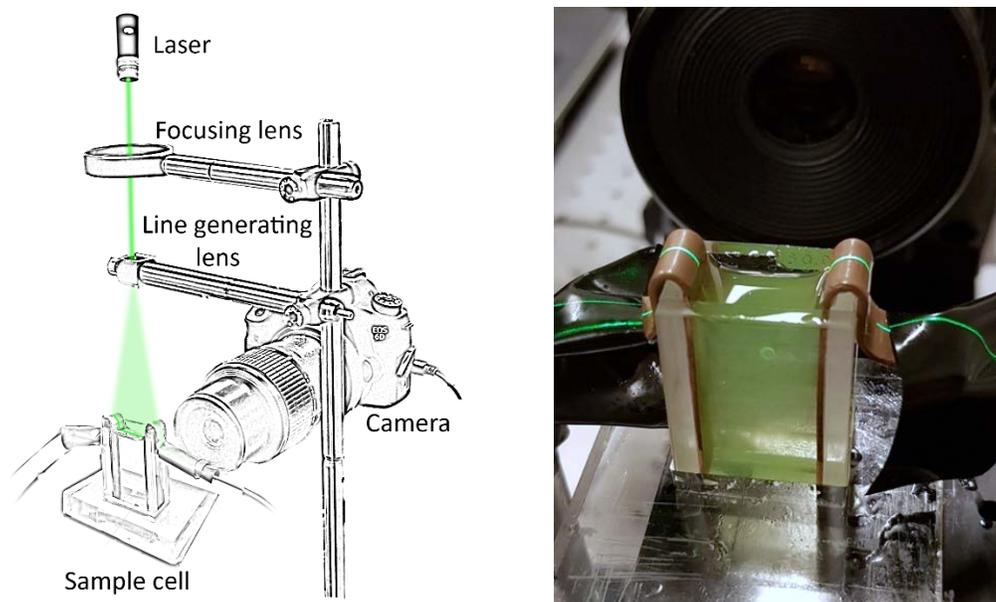


Fig. S1 (a) A schematic illustration and (b) a picture of the set-up used for estimating the electrohydrodynamic (EHD) flow velocities. EHD flowlines around drops were traced using particle image velocimetry (PIV). Fluorescent polyethylene particles (UVPMS-BY2-1.00, with average size of $35\ \mu\text{m}$, purchased from Cospheric LLC) were dispersed in castor oil (0.3% by weight) and poured in the sample cell. A $500\ \mu\text{m}$ thin sheet of particles were selected by focusing 532 nm laser light (COM-09906-5mW laser, purchased from SparkFun Electronics) from above the sample cell through a laser line generator lens. During the experiments, the laser sheet was always aligned in the middle of the drop (which was positioned in the middle of the sample cell) and oriented along the electric field direction, and perpendicular to the view direction of the microscope.

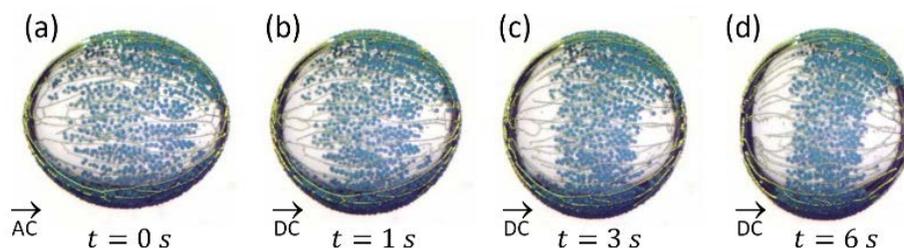


Fig. S2 Manipulation of particles by switching the electric field frequency from (a) 200 Hz to (b-d) 0 Hz. Silicone oil drop covered by a mix of $15\ \mu\text{m}$ Ag-coated spheres and $50\ \mu\text{m}$ polyethylene (PE) particles. Blue PE particles are here used to qualitatively observe the presence or absence of EHD flows. (a) At AC fields, the PE particles do not move towards the drop electric equator, are loosely packed, and confined by the structured conductive particles. This is a direct confirmation that the EHD flows are completely suppressed at an electric field frequency of 200 Hz. (b-d) As the electric field frequency is switched back to 0 Hz, the induced EHD liquid flows convect the PE particles towards the electric equator of the drop.