

Abstract Submitted
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Destabilization of Pickering emulsions using external electric fields KYUHO HWANG, Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, PA 15213, PUSHPENDRA SINGH, Department of Mechanical Engineering, New Jersey Institute of Technology, Newark, New Jersey, 07102, NADINE AUBRY, Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, PA 15213 — It is known that emulsions can be stabilized by the presence of particles which get trapped at fluid-fluid interfaces and prevent adjacent drops from coalescing with each other. We show here that such emulsions, or Pickering emulsions, can be destabilized by applying external electric fields. This is demonstrated experimentally by studying water drops in decane and using various types of particles, including micro and nanoparticles. It is conjectured that the destabilization occurs due to the motion of particles on the surface of drops in presence of a uniform electric field. Although there should be no electrostatic forces acting on neutral particles in a uniform electric field, the presence of the drop itself introduces some non-uniformity which is responsible for particle motions along the surface. Particles translate either to the poles or equator of the drop, depending on the relative dielectric constants of the particles, the surrounding fluid and the fluid within the drop. Such motions break the particle barrier, thus allowing for drops to merge into one another.

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