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Electro-coalescence of particle-coated droplets[1]

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Droplets in air or in an immiscible liquid phase are used widely in applications ranging from personal hygiene products to drug delivery. The stability of the droplets are highly linked to their utility, and thus have been systematically studied. To enhance the stability of the droplets, particles are often added to the droplets. In this talk, I will discuss how the particle layer at droplet interfaces responds to electrical charging of the droplets. The electrical forces can distort the droplet shape, which is opposed by the layer of particles adsorbed. A balance of the electrical and interfacial effects provides a quantitative indicator of the droplet instability. The coalescence of droplets in both air and liquid induced by electrically charging, which we call "electro-coalescence", will be introduced, with its potential application in devising a digital millifluidic platform.

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