

Controlling the Partial Coalescence of Particle-stabilized Droplets

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Partial Coalescence: a coalescence event in which pinch-off occurs creating a smaller daughter droplet. Pinch-off is governed by the rates of horizontal and vertical collapse, which in the case of particle-laden droplets is controlled by droplet rheology.



Drop at rest



Film rupture



Capillary stretching

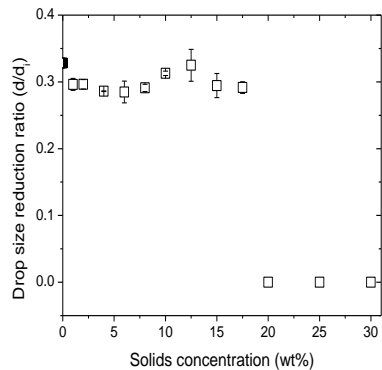


Neck thinning

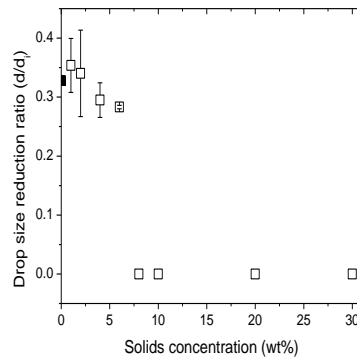


Pinch-off

Both particle-laden and particle-stabilized droplets are to be considered. The role of particle concentration, size, surface charge and wettability on the transition from partial to complete coalescence will be studied.



Increasing particle concentration (low electrolyte concentration)



High electrolyte concentration

Partial coalescence can be suppressed through (i) impedance of horizontal collapse by means of particle network interaction (jamming) and (ii) dampening of the propagating capillary wave.

We have been able to show that particle concentration and charge influence the transition condition (left) which is directly related to droplet rheology.

Our next goal will be to elucidate the effect of particle size for particle-laden droplets and wettability for particle-stabilized droplets.