

Coalescence of Pickering Emulsion Droplets Induced by an Electric Field

(Talk #28)

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We would like to present our latest findings on the followings [1].

Combining high-speed photography with electric current measurement, we investigate the electro-coalescence of Pickering emulsion droplets. Under a high enough electric field, the originally stable droplets coalesce via two distinct approaches: normal coalescence and abnormal coalescence. In the normal coalescence, a liquid bridge grows continuously and merges two droplets together, similar to the classical picture. In the abnormal coalescence, however, the bridge fails to grow indefinitely; instead, it breaks up spontaneously due to the geometric constraint from particle shells. Such connecting-then-breaking cycles repeat multiple times, until a stable connection is established. In depth analysis indicates that the defect size in particle shells determines the exact merging behaviors: when the defect size is larger than a critical size around the particle diameter, normal coalescence will show up, while abnormal coalescence will appear for coatings with smaller defects.

Reference:

[1] G. Chen, P. Tan, S. Chen, J. Huang, W. Wen, and L. Xu, Phys. Rev. Letts. 110, 064502 (2013).