

Tuning the Adhesion of Clay-Stabilised Water Drops in Oil

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We investigated the flocculation of water drops in emulsions stabilized by clay particles treated with dimethyl dihydrogenated tallow. Adding moderately hydrogen-bonding, polar solvents to the emulsions caused the drops to flocculate. The structure of the weakly aggregated droplet clusters was examined by optical microscopy. Oscillatory rheology was used to probe the structure of strongly flocculated emulsions. The solvent composition causing a sharp flocculation transition in the emulsions was identified. Theoretical predictions of the particle interactions based on mismatch in solubility parameters between hydrophobic chains in the tallow and the solvent composition were consistent with the measured flocculation transition.

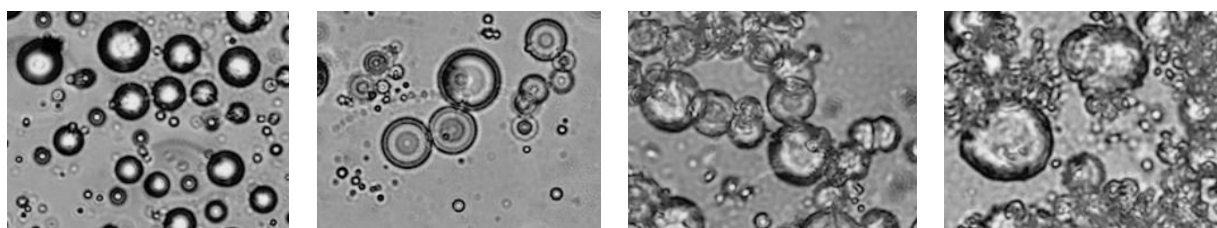


Fig. 1 Optical images of the droplet microstructure in a clay particle-stabilised water-in-oil emulsion. Droplet aggregation increases as the mismatch between the oil solvent and the hydrophobic coating on the clay particles increases (from left to right).