

Abstract Submitted
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Thermodynamically Stable Pickering Emulsions Stabilized by Janus Dumbbells FUQUAN TU, BUM JUN PARK, DAEYEON LEE, University of Pennsylvania — Janus particles have two sides with different, often opposite, surface properties. Janus dumbbell is one type of Janus particles that consists of two partially fused spherical lobes. It is possible to independently control the geometry and surface wettability of Janus dumbbells. Janus dumbbells can also be produced in a large quantity, making them useful for practical applications such as emulsion stabilization. In this work, we calculate the free energy of emulsion formation using amphiphilic Janus dumbbells as solid surfactants. In contrast to kinetically stable emulsions stabilized by homogeneous particles, emulsion stabilized by Janus dumbbells can be thermodynamically stable. There also exists an optimal radius of droplets that can be stabilized by infinite or limited number of amphiphilic dumbbells in the continuous phase. We demonstrate that the optimal radius of dumbbell-stabilized droplets can be predicted based on the volume of the dispersed phase and the volume fraction of dumbbells in the continuous phase. We believe our calculation will provide guidelines for using Janus dumbbells as colloid surfactants to generate stable emulsions.

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