

## Effect of interaction heterogeneity on colloidal arrangements at a curved oil-water interface

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We present the unique arrangement behavior of colloidal particles at a curved oil-water interface. Particles trapped at a centrosymmetrically curved oil-water interface, formed by placing an oil lens at a neat air-water interface, organize into diverse structures by balancing gravity-induced attraction and electrostatic repulsion. To reveal a possible mechanism behind the observed diversity, we investigate the interactions between pairs of particles at the curved oil-water interface. The magnitude of electrostatic repulsive interactions between pairs of particles is determined by minimizing the total potential of the particle pairs. We find that the pair interactions are quite heterogeneous, following a Gamma distribution. By using the experimentally determined pair potential and the heterogeneity in the potential as input parameters for Monte Carlo simulations, we show that such interaction heterogeneity affects the particle arrangements at the curved interface and results in the observed diversity in the particle arrangement structures.