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Tuning Raft Interactions in Colloidal Membranes using Component Chirality JOIA MILLER, Brandeis University, PRERNA SHARMA, Indian Institute of Science, ZVONIMIR DOGIC, Brandeis University — Two-dimensional colloidal membranes composed of rods of different lengths display rich phase behavior. In particular, the chirality of constituent rods stabilizes assembly of colloidal rafts, micron-sized droplets enriched in one type of rod floating in a membrane background with a different rod composition. Raft interactions are mediated by local rod twisting due to their rods' inherent chirality, leading to long-range repulsive interactions. We explore the behavior of rafts while reducing the net chirality of the membrane background. Even in the achiral limit, stable or metastable rafts form. However, in the achiral case the long-range interactions between rafts are attractive but not pairwise additive, resulting in the assembly of clusters of individual rafts. The membrane background has large-scale density fluctuations which we correlate to the raft interactions. Our work demonstrates a new method for assembly of well-defined clusters, one that does not rely on complex colloidal synthesis, but rather on the unique anisotropic environment of the colloidal membranes.

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