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Visualizing, manipulating, and imprinting π-wall defects in self-assembled colloidal membranes MARK ZAKHARY, THOMAS GIBAUD, C. NADIR KAPLAN, EDWARD BARRY, Brandeis University, RUDOLF OLDENBOURG, Marine Biology Laboratory, ROBERT B. MEYER, ZVONIMIR DOGIC, Brandeis University
— Geometric frustration and the resulting topological defects play an important role in determining the structural, mechanical and optical properties of materials. Here we describe the behavior of a new type of defect, called a π-wall, in a model system of colloidal membranes composed of chiral rod-like *fd* viruses. We use complimentary optical microscopy techniques to study the structure and energetics of π-walls, and develop a model based on the analogy between liquid-crystals and superconductors to determine the structure and energetics of π-walls. We then focus on π-wall formation, showing that π-walls naturally assemble through a unique coalescence process in which chiral frustration plays an essential role. π-walls can also be artificially created and engineered using externally applied optical forces.

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