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Modeling the Elastic Properties of Lipid Bilayer Membranes EDWARD BARRY[1], MRSEC at Brandeis University, THOMAS GIBAUD, MRSEC at Brandeis Universiy, MARK ZAKHARY, ZVONIMIR DOGIC, MRSEC at Brandeis University — Model membranes such as lipid bilayers have been indispensable tools for our understanding of the elastic properties of biological membranes. In this talk, I will introduce a colloidal model for membranes and demonstrate that the physical properties of these colloidal membranes are identical to lipid bilayers. The model system is unique in that the constituent molecules are homogenous and non-amphiphilic, yet their self-assembly into membranes and other hierarchical assemblages, such as a lamellar type phases and chiral ribbons, proceeds spontaneously in solution. Owing to the large size of the constituent molecules, individual molecules can be directly visualized and simultaneous observations at the continuum and molecular lengthscales are used to characterize the behavior of model membranes with unprecedented detail. Moreover, once assembled in solution, molecular interactions can be controlled in situ. In particular, the strength of chiral interactions can be varied, leading to fascinating transitions in behavior that resembles the formation of starfish vesicles. These observations point towards the important role of line tension, and have potential implications for phase separated lipid mixtures or lipid rafts.

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Edward Barry
MRSEC at Brandeis University

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