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Shape Selection in Self-Assembled Chiral Membranes: New Mechanism Based on the Flexoelectric Effect ZHAO LU, ROBIN SELINGER, JONATHAN SELINGER, Liquid Crystal Institute, Kent State University — Many biological materials self-assemble into chiral microstructures such as cylindrical tubules and helical ribbons. A chiral elastic theory proposed by Selinger et al., based on the elastic properties and chirality of amphiphilic lipid molecules, has been successful in explaining the formation of tubules and helical ribbons. Recently, an experiment has shown that achiral lipid molecules can also form chiral microstructures. This challenges the previous theory based on molecular chirality. Toward understanding this problem, we develop a new model for membrane shape selection based on the flexoelectric effect. We investigate this model through both analytical calculations and dissipative particle dynamic simulations on tethered membranes.

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