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Microstructures in a phase separating chiral membrane[1] RAUNAK SAKHARDANDE, ARVIND BASKARAN, MICHAEL HAGAN, APARNA BASKARAN, BULBUL CHAKRABORTY, Brandeis Univ — Chiral rod-like particles suspended in the presence of non-adsorbing polymer are driven by depletion interactions to form diverse high-order assemblies. Of particular interest are colloidal membranes, which is a one rod-length-thick monolayer of vertically aligned rods. Here, we discuss the phase behavior of colloidal membranes comprised of three rod species. One has a short length and right-handed chirality, the other two have long lengths and respectively right- and left-handed chirality. Experiments have shown that such a system undergoes microphase separation, with the short rods forming finite-sized domains floating in a background of the two long species. Tuning the background composition to be effectively achiral leads to complex, non-pairwise interactions between domains which exhibit multiple stable minima. We employ a Ginzburg-Landau description of the system to understand how this behavior depends on chirality and depletion interaction strength, and identify competing interactions which give rise to the complex inter-domain potentials.

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