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Attractive amphiphilic polymer layers form amorphous membranes HO CHEUNG SHUM, Harvard University, JEROME BIBETTE, Ecole Supérieure de Physique et Chimie Industrielle, DAVID WEITZ, Harvard University — Amphiphilic polymer molecules becomes attractive and form aggregates in a poor solvent. By confining two layers of attractive polymer layers at neighboring interfaces, we form a thin amorphous membrane instead of aggregates. The rigidity of the membrane is shown to be controlled by the magnitude of attractive interaction between the two layers. At very high attractive interactions, possibly glassy membranes are formed. We demonstrate these using microfluidics to form polymer vesicles with amorphous membranes. By measuring the energy of adhesion between the two layers, we propose a physical explanation behind the membrane formation process. The amorphous membranes are shown to have a similar structure as lipid bilayers, but with a significantly improved rigidity. Our system provides a simple way to look into membrane formation and suggests that the membrane rigidity is closely related to the interactions between the constituent molecules.

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