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Using Microfluidics to Measure the Equation of State for a 2D Colloidal Membrane ANDREW BALCHUNAS, RAFAEL CABANAS, SETH FRADEN, ZVONIMIR DOGIC, Brandeis Univ — In the presence of non-adsorbing polymer, monodisperse filamentous viruses assemble into colloidal membranes, which are 2D liquid-like one-rod-length-thick monolayers of aligned rods. Colloidal membranes are of particular interest because their properties are accounted for by the same theoretical models that are used to describe the biophysics of conventional lipid bilayers. However, bulk membrane formation only occurs over a very limited range of depletant concentrations and ionic strengths. In order to explore the properties of the colloidal membranes under a much wider range of molecular parameters, we have developed a microfluidic technique that allows for in-site exchange of the enveloping polymer suspension. This allows us to access the region of phase space where membranes are metastable. Using our technique we can measure how the colloidal membrane area depends on applied osmotic pressure, allowing us to determine its equation of state. We also characterize the dynamics of the constituent rods by using single molecule tracking techniques.

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