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Measuring the equation of state for a 2D colloidal membrane: A microfluidic approach to buffer exchange ANDREW BALCHUNAS, RAFAEL CABANAS, SETH FRADEN, ZVONIMIR DOGIC, Brandeis University — Previous work has shown that monodisperse rod-like colloidal particles, such as a filamentous bacteriophage, self assemble into a 2D monolayer smectic in the presence of a non-adsorbing depleting polymer. These structures have the same functional form of bending rigidity and lateral compressibility as conventional lipid bi-layers, so we name the monolayer smectic a colloidal membrane. We have developed a microfluidic device such that the osmotic pressure acting on a colloidal membrane may be controlled via a full in situ buffer exchange. Rod density within individual colloidal membranes was measured as a function of osmotic pressure and a first order phase transition, from 2D fluid to 2D solid, was observed. k_{on} and k_{off} rates of rod to membrane binding were measured by lowering the osmotic pressure until membrane evaporation occurred.

Andrew Balchunas
Brandeis University

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