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Single Nanometer Thickness of Polymer Nanocapsules Measured using Small Angle Neutron Scattering ANDREW RICHTER, Valparaiso University, SERGEY DERGUNOV, EUGENE PINKHASSIK, University of Connecticut — We have been creating polymer nanocapsules using a directed assembly approach in which hydrophobic monomers, crosslinkers, and pore-forming templates are localized in the hydrophobic interior of the surfactant bilayer of vesicles that are 50 – 200 nm in diameter. Polymerization and rinsing results in hollow polymer spheres with well-defined pores that can be used as a platform for drug delivery, sensing, and catalysis applications. Many of these applications rely on the polymer shell to be as thin as possible so as to maximize the interior cargo space and to allow for fast mass transport through the shells. Directly measuring that thickness has proven to be difficult due to the small amount of material comprising the wall, adequate dispersal of the nanocapsules in solution, and the lack of contrast between the wall and the solvent, among other issues. We have recently completed a series of small-angle neutron scattering experiments that push the edge of the capability of the technique that show that the polymer shell is only 1 nm thick, making these shells some of the thinnest membranes ever fabricated. We will present that analysis and discuss some of the complicating factors in performing this measurement.

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