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Characterizing Mesoporous Block Copolymers by Resonant Soft X-ray Scattering[1] DAVID WONG, KEITH BEERS, UC Berkeley and Lawrence Berkeley National Lab, CHENG WANG, Advanced Light Source, Lawrence Berkeley National Lab, JEFFREY KORTRIGHT, Lawrence Berkeley National Lab, NITASH BALSARA, UC Berkeley and Lawrence Berkeley National Lab — Mesoporous block copolymers membranes can be used as water filtration membranes and battery separators. In these applications, it is often advantageous to generate a structure where one block serves as a structural component, and the second block lines the pores. The membrane thus has 3 components: the two blocks and vacuum (or air). Small Angle X-ray Scattering (SAXS), which relies on electron density for contrast, only distinguishes between vacuum and polymer. This is because the scattering contrast between the two blocks is much less than that between the polymer and vacuum. Resonant Soft X-ray Scattering (RSoXS) experiments can be used to adjust the contrast between block copolymer phases by tuning the energy of the incident x-ray beam. We have studied mesoporous poly(styrene-block-ethylene-block-polystyrene) (SES) films, where the semicrystalline polyethylene serves as a structural phase, and the polystyrene lines the pores. At a particular energy, the scattering contrast between PS and vacuum becomes negligible, while contrast between PS and PE is enhanced. We present RSoXS data at different x-ray energies to demonstrate this contrast enhancement.

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