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Resonant soft x-ray reflectivity of polymer bilayers CHENG WANG, TOHRU ARAKI, SHANE HARTON, JEFF KORTRIGHT, GARY MITCHELL, HARALD ADE, North Carolina State University — Hard x-ray reflectivity is a very successful and common tool to measure thin film thickness, roughness, and interfacial widths in bilayers. However, hard x-rays have low or even insufficient contrast for a number of polymer species. For this reason, neutron reflectivity is often used in which the contrast can be enhanced enormously by deuterating one species. Alternatively, x-ray reflectivity capabilities could be extended by enhancing the contrast between layers through resonant methods near absorption edges. We are in the process of evaluating if soft x- ray resonant reflectivity is a valuable complement to hard x-ray and neutron reflectivity. Measurements were performed on PS/PMMA and PS/P2VP bilayer structures near the carbon-1s and nitrogen-1s or oxygen 1s K absorption edges on samples with individual layer thicknesses of 10-40 nm. At these photon energies the scattering factors f_1 and f_2 can be varied substantially, amounting to ?turning on and off? PS and PMMA or P2VP selectively. Large differences in reflected intensity have indeed been observed as a function of photon energy in θ-2θ measurements. We are in the process of characterizing the intrinsic limitation of interfacial width measurements and the limitations on film thickness due the longer wavelength and lower penetration power of soft X-rays. - Data acquired at the X-ray Calibrations and Standards beamline 6.3.2 at the Advanced Light Source at the Berkeley National Laboratory. Research supported by U.S. DoE.

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