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Principles of resonant soft x-ray reflectivity – a novel tool in polymer research CHENG WANG, TOHRU ARAKI, SHANE HARTON, NC State University, TADANORI KOGA, SUNY Stony Brook, HARALD ADE, NC State University — Resonant soft x-ray reflectivity (RXR) has been reported to be a potentially excellent tool for the study of polymer thin films [1]. To further delineate the applicability of this method, detailed principles about RXR will be discussed. Near the carbon 1-s absorption edge, the complex index of refraction n = 1-δ-iβ is changing rapidly as a function of photon energy in a manner that strongly depends on the chemical moieties of the polymer. This leads to enhanced contrast between two polymers at specific energies when compared to hard x-rays. This contrast enhancement mimics the contrast enhancement achieved through deuteration used in neutron reflectivity, yet does not require special chemical procedures. PS/PMMA, PBrS/PMMA, PS/SAN, PS/P2VP and PCHMA/PMMA bilayers were characterized by RXR at beamline 6.3.2 at the Advanced Light Source. For a subset of these samples, RXR results were directly compared to hard x-ray reflectivity characterization that uses a fourier analysis method [2], and the results showed good agreement. [1]C. Wang, T. Araki, and H. Ade, Appl. Phys. Lett. 87, 214109 (2005). [2]O. H. Seeck et al., Appl. Phys. Lett. 76, 2713 (2000).

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