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Soft X-ray Resonant Scattering of Polymers: A Complement to NEXAFS Microscopy TOHRU ARAKI, SHANE HARTON, YING ZOU, HARALD ADE, North Carolina State University, GARY MITCHELL, The Dow Chemical Company, JEFFREY STUBBS, University of New Hampshire, JEFFREY KORTRIGHT , Lawrence Berkeley National Laboratory — SAXS is a method that can provide spatial resolution information of ensemble averages approaching the $\lambda/2$ limit in a backscattering geometry. Using resonant scattering, we can achieve chemical differentiation related to the exquisitely varied NEXAFS of organic materials. It might now offer an important complement to NEXAFS Microscopy for the chemical differentiation of small phases in polymeric materials. To evaluate the utility of resonant scattering, we have acquired data near the C1s, N1s, and O1s absorption edges of a number of model polymer structures with features in the 20-100 nm range, including self-assembled block copolymer thin films and core-shell micro spheres. We have performed the scattering experiments in transmission geometry with polymer samples supported on the silicon nitride membrane to simplify the interpretation and to conduct STXM measurement with the identical samples. The feature size in the phase separated block copolymer thin films from the scattering results is in good agreement with AFM data. Angular scans as a function of photon energy, and photon energy scans at several scattering angles reveal large differences due to the chemical differentiation possible near the absorption edges. High spatial resolution information well below the present resolution limit of STXM is already achievable

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