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**Diffuse X-ray Scattering from Polystyrene Films** XUESONG JIAO, JARRETT STARK, LAURENCE LURIO, Department of Physics, Northern Illinois University, SURESH NARAYANAN, ALEC SANDY, Argonne National Laboratory, ZHANG JIANG, SINHA SUNIL, Department of Physics, University of California at San Diego — The diffuse x-ray scattering from a series of thin polystyrene (PS) films spun cast onto Si substrates has been measured. A standing wave technique was used to decompose the measured x-ray scattering into the contribution from the surfaces of the film and the contribution from density fluctuations in the films interior. The scattering from the interior yields the compressibility of the film. For thick films (100 nm) the compressibility is found to equal the bulk value. For thinner films the compressibility is increases with decreasing thickness up to 20% for the thinnest film measured (35 nm). Additional diffuse scattering was found to originate from both the top and bottom interfaces. When the contribution from surface capillary waves is taken into account there is a residual scattering, which is of similar magnitude at each interface. We attribute this scattering to a near surface region in the polymer where there is incomplete chain interpenetration.

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