Abstract Submitted
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Grazing-incidence x-ray scattering studies on surface melting in ultrathin polymer films[1] TADANORI KOGA, Y. WANG, M. RAFAILOVICH, J. SOKOLOV, Stony Brook University, A. TIKHONOV, D. SCHULTZ, M. LEE, University of Chicago, M. TOLAN, Dortmund University — The aim of this study is to investigate surface crystal structures formed in ultrathin (thickness below 100 nm) polymer films by using surface-sensitive x-ray scattering techniques. This study was motivated by our current experimental finding that showed a drastic suppression (the decrease of $\sim 50\,^{\circ}$C) in the surface melting temperature (T_m) of ultrathin polymer films, which was determined as the onset of surface softening by using the shear modulation force microscopy (SMFM) method[1]. In order to clarify the relationship between the melting behavior and surface crystal structures, we integrated a variety of grazing-angle x-ray scattering techniques including reflectivity, diffuse scattering, grazing-incidence diffraction, and grazing-incidence small-angle scattering. As a result, we found that diffuse scattering, which is sensitive to surface roughness, drastically changed at T_m determined from SMFM, while the surface crystallinity decreased with increasing temperature, but remained up to the bulk melting temperature. A model to explain the mechanism of the surface melting will be discussed. [1]Wang, Y. et al. Macromolecules, **37**, 3319 (2004).

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