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Synchrotron X-ray scattering study of structure and dynamics of thin block copolymer films HYUNJUNG KIM, HEEJU LEE, YOUNG JOO LEE, SANGHOON SONG, YOUNGSUK BYUN, Physics & Interdisciplinary program of Integrated Biotechnology, Sogang U., Korea, ZHANG JIANG, SUNIL K. SINHA, Dept. of Physics, U. of California San Diego, CA 92093, ADRIAN RÜHM, Max Planck Institute for Metals Research, Stuttgart, Germany, SURESH NARAYANAN, Argonne National Laboratory, Argonne, IL 60439 — We have studied the structure and the dynamics of block copolymer films of poly(styrene)-b-poly(dimethylsiloxane) in the melt using X-ray Photon Correlation Spectroscopy. Block-copolymers exhibit internal interactions and therefore an internal structure (in our case spherical micelles). This ought to have a strong influence on the physical properties of the thin films. It can be expected that the dynamics is strongly altered once the film thickness reaches the characteristic length scale in the polymer, which is in our case given by the micelle diameter. The surface tension obtained from static grazing incidence scattering data shows that a PDMS layer segregates to the free surface of the film. The dynamics results are compared with the theory of overdamped thermal capillary waves on thin films. Both the surface dynamics and the micelle dynamics, which were selectively measured by changing the incident angle, will be discussed. It was supported by Korea Science & Eng. Foundation / Seoul Research & Business Development Program.

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