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Anomalous Surface Dynamics Near Tg in Supported Polystyrene Films by XPCS[1] ZHANG JIANG, MRINMAY MUKHOPADHYAY, SUNIL SINHA, Department of Physics, University of California at San Diego, SANGHOON SONG, HYUNJUNG KIM, Department of Physics & Interdisciplinary Program of Integrated Biotechnology, Sogang University, Korea, LAURENCE LURIO, Department of Physics, Northern Illinois University — The reduction of the glass transition temperature (Tg) in supported thin polymer films is of great interest. One proposed explanation is that close to the surface region there exists a thin layer with very low viscosity. Here we report a recent XPCS (X-ray photon correlation spectroscopy) measurement from silicon supported polystyrene films. At just above Tg, we have found a relaxation mode of the surface fluctuations at least 100 times faster than the capillary wave theory predicts. Surprisingly, this mode does not show significant molecular weight dependence. At higher temperatures (T-Tg>=50C), the surface relaxation becomes normal, as predicted by the capillary wave theory [1].

[1] H. Kim, et al., Phys. Rev. Lett. 90, 68302 (2003)

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