

Abstract Submitted  
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**Surface Dynamics of Macrocyclic Polystyrene Films** SHIH-FAN WANG, MARK D. FOSTER, Dept. of Polymer Science, The University of Akron, Akron OH 44325-3909, ZHANG JIANG, SURESH NARAYANAN, X-ray Science Division, Argonne National Laboratory, Argonne, IL 60439 — Thermally stimulated fluctuations of the surface of a melt of macrocyclic polymers have been studied for the first time. The surface fluctuations of macrocyclic polystyrene (cPS) of 2k, 7k, 17k, and 37k molecular weight (M) were probed using x-ray photon correlation spectroscopy (XPCS), a recently-developed technique that has already been applied to study surfaces of linear PS melts. The surface fluctuations for the cPS films are slower than those of linear chain analogs for all M. However, the glass transition temperatures ( $T_g$ ) of the cyclic chains are higher than those of the linear analogs, with the discrepancy decreasing with increasing M. A continuum hydrodynamic theory of thermally stimulated capillary waves with a nonslip boundary condition is adequate to rationalize the behavior of the cPS films. When results from cPS of different M are plotted as a function of  $T/T_g$  the data nearly collapse to a single curve, indicating that  $T_g$  is a key parameter for the surface dynamics of macrocyclics in the temperature range studied. Acknowledgements: NSF CBET 0730692

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