

Abstract Submitted
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Demonstration of Glass Transition Temperature Depression in Thin Supported Polystyrene Films Using Internal Standard MIKHAIL EFREMOV, PAUL NEALEY, Department of Chemical and Biological Engineering, University of Wisconsin - Madison, Madison, WI 53706 — Clear evidence for glass transition temperature (T_g) depression in ~ 5 nm thick atactic polystyrene (M_w = 212 kg/mol) films supported on silicon substrates is demonstrated by ellipsometry in vacuum [1]. Transition in polystyrene droplets formed by dewetting is used as an internal reference. Both temperature-modulated [2] and linear temperature scanning techniques are utilized; measurements are performed at $10^{-6} - 10^{-8}$ torr residual gas pressure. The method is sensitive enough to observe glass transition in 1 – 2 nm thick supported polystyrene films. Our recent study shows appreciable reduction of T_g in less than 10 – 20 nm thick samples; T_g versus thickness function is found to follow a step-like curve originally reported by [3]. The curve is characterized by moderate (about 17 K) constant T_g depression for thickness less than 7 – 8 nm. References: [1]. M. Y. Efremov, S. S. Soofi, A. V. Kiyanova, C. J. Munoz, P. Burgardt, F. Cerrina, and P. F. Nealey, *Rev. Sci. Instrum.*, **79**, 043903 (2008). [2]. M. Y. Efremov, A. V. Kiyanova, and P. F. Nealey, *Macromolecules*, **41**, 5978 (2008). [3] T. Miyazaki, K. Nishida, and T. Kanaya, *Phys. Rev. E*, **69**, 061803 (2004).

Mikhail Efremov
Department of Chemical and Biological Engineering,
University of Wisconsin - Madison, Madison, WI 53706

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