

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Surface Self-diffusion of Organic Glasses and Low Molecular Weight Polystyrene WEI ZHANG, CALEB BRIAN¹, LIAN YU, Univ of Wisconsin, Madison — The study of surface self-diffusion of organic glasses and low molecular weight polystyrene help understand the formation of stable glasses by vapor deposition, the nature of surface mobility on polymer glasses and the fast surface crystal growth. Surface self-diffusion was measured via surface grating decay. Corrugated patterns were embossed on sample surfaces with master gratings at elevated temperatures. The smoothing of surface gratings was monitored with Atomic Force Microscopy or light diffraction. It was identified by Mullins' model that viscous flow dominates grating decay at high temperatures, but surface diffusion is the leading mechanism upon cooling. Surface diffusion coefficients were measured for organic glasses and polystyrenes with different glass transition temperatures and intermolecular forces. Surface diffusion is at least 10^5 times faster than bulk diffusion at T_g , and unlike bulk diffusion, surface diffusion exhibits strong material dependence. The fast surface diffusion implies fast rearrangement of molecules on surface during vapor deposition and helps the formation of stable glasses.

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Date submitted: 13 Nov 2014

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