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Exceptionally stable organic glasses: a molecular view of the glass-to-liquid transformation STEPHEN SWALLEN, KENNETH KEARNS, MARK EDIGER, University of Wisconsin-Madison — Exceptionally stable organic glasses have been prepared by physical vapor deposition. Substrate temperature and deposition rate have been found to determine the degree of stabilization. When optimized, these factors allow the production of films with very slow kinetics and up to 2% more dense than the ordinary glass. This is as dense as the estimated density of the equilibrium supercooled liquid at Tg – 50 K. Translational motion, density and surface mobility were measured in films vapor deposited at a range of temperatures from Tg down to Tg – 150 K. Stable films can be superheated well above Tg, and the very slow relaxation rates allow the investigation of the glass-to-liquid "melting" transition. Results suggest this process occurs by nucleation and growth, with regions of low viscosity liquid developing within the glassy matrix.

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