Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Exceptionally Stable Organic Glasses with Low Enthalpy and High Kinetic Stability Prepared by Vapor Deposition KENNETH L. KEARNS, STEPHEN F. SWALLEN, M.D. EDIGER, Department of Chemistry, University of Wisconsin-Madison, YE SUN, TIAN WU, LIAN YU, School of Pharmacy, University of Wisconsin-Madison — Vapor deposition can be used to prepare glasses of 1,3,5-(tris)naphthylbenzene (TNB) and indomethacin (IMC) that are much more stable than those created by cooling from the liquid. By controlling the temperature of the substrate and the deposition rate, the stability of the glass can be tuned. Glasses can be deposited with enthalpies as much as 10 J/g lower than the glass made by cooling the liquid. Vapor-deposited glasses can also be superheated well above the conventional T_g. The slow evolution from the low energy glass to the supercooled liquid is observed and can take tens of hours to evolve at temperatures near T_g+ 5 K. Trends in stability support an enhanced surface dynamics mechanism where we estimate the dynamics in the top 1 nm to be about 7 orders of magnitude faster than the bulk at T_g – 25 K. Vapor deposition has also allowed us to progress more than 40% towards the bottom of the amorphous potential energy landscape.

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Date submitted: 30 Nov 2007 Electronic form version 1.4