Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Nanocalorimetry as a means to explore thin films of vapor-deposited organic glasses KENNETH L. KEARNS, Department of Chemistry, University of Wisconsin-Madison, HEIKO HUTH, MATHIAS AHRENBERG, CHRISTOPH SCHICK, Institute of Physics, University of Rostock, M. D. EDIGER, Department of Chemistry, University of Wisconsin-Madison — Vapor deposition was used to prepare nanometer thick films of small molecule organic glasses. Films of indomethacin (IMC) and 1,3,5-(tris)naphthylbenzene (TNB) with a range of stabilities and thicknesses were created and characterized using differential nanocalorimetry. The heat capacity-like calorimetric signal was lower for the stable vapor-deposited glass films at temperatures below the glass transition T_g than for an ordinary glass prepared by cooling the liquid. A gradual increase in the calorimetric signal was observed during the isothermal transformation above T_g from stable to ordinary glass with the fastest transformation taking place in about 200 τ_α. The time for this transformation was dependent on film thickness with 350 nm thick films transforming approximately 5 times faster than 40 μm thick films. Aging experiments on the ordinary glass also showed a thickness dependence with thinner films aging more rapidly. This thickness dependent behavior is consistent with a mechanism where the dynamics at the film interfaces are faster than those in the bulk.

Kenneth L. Kearns
Department of Chemistry, University of Wisconsin-Madison

Date submitted: 21 Nov 2008 Electronic form version 1.4