Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Controling thickness dependent elastic moduli of organic glass films using deposition temperature BRYAN VOGT, Univ of Akron — The elastic moduli of vapor-deposited small molecule glasses, commonly utilized for OLEDs, are examined using surface wrinkling. It is known that the deposition temperature can strongly influence the dynamics of vapor deposited glasses and this can be used to tune the modulus of bulk-like glasses. Here, examination of ultrathin (<30 nm) films provides a route to further test hypotheses about mobile surface layers near Tg. We find that the proximity of the mechanical testing temperature to bulk Tg controls if the modulus is increased or decreased in ultrathin films for materials deposited at low temperatures. Moreover, the thin film behavior of these small molecule glasses are altered by the deposition temperature to generate films with moduli nearly twice that obtained for analogous films fabricated under normal vapor deposition conditions. For N,N′-Di-[(1-Naphthyl)-(N,N′-diphenyl]-1,1′-biphenyl)-4-4′-diamine (NPD) with a bulk Tg of ∼90°C, the modulus of the material is optimized if deposited at 70 C (0.94Tg). The stable glass deposition temperature of 0.85Tg reported originally by Ediger and coworkers results in more than 20% decrease in the elastic modulus. This suggests that the optimum deposition temperature depends on property of interest.

Bryan Vogt
Univ of Akron

Date submitted: 05 Nov 2014 Electronic form version 1.4