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Using deposition rate as a means to alter the properties of small molecule organic glasses for OLED applications KENNETH KEARNS[1], The Dow Chemical Company, PAIGE KRZYSKOWSKI[2], ZACHARY DEVEREAUX[3], Department of Chemistry, Saginaw Valley State University — Organic light emitting diode (OLED) devices rely on vapor-deposited, small molecule organic glasses. Recent work has shown that deposition condition plays a critical role in altering OLED device performance. Here it will be shown that the deposition rate alters the onset and fictive temperatures measured by differential scanning calorimetry (DSC) of the deposited glass. Glasses of the common hole transport materials NPD and TPD were prepared with onset temperatures 17 and 16 K higher, respectively, than the ordinary glass prepared by cooling the supercooled liquid. The thermal stability of glasses in functioning devices can be underestimated due to increases in onset temperature relative to Tg. The fictive temperatures for NPD and TPD were 32 and 27 K lower, respectively, than the Tg of the ordinary glass. These results are consistent with literature reports on other non-OLED glasses where enhanced surface mobility allowed for glasses with similar properties to be made. Ellipsometry studies on NPD showed that the fictive and onset temperatures were consistent with the DSC results. Additionally, the modeled birefringence of the as-deposited NPD glass was non-zero and quickly decreased upon heating above the onset temperature, which has implications for device performance.

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