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GIWAXS characterization of amorphous, anisotropic, vapor-deposited organic semiconductor films ANKIT GUJRAL, University of Wisconsin-Madison, KATHRYN O'HARA, MICHAEL CHABINYC, University of California, Santa Barbara, MARK EDIGER, University of Wisconsin-Madison —
Vapor-deposited organic glasses can be produced with enhanced thermal stability and tunable molecular packing by controlling deposition conditions, such as the rate of deposition and the substrate temperature. Recent work in organic electronics has also shown improved charge carrier mobility associated with anisotropic molecular packing. In this work, grazing-incidence wide angle x-ray scattering (GIWAXS) is used to characterize the structural anisotropy in glasses of a hole transport material, TPD, prepared by physical vapor deposition. A Hermans' order parameter is used to quantify the changes observed in the scattering patterns of glasses prepared at different substrate temperatures. The order parameter correlates closely with spectroscopic ellipsometry measurements showing different molecular orientations depending upon the substrate temperature during deposition. Additionally, the GIWAXS measurements indicate there is a change in structure at the surface of the film compared with the bulk, providing insight into the formation of stable glasses. These findings may contribute in understanding the enhanced charge carrier mobility observed for anisotropic glasses used in OLEDs.

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