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Thermal Stability of Vapor-Deposited Stable Glasses of an Organic Semiconductor DIANE WALTERS, University of Wisconsin-Madison, RANKO RICHERT, Arizona State University, MARK EDIGER, University of Wisconsin-Madison — Organic glasses prepared by physical vapor deposition can be highly stable and resistant to transformation upon heating. Unlike ordinary glasses, transformation to the supercooled liquid is initiated at a free surface or other interface and propagates through the material as a constant velocity front. In this work, we show that an organic semiconductor commonly used as an active layer in organic electronics, TPD, transforms via propagating fronts when heated above the glass transition temperature. We measure transformation front velocities using spectroscopic ellipsometry. Using high-throughput preparation and annealing techniques, we find that front velocity can vary by over an order of magnitude depending upon the substrate temperature during the deposition of the glass. Transformation front velocity is also influenced by the mobility of the supercooled liquid at the annealing temperatures and, consistent with this view, transformation fronts have the same activation energy for stable glasses prepared with a wide range of the substrate temperatures. These results may aid in designing organic electronic devices with improved lifetimes.

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