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Probing the Dynamics of Thin TPD Glass Films via Dewetting[1]

YUE ZHANG, ETHAN GLOR, TIANYI LIU, CHEN LI, ZAHRA FAKHRAAI, Department of Chemistry, University of Pennsylvania — Enhanced mobility of surface layer has been observed in both polymer glasses and small molecule organic glasses. In polymers, the mobile surface layer is believed to have great effects on the properties of thin films. Similar studies in small molecule glasses are significantly more challenging due to dewetting Understanding the dynamics of this mobile layer, and its effect on thin film dynamics can be important in understanding heterogeneous dynamics in glassy systems. In this work, we investigate the properties of the mobile layer and its effect on the overall properties of thin glass films of small molecule organic glasses. We show that thin (thickness below 30nm) TPD (N,N′-Bis(3-methylphenyl)-N,N′-diphenylbenzidine) films prepared by physical vapor deposition (PVD), can be unstable and dewet in a hole growth manner due to enhanced mobility at temperatures as low as Tg-35K. By following the kinetics of dewetting, we investigate the mobility changes with temperature and film thickness. These studies can elucidate the relation between the enhanced mobility and the stability of thick films of the same materials prepared at similar deposition temperatures and thus the formation mechanisms and unique properties of physical vapor deposited glasses.

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