Abstract Submitted
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Exploring ultrastability in nanostructured glassy polymer films by fast-scanning calorimetry.[1] MITHUN CHOWDHURY, YUCHENG WANG, HYUNCHEOL JEONG, Department of Chemical and Biological Engineering, Princeton University, Princeton, NJ 08544, USA, DANIELE CANGIALOSI, Centro de Fisica de Materials, CSIC-UPV/ EHU, San Sebastian 20080, Spain, RODNEY PRIESTLEY, Department of Chemical and Biological Engineering, Princeton University, Princeton, NJ 08544, USA — A decade ago ultra-stable small molecule glass formers were discovered. Since then a significant amount of research has been devoted to traverse down the energy landscape of such glass formers via physical vapor deposition (PVD). Matrix assisted pulsed laser evaporation (MAPLE) has the known ability to produce vapour deposited nanostructured polymer glass with exceptional kinetic stability. We explored the role of deposition temperature/ growth rate on thermodynamic and kinetic stabilities of poly (methyl methacrylate) (PMMA) films, deposited over a fast-scanning calorimetry sensor. We found in general any MAPLE deposited glass is kinetically more stable than bulk polymer and its spin-coated film. Moreover slow growth rate and optimum temperature during MAPLE deposition can additionally lead to thermodynamically stable (low-energy) glass. The role of interfaces formed through dramatic nanostructuring and packing of nanoglobules (removal of void space) may have additional role on such ultrastability.

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