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Nanostructured glassy polymer films deposited via matrix assisted pulsed laser evaporation KIMBERLY SHEPARD, RODNEY PRIESTLEY, Princeton University — It has recently been illustrated that nanostructured glassy polymer films can be formed via Matrix Assisted Pulsed Laser Evaporation (MAPLE). During the MAPLE process, a pulsed laser beam strikes a target, which is made of a frozen dilute polymer solution held under high vacuum. The interaction between laser light and target causes phase explosion and subsequent formation of a plume, containing clusters of polymer and solvent. The solvent is pumped off as the plume travels away from the target. The plume is collected on a temperature-controlled substrate, where a polymer film forms at a controlled, slow growth rate. The glassy films formed by MAPLE can exhibit an unusual combination of material properties. For instance, a significant reduction in density may be accompanied with a simultaneous increase in thermal/kinetic stability. These interesting material properties are a result of the films' nanostructured morphology, i.e., they exhibit a nanoglobular morphology. Here, we present further evidence connecting the global film properties to those of the nanoscale building blocks, i.e., the nanoglobules. In addition, we explore the impact of concentration (a key processing parameter) on the morphology of the films. Finally, we demonstrate the generality of nanostructured film formation via MAPLE for a series of poly(n-methacrylate)s.

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