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Post-confinement Relaxation Behavior of Nanostructures on Polymer Surface[1] HUA-GEN PENG, YEN PENG KONG, ALBERT YEE, University of California, Irvine — Dimensional relaxation of nanostructures on polymer film was studied to understand dynamics at surfaces and *post*-confinement relaxation. Line gratings from 33 nm and up on PS surface were formed by nanoimprint lithography, and AFM was used to monitor their relaxation with time and temperature. When annealed at temperatures in the vicinity of the bulk Tg, the grating height slumps – or shrinks – as surface tension and other driving forces overcome the viscosity. The temperature for rapid slumping decreases at smaller and smaller gratings of all molecular weights, but a simple explanation based on enhanced surface mobility due to increased surface to volume ratio fails to explain the results. Analysis of viscosity shows that the stress from surface tension may cause shear thinning and thus contribute to the reduced nanostructure stability. More importantly, confinement of polymer chains to spatial dimensions comparable to or even smaller than the radius of gyration seems to enhance molecular relaxation, which may be the major factor for the surprisingly low slumping temperature.

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