

Abstract Submitted  
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**The mechanical properties of supported thin polystyrene films**

PETER CHUNG, EMMANOUIL GLYNOS, PETER GREEN, Univ of Michigan - Ann Arbor — The mechanical properties of supported thin polystyrene films with thicknesses in the range of 100 nm to 1 micron were studied by atomic force microscopy (AFM) nanoindentation measurements. The effective modulus of the 1 micron thick PS film at small indentation depths, in the range of few nanometers ( $\sim 3$  nm), was independent of frequency (indentation rate) in the range we studied. On the other hand, the effective modulus of thinner PS films showed an increase in the modulus with decreasing film thicknesses and this enhancement was frequency-dependent. Finite element analysis revealed that the stress field induced by nanoindentation propagates a few hundred nanometers into the film even with only a few nanometers of indentation, and the enhancement in the effective modulus stems from the underlying hard substrate.

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