

Abstract Submitted  
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**Liquid and Glassy Specific Volume Variations in Thin Supported Polystyrene Films** XINRU HUANG, CONNIE ROTH, Emory University — Studies of density or specific volume in thin films have been previously studied as a possible means of understanding changes in the glass transition temperature  $T_g(h)$  with decreasing film thickness. In the late 1990s, studies reported no change in the glassy, room temperature density of thin films outside of the plus or minus 1 percent experimental error, while more recent studies have claimed large 25-30 percent increases in film density below about 40 nm. In addition, recent theoretical efforts have suggested that  $T_g(h)$  decreases may be associated with small less than 1 percent increases in specific volume of the equilibrium liquid-line. We use ellipsometry to investigate variations in the liquid and glassy specific volume lines for polystyrene films supported on silicon. We observe small, reproducible increases in specific volume of 0.4 plus or minus 0.2 percent for both the liquid and glassy regimes that are uncorrelated with the observed  $T_g(h)$  decrease. Below 20-30 nm, we also observe what appears to be large increases in density that we attribute to breakdown of the assumptions used to derive the Lorentz-Lorenz formula.

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