Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

**The Glass Transition Temperature of Polymer Nanoparticles under Soft and Hard Confinement** CHUAN ZHANG, YUNLONG GUO, RODNEY PRIESTLEY, Department of Chemical and Biological Engineering, Princeton University — When confined to the nanoscale, the glass transition temperature (Tg) of polymers can deviate substantially from the bulk, i.e., the Tg-confinement effect. Due to ease of processing, most studies have focused on the size-dependent Tg of thin films, while few have extended investigations to other geometries. As polymers confined in higher geometrical dimensions become the enabling material in technologies ranging from drug delivery to plastic electronics, a greater understanding of size effects on Tg is warranted. Here, we investigate the effect of soft and hard three-dimensional confinement on the Tg of polymer nanoparticles. Via modulated differential scanning calorimetry, we show that Tg decreases with size for bare polymer nanoparticles, i.e., the case of soft confinement while Tg is invariant with size for silica-capped polymer nanoparticles, i.e., the case of hard confinement. These results suggest that the free surface is a key factor in Tg reductions of three-dimensionally confined polymer.

Rodney Priestley
Department of Chemical and Biological Engineering, Princeton University

Date submitted: 19 Nov 2010 Electronic form version 1.4