The viscoelastic properties of ultrathin polymer films as measured with a novel nanobubble inflation technique PAUL OCONNELL, GREGORY MCKENNA, Texas Tech University — Using a novel microbubble inflation technique developed within our laboratory, we are able to measure the absolute bi-axial compliance of polymer films as thin as 13 nm. Experiments performed on both poly(vinyl acetate) (PVAc) and polystyrene (PS) films show that large reductions in the glass transition temperature at the nano-scale are non-universal, viz., the PVAc shows no reduction even for the thinnest films while the PS shows a significant reduction at a thickness below approximately 80nm. More surprisingly, the rubbery plateau region for both materials shows dramatic stiffening as the thickness is reduced (by up to 300 times), perhaps due to surface pinning of the entanglement network. The compliance increases as approximately the square of film thickness until the bulk values are achieved at a thickness of the order of 300nm.