Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

**The Effect of Molecular Weight on the Glass Transition Temperature of Polymer Thin Films** QIANG GU, DONGSHAN ZHOU, GI XUE, Department of Polymer Science and Engineering, The School of Chemistry and Chemical Engineering, Nanjing University, Nanjing 210093, GI XUE TEAM — The thickness dependence of glass transition temperature (Tg) of polymer thin films has attracted considerable attention in both technological and scientific fields. With decreasing polymer film thickness d, the Tg(d) can decrease, increase or remain constant lying on the details of measurement techniques and sample preparation, etc. Using the recently developed differential alternating current chip calorimeter, we directly measured the calorimetric Tg of polystyrene thin films with various molecular weights. We found that when the molecular weight of polystyrene is below the critical chain entanglement, its Tg in a thin film with a thickness of 15 nm can reduce by 20 degrees (compared to bulk sample). However, the Tg of polystyrene film above the entanglement molecular weight remains constant as the film thickness changes. We argue that the molecular weight plays an important role in the thickness dependence of glass transition temperature of polymer thin films.

Gi Xue
Dept of Polymer Science and Engineering, The School of Chemistry
and Chemical Engineering, Nanjing University, Nanjing 210093

Date submitted: 22 Nov 2010 Electronic form version 1.4