MAR12-2011-001488

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

Glass Transition and Physical Aging in Thin Polymer Films: A Unified Picture of Confinement

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The effect of confinement on the glass transition, structural relaxation, and other material properties has garnered a great deal of attention during the past two decades. Despite the common misperception, there is considerably more agreement than disagreement (or "controversy") of the phenomena in the existing literature. This talk will summarize current experimental findings in the field, focusing on the author's recent work that links physical aging in thin polymer films to Tg changes near a free surface. We also demonstrate that the intricate molecular weight dependence of the film thickness dependent Tg reductions in free-standing films result from two separate mechanisms acting simultaneously on the films. From these results a universal picture is starting to emerge with some effects common to colloidal and small molecule glasses as well.