

Abstract Submitted  
for the MAR11 Meeting of  
The American Physical Society

**Difference in the heat capacity and the coefficient of thermal expansion responses during thermal cycling** GRIGORI MEDVEDEV, EUN-WOONG LEE, JAMES CARUTHERS, Purdue University — An observation that different experimental methods give different values of  $T_g$  is part of the lore of the field of the glassy polymers. We report on a careful study of a series of polymeric systems both thermoplastic and thermoset, including PMMA, PC, PS, and 3,3' DDS Epon 825, conducted using DSC and TMA techniques. We found that for the same thermal history the heat capacity and the coefficient of thermal expansion (both measured upon heating) as functions of temperature transition from the glassy asymptote to the equilibrium asymptote at significantly different temperatures; this difference was in the range from 8 to 17 degrees, depending on the system. We argue that such a large difference in the enthalpy and volume responses during the same thermal history is inconsistent with the commonly used material clock models, but is consistent with the view of the glassy materials as containing dynamically heterogeneous regions.

Grigori Medvedev  
Purdue University

Date submitted: 17 Nov 2010

Electronic form version 1.4