

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**The thermal properties and the microstructures of organic-inorganic nano-composite materials** KENGCHING LIN, Department of Physics, FuJen Catholic University, KUO-HSIN CHANG, Institute of Materials Science and Engineering, National Taiwan University, WEIFANG SU, Institute of Polymer Science and Engineering, National Taiwan University — The imaging capability of the atomic force Microscope (AFM) with thermal accessory is utilized to study the nano-scale  $T_g$  and morphological evolution of silica-polyacrylate composites. The polymer matrix is made by irradiation-inducing polymerization of the blend of TEGDA and EOBDA (Ethoxylated (3) Bisphenol A Diacrylate)acrylate. The surface area ratio of the nano-particles and the measured frame is applied to define the melting event on the composite film and make a direct comparison with the macro-scale  $T_g$  obtained from Differential Scanning Calorimetry (DSC) and Thermo-Mechanical Analyzer (TMA). The decomposition temperature  $T_d$  of the composites is measured by Thermo-Gravimetric Analyzer (TGA). In analog to the mechanical property transition as the nanoparticle content reaches the critical density, the measured melting temperature of these hybrid materials displays a nonlinear trend as the filler content increases. When the silica particles form a percolation network within the composite, the 2-D melting and 3-D disintegration behave differently. This discrepancy arising either from the fundamental difference of physical nature or the instrumental limits will be discussed.

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Date submitted: 18 Nov 2006

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