Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Mapping Mechanical Properties and Glass Transition Temperature in Polymer Materials with sub-100 nm Resolution[1] MAXIM NIKIFOROV, Oak Ridge National Laboratory, STEPHEN JESSE, SANGAH GAM, RUSSELL COMPOSTO, LOUIS GERMINARIO, SERGEI KALININ, OAK RIDGE NATIONAL LABORATORY TEAM, UNIVERSITY OF PENNSYLVANIA TEAM, EASTMAN CHEMICAL CO. TEAM — Thermomechanical properties at the nanoscale are extremely important for understanding fundamental as well as technological problems. To date, Local Thermal Analysis (LTA) provides information about glass transition and melting temperature with about 1-2 μm spatial resolution. We developed LTA technique based on Scanning Probe Microscopy that allows probing not only melting and glass transition temperatures, but also elastic and loss moduli on a 100 nanometer length scale. This universal method for quantitative thermomechanical analysis was used to study the kinetics of phase separation in PMMA:SAN system. The maps of mechanical properties as function of temperature were obtained with sub-100 nm resolution. The difference of mechanical properties for two materials was determined.

[1]This Research at Oak Ridge National Laboratory's Center for Nanophase Materials Sciences was sponsored by the Scientific User Facilities Division, Office of Basic Energy Sciences, U.S. Department of Energy.

Maxim Nikiforov
Oak Ridge National Laboratory

Date submitted: 29 Nov 2008 Electronic form version 1.4