Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Highly Localized Optically Induced Melting Transitions in Block Copolymers AZAR ALIZADEH, EUGENE BODEN, XIALEI SHI, VICTOR OSTROVERKHOV, DANIEL BRUNNELLE, VICKI WATKINS, CHARLES KERBAGE, MATTHEW MISNER, BRIAN LAWRENCE, GE GLOBAL RESEARCH, NISKAYUNA, NY 12309 TEAM — Semi-crystalline block copolymers are well known to exhibit confined crystallization and/or melting phase transitions in sub-50 nm domains. Confined crystallization within these nano-domains is favored under the following conditions: 1) the crystallizable block forms discrete spherical or cylindrical domains; 2) the glass transition temperature of the matrix block is above the crystallization and melting temperatures of the crystallizable minority block; and 3) the block constituents form a strongly segregating system, such that the phase separation dominates the crystallization process. Here we report on optically induced highly localized crystalline-to-amorphous phase transitions in a composite medium comprised of a semi-crystalline block copolymer and a heat generating dye. We use an optical probe-pump and a Bragg reflective grating to both induce and detect the optically induced phase transitions in these block copolymers. We show that extremely fast and localized melting in these block copolymers can be achieved by exposing the samples to very short (5-20 ns) pulses of light. This study provides a new insight on the timescale of melting transitions in polymeric materials.

Azar Alizadeh

Date submitted: 19 Nov 2010 Electronic form version 1.4