Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Microphase Separation and Dynamics of Elastomeric Polyureas[1] JAMES RUNT, ALICIA CASTAGNA, TAEYI CHOI, YOUMI JEONG, Penn State University — Polyureas, consisting of alternating polyether soft segments and urea-containing hard segments, are of interest for shock and other energy absorbing applications. The properties of these materials are strongly influenced by microphase separation of the hard and soft segments, which is rather incomplete. Bulk- and solution-polymerized polyureas based on oligomeric polytetramethylene oxide and methylene diphenyl diisocyanate were investigated, and the role of PTMO molecular weight was identified. The morphology was characterized using atomic force microscopy and quantitative degrees of phase separation were determined from small-angle X-ray scattering. Dielectric relaxation spectroscopy and dynamic mechanical analysis were used to probe the dynamics. Particular attention was paid to the segmental dynamics of the soft phase, which has been proposed to be a major contributor to shock energy absorption in these materials.

[1]Supported by the Office of Naval Research.

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Date submitted: 15 Nov 2011 Electronic form version 1.4