Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Relationship between Fluctuation and Stress Relaxation in a Block Copolymer Melt AMISH PATEL, NITASH BALSARA, Department of Chemical Engineering, University of California, Berkeley, SURESH NARAYANAN, ALEC SANDY, Argonne National Laboratory, SIMON MOCHRIE, Department of Physics, Yale University, BRUCE GARETZ, Othmer Department of Chemical & Biological Sciences & Engineering, Polytechnic University, HIROSHI WATANABE, Institute for Chemical Research, Kyoto University — The relationship between microscopic fluctuation relaxation and macroscopic stress relaxation was explored in a disordered block copolymer melt containing disordered micelles. Experiments conducted near the order-to-disorder transition, show that the fluctuation relaxation time, measured by X-ray photon correlation spectroscopy is larger than the terminal stress relaxation time, measured by rheology, by factors as large as 100. These observations are in qualitative agreement with predictions of the Fredrickson-Larson theory. The lack of quantitative agreement suggests the need for a comprehensive theory that predicts stress relaxation in systems with complex free energy landscapes, such as those containing micelles and disordered fluctuations.

Amish Patel
Department of Chemical Engineering, University of California, Berkeley

Date submitted: 19 Jan 2006 Electronic form version 1.4