Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Collective dynamic response of bound polymer chains to nanofillers in a good solvent[1] TAD KOGA, NAISHENG JIANG, MAYA ENDOH, Stony Brook University, TOMOMI MASUI, HIROYUKI KISHIMOTO, Sumitomo Rubber Industries, TAKASHI TANIGUCHI, Kyoto University, MICHIHIRO NAGAO, NIST — As proposed initially by Stickney and Falb, a bound polymer covers the surface of filler particles with a stable layer of macromolecules via van der Walls interactions and is thus resistant to dissolution even in a good solvent. The most thorough experimental and theoretical studies on bound polymer layers (BPLs) have been carried out for carbon black (CB)-filled rubber systems. However, a molecular scale description of real chain conformations/dynamics within such a very thin BPL (typically 1-5 nm in thickness) remains unsolved due to the lack of methods capable of providing high-resolution structural information. Here we present small-angle neutron scattering and neutron spin-echo spectroscopy results for bound polybutadiene (PB, M_w = 38,000) chains to the CB surface in toluene. To label the bound layer for the neutron scattering experiments, deuterated toluene, which has the nearly same scattering length density as that of CB, was used. We will highlight the unique collective dynamic response of the bound polymer chains in the good solvent.

[1]We acknowledge the financial support from NSF Grant No. CMMI-1332499.

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Date submitted: 14 Nov 2013 Electronic form version 1.4