Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Dynamics of Poly(2-vinylpyridine)/Silica Nanocomposites from Brillouin and Raman Light Scattering SHIWANG CHENG, ALEXANDER KISLIUK, Chemical Sciences Division, Oak Ridge National Lab, VLADIMIR NOVIKOV, Chemical Sciences Division, Oak Ridge National Lab; Department of Chemistry, University of Tennessee, ADAM P. HOLT, Department of Physics, University of Tennessee, ALEXEI P. SOKOLOV, Chemical Sciences Division, Oak Ridge National Lab; Department of Physics and Astronomy, Department of Chemistry, University of Tennessee — Recent studies show an interfacial layer exists between polymer matrix and nanoparticle surface in polymer nanocomposites (PNCs)[1],which could potentially explain the drastic mechanical enhancement in such materials [2]. Dynamics of this interfacial layer were captured by various techniques, where the typical dynamic range was limited to be below 1 GHz. However, the fast dynamics (above 1 GHz) of the interfacial layer is also important to the application of PNCs under severe conditions. Unfortunately, little work has been done to explore the structure and the dynamics of this layer at high frequencies. In this study, we demonstrated that Brillouin Light Scattering (BLS) can be used to estimate the thickness of the interfacial layer and its mechanical properties. By combining BLS and Raman Scattering, we probed the dynamics in the range from 1 GHz to 5 THz of the Poly(2-vinylpyridine)/Silica nanocomposites with loadings from 5% wt to 52% wt. The various features observed can also be explained in the spirit of the existence of an interfacial layer between the polymer matrix and nanoparticles. [1] Holt, A. P., et al; *Macromolecules* **2014,** *47*, 1837-1843. [2] Papon, A. et al; *Soft Matter* **2012,** *8*, 4090-4096.

Shiwang Cheng
Chemical Sciences Division, Oak Ridge National Lab

Date submitted: 11 Nov 2014 Electronic form version 1.4