Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Macroscopic dynamics of polystyrene grafted silica nanoparticles in a homopolymer matrix JOSEPH MOLL, Columbia University, PINAR AKCORA, University of Missouri, SANAT KUMAR, Columbia University, RALPH COLBY, Pennsylvania State University — Silica nanoparticles grafted with polymers, dispersed in a homopolymer matrix, and annealed over time adopt a broad range of dispersion states which depend on grafting density, annealing time, weight percent silica, and the molecular weights of the polymers. We tuned these variables to give desired dispersion states, from uniformly dispersed particles to agglomerated clusters. Rheology was used to critically determine how the dispersion state affects the mechanical reinforcement of the composite. We have run both steady shear and small amplitude oscillatory shear experiments on nanocomposites comprising a range of dispersion states. By mapping the observed reinforcement on a morphology diagram, we observe the location of a maximum in reinforcement.

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Date submitted: 20 Nov 2008 Electronic form version 1.4