

Abstract Submitted  
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**Nanoparticle Size Dependence of a Polymer's Mechanical Properties**<sup>1</sup> JOSEPH MOLL, Columbia University, SHUSHAN GONG, The Pennsylvania State University, SANAT KUMAR, Columbia University, RALPH COLBY, The Pennsylvania State University — Nanoparticle size critically affects the properties of polymer nanocomposites. We use a silica/poly(2-vinyl) pyridine (P2VP) polymer nanoparticle composite to investigate these effects by varying the nanoparticle sizes from 2nm to a micron. Since silica and P2VP are miscible, we obtain uniform nanoparticle spatial distribution in all cases. Rheology is employed to measure the macroscopic mechanical properties. X-ray photon correlation spectroscopy is used to probe nanoparticle dynamics. We rationalize our search for an optimal nanoparticle size (with regards to composite mechanical properties) by using thermogravimetric analysis to determine particle bound layer thickness as a function of particle size.

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Joseph Moll  
Columbia University

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