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The Dynamics of Nanoparticles in Polymer Solutions and Melts[1]

ASHIS MUKHOPADHYAY, SHARMINE ALAM, INDERMEET KOHLI, Wayne State University — Polymer nanocomposites (PNCs) has received a lot of attention in the recent years because of their potential applications in fabricating materials with novel mechanical, electrical, and photonic properties. The mobility of nanoparticles (NPs) play crucial role in determining various properties of PNC systems. Computer simulations and recent experiments have suggested that properties such as the toughness of a composite depend upon particle mobility. Even nanocomposites with "self-healing" properties that can restore strength in damaged regions have been proposed and some early work of their feasibility has been demonstrated. In this talk I will present some of our experimental work on the diffusion of nano-sized gold particles in polymer solutions and melt. Unusually fast diffusion of NPs when their size is smaller than the tube diameter in an entangled polymer was observed. Comparison with current theories and simulations will be shown. If time permits, our recent results on gold nanorod diffusion in polymer solution using polarized fluorescence correlation spectroscopy will be presented.

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