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Enhancement of nanoparticle dispersion in crosslinked network composites through surface modification ADAM RICHARDSON, School of Polymers and High Performance Materials, University of Southern Mississippi, GREGORY STRANGE, PHILIP COSTANZO, Department of Chemistry and Biochemistry, California Polytechnic State University, DANIEL SAVIN, School of Polymers and High Performance Materials, University of Southern Mississippi — Nanoparticles (NPs) have been investigated as an effective method for the toughening of coatings. Challenges in complete dispersion represent the major barrier to wider application. A grafting-to approach was utilized to tether poly(ethylene glycol) (PEG) chains to the surface of silica NPs. This process was shown to offer a simple and effective means for dispersion of NPs in a crosslinked EPON-Jeffamine network. PEG layer thickness and T_g were dependent on the feed ratio of PEG to nanoparticles, investigated by DLS and DSC, respectively. TEM, AFM and optical imaging confirmed the improved dispersion of PEG-ylated NPs versus bare silica whereas mechanical analysis demonstrated the effects on film toughening. Tethering of PEG chains to silica NPs using Diels-Alder chemistry allows for reversible surface modification. This method has possible uses in self-healing materials and coatings.

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