

Abstract Submitted
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Improvement of the dispersion of silica nanoparticles in PMMA¹

KEREM GOREN, OSMAN B. OKAN, LIMENG CHEN, LINDA S. SCHADLER, RAHMI OZISIK, Rensselaer Polytechnic Institute — Creating well-dispersed polymer nanocomposites is an important part of controlling composite properties. Nanoparticles have been shown to demonstrate quite beneficial electrical and thermo-mechanical properties when they are added to polymers. In the current study, the effects of foaming on de-aggregation of nanoparticles in silica/PMMA nanocomposites are investigated. It was found that the saturation of polymer nanocomposite with supercritical carbon dioxide and subsequent rapid de-pressurization is successful in improving the dispersion of nanoparticles in polymer matrix. In addition, by varying saturation pressure, the degree of dispersion improvement can be controlled. Controlled saturation pressure experiments demonstrated that a decrease in saturation pressure led to decreased improvement of nanoparticle dispersion in polymer matrix. By monitoring the inter-nanoparticle distance using transmission micrographs, a quantitative comparison via radial distribution function (RDF) was constructed for before and after each saturation pressure.

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