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Enthalpic Relaxation of Silica-Polyvinyl Acetate Nanocomposites. SAMUEL AMANUEL, Department of Physics and Astronomy, Union College, Schenectady, NY 12308, SANFORD STERNSTEIN, Department of Materials Science and Engineering, Rensselaer Polytechnic Institute, Troy, NY 12180 — While the effects of nanoparticle size and surface treatment on the glass transition temperature have received well-deserved attention, their effects on other physical parameters associated with the glass transition have received less interest. In order to understand how the incorporation of nanofillers affects the enthalpic relaxations associated with the glass transition, Differential Scanning Calorimeter (DSC) measurements were carried out on silica-polyvinyl acetate nanocomposites with respect to filler content, annealing temperature and annealing period. As expected, longer annealing periods below the glass transition temperature result in an increase of the subsequent enthalpic relaxations. However, the presence of filler substantially reduces the enthalpic relaxation relative to that of the neat polymer. Even after corrections to account for filler weight, the enthalpic relaxations still decrease monotonically with increasing filler content. The underlying enthalpic relaxations and the effects suppressed by the fillers are specific to the annealing temperature. These results suggest a significant alteration of the physical state of the matrix material by the presence of the filler particles.

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