

Abstract Submitted
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The Glass
Transition at Silica/PMMA Nanocomposite Interfaces¹ RAHMI OZISIK,
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Local glass transition temperatures (T_g) have been measured in the interfaces of
solution blended silica/poly(methyl methacrylate) (PMMA) nanocomposites using
fluorescence spectroscopy and compared with T_g measured by differential scanning
calorimetry (DSC). It was found that the two types of measurements yielded signifi-
cantly different information. Combinations of silanes and poly(propylene glycol)-
based molecular spacers bound to fluorophores were covalently linked to the surface
of the nanoparticles, allowing for variation of the fluorophore response with respect
to the distance from the nanofiller surface. Increases in the bulk T_g from the neat
PMMA value were found upon the addition of nanofillers, but were independent of
the nanofiller concentration when the filler concentration was above 2% by weight.
Furthermore, as the size of the grafted molecular spacer was increased, T_g values
were found to decrease and approach T_g of the neat PMMA. Owing to variable
conformations of the spacers, an effective distribution of fluorophore-silica distances
exists, which influences the fluorophores' response to the transition.

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