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Controlling the Average and Local Glass Transition Temperatures of PMMA-SWCNT Nanocomposites PERLA RITTIGSTEIN[1], T. RAMANATHAN[2], L. CATHERINE BRINSON[3], JOHN M. TORKELSON[4], Northwestern University — The presence of nanofillers in a polymer matrix can drastically alter the chain segmental mobility and limit the polymer conformations, changing the properties of the system. Here, fluorescence is used to measure local and average Tg's in poly(methyl methacrylate) (PMMA)/single-walled carbon nanotubes (SWCNT) nanocomposites. SWCNT functionalized with amide groups via chemical modification of carboxyl groups introduced on the carbon nanotube surface, allow for covalent bonding with PMMA. In this study, three side groups, $(CH_2)_{12}$, a phenyl ring and $(CH_2)_2$, were used in the amide functionalized SWCNT. The PMMA-grafted SWCNT was blended with bulk PMMA at different compositions to form polymer nanocomposites. The results show that, relative to the bulk Tg of PMMA, the increases in local and average Tg of PMMA-SWCNT nanocomposites, ranging from 3 K to 32 K, correlate with the length and flexibility of the side group on the amide functionalized SWCNT.

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