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Impact of Carbon Nanoparticle Shape on Polymer Dynamics in Nanocomposites[1] BRAD MILLER, MARK DADMUN, Department of Chemistry, University of Tennessee, Knoxville — In forming quality nanocomposites of carbon-based nanoparticles (CNPs) in a polymer matrix, achieving and maintaining a high degree of dispersion is a crucial problem. One method to attain well-dispersed CNP nanocomposites is to incorporate non-covalent interactions between the CNP and matrix, which also impacts the dynamics of the polymer chain. In this work, T2 NMR relaxometry (T2 NMR) examines the effect on polymer chain dynamics of incorporating CNPs into polystyrene-co-acrylonitrile (SAN) random copolymer matrices. In SAN-CNP composites, the segmental-chain dynamics can be influenced by the non-covalent interactions formed with the nanoparticle (interacting), but are also influenced by the CNP steric bulk alone (non-interacting). The use of T2 NMR allows for the examination of the influence of the extent of non-covalent interactions on this segmental chain level. This segmental level view also allows for the distinction between relaxation dynamics of the interacting and non-interacting regimes. Current data indicates that increased acrylonitrile content in the copolymer results in increased non-covalent interactions and overall slowing of chain dynamics.

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