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Effect of Chain Architecture on Nanoparticle Miscibility in Block Copolymer Nanocomposites JESSICA LISTAK, HYUNG JU RYU, ILHEM F. HAKEM, Carnegie Mellon University, RANGOU SOFIA, POLITAKOS NIKOLAOS, MISICHRONIS KONSTANTINOS, APOSTOLOS AVGEROPOULOS, University of Ioannina, MICHAEL R. BOCKSTALLER, Carnegie Mellon University — This contribution will present a combined experimental and theoretical analysis of the effect of block copolymer chain architecture on the miscibility and morphology of enthalpically neutralized particle additives. The chain architecture is found to be a critical parameter in facilitating particle dispersion imposing both direct as well as indirect constraints on the particle distribution. Continuous block configurations (such as the bridged midblocks in triblock copolymers) are found to inhibit particle compatibilization. Interestingly, the particle miscibility is found to be strongly affected by the configuration of the block adjacent to particle-filled domains (indirect constraint). In particular, incompatibility is observed for high branching densities in the adjacent domains (such as miktoarm chain architectures). A mean-field model will be presented to rationalize this observation as a consequence of segmental crowding that counteracts changes in the layer dimensions induced by particle sequestration.

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