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Origins of Linear Viscoelastic Behavior of Polymer-Nanoparticle Composites VICTOR PRYAMITSYN, VENKAT GANESAN, University of Texas at Austin — We use computer simulations to study the mechanisms governing the linear viscoelasticity behavior of composites of spherical nanofillers dispersed in polymer melt matrices. Our results suggest that particles can influence the viscoelastic properties of the system by a variety of different mechanisms. On the one hand, the particle-induced effects on the dynamics of polymer segments modify the relaxation spectrum of the polymers. Secondly, particle jamming effects lead to slow relaxations and substantial enhancements in elasticity. Finally, our results suggest that the strain field distortion caused by the presence of rigid inclusions also affects the overall modulus of the composite. For our model system, we delineate the regimes and frequencies at which the different effects manifest and also suggest how the picture can be generalized for parametric conditions different from our simulations.

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