Abstract Submitted
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Electron microscopy of polystyrene grafted silica nanoparticles in a homopolymer matrix subjected to steady shear JOSEPH MOLL, SANAT KUMAR, Columbia University in the City of New York, RALPH COLBY, The Pennsylvania State University, YU LI, BRIAN BENICEWICZ, University of South Carolina — Silica nanoparticles grafted with polymers, dispersed in a polymer matrix, and annealed over time adopt a broad range of dispersion states which depend on grafting density, annealing time, weight percent silica, and the molecular weights of the polymers. We are able to tune these variables to give desired dispersion states, from uniformly dispersed particles to agglomerated clusters. Steady shear rheological tests were used to critically determine how the dispersion state is affected by strain and by shear rate. As a function of strain, nanoparticles agglomerate as well as align themselves with the direction of flow in the matrix. Numerous image analysis tools were used to quantify the differences in the dispersion state as a function of strain. Initial dispersion states ranged from small clusters of particles to fractal-like networks to well dispersed particles.

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