

Abstract Submitted
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Mechanical Reinforcement Induced by Polymer-Decorated Nanoparticles in Polymer Thin Films DAMIEN MAILLARD, Columbia University, SANAT KUMAR, Columbia University, Chemical Engineering, BENJAMIN FRAGNEAUD, JEFFREY KYSAR, Columbia University, Mechanical Engineering — PS-grafted nanoparticles mixed in a PS matrix and annealed at a temperature above the Tg of the polymer can self assemble to form large complex structures. The morphology of these structures is ruled by the grafting density of the particles and the grafted/matrix chains molecular weight ratio, and can vary from spherical aggregates to sheets or strings. In the case of thin films, in addition to those particles-particles aggregation, a surface segregation leads to 2D structure formation. The mechanical reinforcement provided by those particles and their structures to 100 nm thick films has been studied with a homemade bulge test system. The inter-particle interaction, the structure form factor and the lateral chains alignment seem to be able to modify the Young modulus, the Yield and the fracture of the samples at the same time.

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