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Semi Fluorinated Polymers Mediated Nanoparticle Assemblies DILRU RATNAWEERA, UMESH SHRESTHA, DENNIS W. SMITH JR., DVORA PERAHIA, Clemson University, SCOTT T. IACONO , Patrick AFB, FL, JOSEPH MABRY, Edwards AFB, CA — Thin films of semifluorinated (SF) polymer-mediated nanoparticle (NP) assemblies have been investigated using neutron reflectometry. The inherent incompatibility between fluorinated (F) and protonated (H) domains within SF polymers coupled with modification of the surface of the NPs offer a means to control the interactions between the polymer and the NP and drive the structure and dynamics of the composite films. A random copolymer, Biphenyl Perfluorocyclobutane, has been used as the host for POSS (Polyhedral Oligomeric Silsesquioxanes) NPs whose surfaces were modified by either F or H side chains. Films of NPs, tethered to the polymer chains or blended, were spin cast from a mutual solvent, resulting in an initial homogenous distribution of the particles. With annealing as layering of the polymer takes place, the NPs have migrated to the F/H interfacial regions, with a distinct preference of the F-POSS to segregate into the F regions. Both tethers and blended NPs migrated to the film interfaces with the air interface enriched by the F one and the solid interface by the H one. The degree of enrichment of the interfaces was larger for the free NPs compared to tethered ones.

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