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A Random Approach to Co-Continuous Packing of Dissimilar Nanoparticles XIAOBO SHEN, IREM KOSIF, TODD EMRICK, DHANDAPANI VENKATARAMAN, THOMAS RUSSELL, University of Massachusetts Amherst — To develop a novel nanoparticle self-assembly based approach for the preparation of co-continuous morphologies for organic photovoltaic applications, the nature and characteristics of the interactions and packing between dissimilar nanoparticles must be understood. Organic and inorganic nanoparticles, polystyrene (PS) and silica (SiO_2), respectively, were prepared with different sizes and surface functionalities. Consequently, the inter-particle interactions were tuned and composite coatings comprising binary mixtures of nanoparticles were fabricated by evaporation-assisted methods. The packing structure of dissimilar nanoparticles was characterized by scanning electron microscopy and laser scanning confocal microscopy and shown to be dependent on the inter-particle interaction, the ratio of particle sizes and the kinetics of the assembly. In the regime of hard sphere interactions, a co-continuous packing structure results from the random mixing behavior of the dissimilar nanoparticles.

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