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Self-assembly Nano-filled Polymer Blends in a Photovoltaic Thin-film Device DI XU, JOSEPH ORTIZ, DILIP GERSAPPE, Department of Materials Science and Engineering, Stony Brook University — Engineering heterodyne junction solar cells requires a well-defined morphology of the photoactive polymers and the PCBM conductors such that maximum current reaches the electrodes with minimal resistive scattering. One possible method for accomplishing this may be to use polymer phase segregation in combination with the nanoparticles' natural segregation to the interfaces. In this manner, large-scale devices can be formed using self-assembly methods, rather than fixed methods. We have used Molecular Dynamics simulation to predict the morphology of polymer blends and determine which combination of factors would yield the optimal morphology that would contact the electrodes, while producing the largest number of interfaces. Secondly, we were also able to determine the conditions that would cause the particles to segregate and template along the interfaces, which would provide direct conductivity to the electrodes. Using thin film and bulk structures and by manipulating particle size, the attraction between the particle and the polymer component, and the amount of filler within the material, we can explore the formation of cheaper, more effective and efficient networks.

Joseph Ortiz
Department of Materials Science and Engineering, Stony Brook University

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