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Innovative energy harvesting nanostructures for organic-based solar cells

Hemali Rathnayake
Western Kentucky University, USA

Linear conjugated polymers (LCPs) exhibit very complex self-assembly behavior due to their structural flexibility, longer chain length, and wide molecular weight distribution. It is essential to develop LCPs having both improved optoelectronic and organizable self-assembly properties. To improve the progress of organic-based devices, synthetic methods need to be developed to make well-defined three-dimensional structures with a controlled size and shape in conjunction with delicately organized self-assembly properties. Here, a series of donor- and acceptor-functionalized nanostructures having both improved optoelectronic and well defined self-assembly properties for low-cost, high efficiency, and flexible solar cells will be disussed. This work will contribute to the fundamental knowledge in this discipline by developing better synthetic methodologies, designing novel hybrid nanostructures, and assembling them in organic polymer matrices. Incorporating linear conjugated polymers to self-guidable three-dimensional structures should avoid the formation of micrometer-sized phase segregated domains, which leads to incomplete exciton dissociation. Improvements inefficiency will be realized by obtaining nanoscale phase separation using these hybrid materials.

Biography

Hemali Rathnayake obtained her Ph.D. under the supervision of Prof. Paul M. Lahti, UMass Amherst, Department of Chemistry in 2007. Just after she finished her Ph.D. thesis defense, she joined Emrick's Research group at Polymer Science & Engineering, UMass Amherst. During her Postdoctoral time period (December 2006 to June 2009), she has worked on various projects on developing new polymer-nanocomposites and hybrid nanostructures. In July 2009, she joined the Chemistry department at WKU as an Assistant Professor.

hemali.rathnayake@wku.edu