Functional Polymeric Nanostructures

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In the last decade, inorganic and organic semiconducting materials have been extensively investigated and utilized for light-emitting devices, field-effect transistors, solar cells, lasers, and photo-detectors. Recent advances in the successful synthesis or fabrication of miniaturized inorganic semiconductors from micro- to nanoscale have spurred great attention due to their unique size-dependent properties and novel optoelectronic and biolabeling applications. Due to the much more structural diversity and complexity of organic molecules, the current tendentious extension of the research from nanosized inorganic to organic semiconducting materials, is expected to create a wide range of new size-dependent properties of organic nanoparticles for promising organic optoelectronic devices in a cost-effective way. A few recent reports have been initiating the investigations on the size-dependent properties of small molecular semiconductors, however, there is a little success to make the size-tunable conjugated polymer nanoparticles due to the difficulty of self-assembling the currently available macromolecules. In our recent research, we have developed a new approach for precisely controlling the size-dependent properties of π-conjugated polymers for high potential applications, due to their much better processing/mechanical and readily tunable optoelectronic properties as compared to that of the small organic molecules.