

Emission Color Tuning of Polythiophene Nanoparticles prepared by Mini & Micro Emulsion Polymerization

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Polythiophene(PT) nanoparticles were directly prepared by Fe³⁺-catalyzed oxidative polymerization of thiophene mini & micro emulsion in aqueous phase. Polymers were initiated by oxidant using the FeCl₃/H₂O₂(catalyst/oxidant) combination system. This re-cyclic reduction-oxidation process, which leads to a high conversion of the thiophene monomers in an aqueous medium. As concentration of surfactant varies, the size of monomer swollen micelle change and it decides size of the final product. The size of PT nanoparticles can be controlled about 30nm ~100nm and emission color varied as particle size from red to blue gradually. Photoluminescent wavelength of PT emulsion at maximum absorption showed blue-shifted emission, and PL intensity also increased as the size decrease. These conditions result in effective chain lengths which change owing to the band gap between HOMO and LUMO. Therefore we obtained various characters which are not only different dimensions also different luminescence properties from same monomer. These particles were dispersive in organic solvents.