Nano-Structured Conducting Polymers and Their Nanocomposites: From Synthesis to Applications

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Abstract

Conducting polymers have demonstrated their important applications in electronics, energy conversion and storage, sensors and medical devices. In recent years, 2D-organic materials such as graphene even received great attractions among both industrial and science communities with their unique properties including electrical, mechanical, and thermal properties. However, the synthesis of 2D and 3D structures of conducting polymers is a still challenging issue from technical point. In addition, 2D and 3D structures of conducting polymers are expected to improve the device performance including polymer solar cell, batteries, supercapacitor, sensor, and medical applications.

Therefore, in this research, we report a novel fabrication method of 2D-, and 3D-conducting polymers, and their nanocomposite, which is a cost-effective, environmental-benign and scalable synthesis technique. This method uses a bicontinous emulsion reactor to produce 2D and 3D conducting polymer via interfacial polymerization technique. By changing reactor conditions we can modify morphology thus the physical properties of polymer. In this work we show effect of oxidant, solvent systems, and temperature on the polymer morphology. Various analytical tools including SEM, BET, XRD are used to characterize these changes. Both electrical and thermal conductivity properties will be reported.