International Journal of Polymer Science

Special Issue on

Polymer-Based Nanocomposites: Processing, Manufacturing, Characterization, and Application

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Nanocomposites are composites in which at least one of the phases shows dimensions in the nanometer range. These are high performance materials that exhibit unusual properties and unique design possibilities and are thought of as the materials of the 21st century. Among many highly hyped technological products, polymer nanocomposites are one of those which have lived up to the expectation. The reinforcement of polymers using fillers, whether inorganic or organic, is common in the production of modern plastics. Polymer-based nanocomposites represent a radical alternative to the conventional filled polymers or polymer blends. In contrast to the conventional systems, where the reinforcement is of the order of microns, polymer-based nanocomposites are exemplified by discrete constituents of the order of a few nanometers (< 100 nm) in at least one dimension. Polymer nanocomposites can be broadly classified as nanoclay-reinforced composites, carbon nanotube-reinforced composites, nanofiber-reinforced composites, and inorganic particle-reinforced composites. Polymer nanocomposites have shown ubiquitous presence in various fields of application. Polymer nanocomposites for different applications can be synthesized by proper selection of matrix, nanoreinforcement, synthesis method, and surface modification of either the reinforcement or polymer (if required). Many products based on polymer nanocomposites have been commercialized. These materials are potential candidates for many applications including packaging, photosensitive drums for printers, photovoltaic cells and photodiodes, water treatment, storage media, anticorrosion coatings, biosensors, tissue engineering, electronic devices, biomedical fuel cells, solar cells, fuel tanks, plastic containers, impellers and blades for vacuum cleaners, power tool housing, and cover for portable electronic equipment such as mobile phones and pagers data.

This special issue focuses on manufacturing and characterization of polymer-based nanocomposites with emphasis on their various technological applications including both numerical modelling and experimental investigations.

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