

Polymer Nanocomposites with Improved Multi-Functional Properties

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Abstract

Polymer nanocomposites have found increasing use in many engineering applications which often require them to satisfy two or more functions of superior mechanical (e.g., toughness, stiffness, strength, wear resistance, etc) and improved physical properties (e.g., electrical and thermal conductivities, transparency, permeability, fire retardancy, etc). Based on recent research conducted at Sydney and with collaborators elsewhere, the fracture toughness, fatigue and creep resistances of several polymer nanocomposites are critically examined with respect to issues on the “nano” and “hybrid” effects caused by the nano-sized fillers incorporated in the matrices. The influence of these nano-fillers on the electrical and thermal conductivities, permeability and optical transparency of the polymer matrices will also be addressed. Finally, polymer nanocomposites with improved mechanical and physical properties are presented with supporting experimental data.