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Composites Enhanced With Nanocrystalline Cellulose (NCC): A Comparative Study

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Abstract

Palmero [1] defines Nanotechnology as the creation, processing, characterization and utilization of materials, devices and systems with dimensions of the order of 10 – 100 nm, exhibiting novel and significantly enhanced physical, chemical and biological properties, functions, phenomena and processes, due to their nano-scale size. She further differentiates that a nanomaterial has a typical grain size <100 nm, whereas ultrafine-grained materials are characterized by grain size <500 nm. Composites are materials in which the distinct phases are separated on a scale larger than the atomic, and in which properties such as the elastic modulus are significantly altered in comparison with those of a homogeneous material. In this category a ``nanocomposite`` comprises multiphase materials, where at least one constituent phase has dimension of less than 100 nm. The most important and largely attained organic entity is that of the cellulose which portrays a distinctive variety of nano-sized and micro-sized structures[2]. The pure Cellulose in a crystalline form, with dimensions of the nano size, is termed as Nanocrystalline Cellulose (NCC) which is derived from over a diverse range of natural sources such as cotton, algae, bacteria and wood. This paper summarizes the advances made in NCC technology in terms of its (a) morphology and dimensions (b) its physical and chemical properties (c) surface functionalizing properties (d) applications and (e) the challenges in the use of NCC.

Author Keywords

Nanocrystalline Cellulose, Homogeneous material, Morphology and dimensions

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