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Engineering at the nanoscale: A strategy for developing high performance functional materials

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The talk will concentrate on various approaches being used to engineer materials at the nanoscale for various applications in future technologies. In particular, the case of clay, carbon nanostructures (e.g., nanotubes, graphene), metal oxides, bio-nanomaterials (cellulose, starch and chitin) will be used to highlight the challenges and progress. Several polymer systems will be considered such as rubbers, thermoplastics, thermosets and their blends for the fabrication of functional polymer nanocomposites. The interfacial activity of nanomaterials in compatibilizing binary polymer blends will also be discussed. Various self-assembled architectures of hybrid nanostructures can be made using relatively simple processes. Some of these structures offer excellent opportunity to probe novel nanoscale behavior and can impart unusual macroscopic end properties. I will talk about various applications of these materials, taking into account their multifunctional properties. Some of the promising applications of clay, metal oxides, nanocellulose, chitin, carbon nanomaterials and their hybrids will be reviewed. Finally the effect of de-wetting up on solvent rinsing on nanoscale thin films will also be discussed.

Recent Publications

C K Radhakrishnan, A Sujith, G Unnikrishnan, S Thomas (2004) Effects of blend ratio and crosslinking systems on the curing behavior, Morphology and mechanical properties of styrene butadiene rubber/Poly (ethylene-co-vinyl acetate blends. J. Appl. Polym. Sci.; 94: 827.

R Thomas, J Abraham, T P Selvin, S Thomas (2004) Influence of carboxyl-terminated (butadiene-co-acrylonitrile) loading on the mechanical and thermal properties of cured epoxy blends. J. Polym. Sci. Part B: Polym. Phys; 42: 2531.

Biography

Sabu Thomas is the Director of the International and Interuniversity Centre for Nanoscience and Nanotechnology and Full Professor of Polymer Science and Engineering at the School of Chemical Sciences of Mahatma Gandhi University, India. He is an outstanding leader with sustained international acclaims for his work in polymer science and engineering, polymer nanocomposites, elastomers, polymer blends, interpenetrating polymer networks, polymer membranes, green composites and nanocomposites, nanomedicine and green nanotechnology.

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