

Polymer - Carbon Nanotube Composites: A critical Review

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This lecture will be divided into 2 sections. The first section, will be a critical review of the physical properties of carbon (nano)structures. The tight connections between the structure of carbon nanotubes and their physical properties (mechanical, thermal, and electric) will be briefly analysed and the speculations about magnetism in pristine nanotubes will be dissected. The differences between single wall carbon nanotubes and multiwalled carbon nanotubes will be critically reviewed. This section will end with physical and chemical routes to functionalize carbon nanotubes.

The second section of the lecture will concentrate on polymer – carbon nanotube composites, with emphasize on polymer-carbon nanotube interface. The mechanical, thermal, and electrical properties of polymer – carbon nanotube composites will be reviewed. The effect of carbon nanotube functionalization on the physical properties of polymer – carbon nanotube composites will be discussed in detail.

The connection between the physical properties of these nanocomposites and their structure will be briefly reviewed. The effect of carbon nanotube of the crystallization of the polymeric matrix as well as the effect of carbon nanotube on the glass transition temperature will be discussed. The lecture will include an analysis of the most important models proposed for the mechanical properties of polymer carbon nanotubes, including a brief analysis on the effect of carbon nanotube orientation on the mechanical properties of the nanocomposite. The analysis will be extended to the electrical properties of polymer –carbon nanotubes composites. Polymer-carbon nanotube interface will be the central theme of the second section of the lecture.