

## Synthesis and Characterization of Functionalized Carbon Nanorods/Polystyrene Nanocomposites

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**Abstract :** Nanocomposites of Carbon Nanorods (CNRs) with Polystyrene (PS), have been synthesized successfully by means of in situ polymerization process and characterized. Firstly, carbon nanorods with graphitic structure were prepared by the standard synthetic procedure of CMK-3 using MCM-41 as template, instead of SBA-15, and sucrose as carbon source. In order to create an organophilic surface on CNRs, two parts of modification were realized: surface chemical oxidation (CNRs-ox) according to the Staudenmaier's method and the attachment of octadecylamine molecules on the functional groups of CNRs-ox (CNRs-ODA). The nanocomposite materials of polystyrene with CNRs-ODA, were prepared by a solution-precipitation method at three nanoadditive to polymer loadings (1, 3 and 5 wt. %). The as derived nanocomposites were studied with a combination of characterization and analytical techniques. Especially, Fourier-transform infrared (FT-IR) and Raman spectroscopies were used for the chemical and structural characterization of the pristine materials and the derived nanocomposites while the morphology of nanocomposites and the dispersion of the carbon nanorods were analyzed by atomic force and scanning electron microscopy techniques. Tensile testing and thermogravimetric analysis (TGA) along with differential scanning calorimetry (DSC) were also used to examine the mechanical properties and thermal stability -glass transition temperature of PS after the incorporation of CNRs-ODA nanorods. The results showed that the thermal and mechanical properties of the PS/ CNRs-ODA nanocomposites gradually improved with increasing of CNRs-ODA loading.

**Keywords :** nanocomposites, polystyrene, carbon, nanorods

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