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FUNCTIONALIZATION OF CARBON NANOTUBES FOR CNTS/PEEK COMPOSITES FABRICATION

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Due to their unique physical properties, carbon nanotubes (CNTs) have generated a great deal of interest particularly as fillers in polymer matrix composite materials. These carbon nanofibers are thought to improve the mechanical, electrical and thermal properties of these composites. Nevertheless a major difficulty remains the control of both nanotubes dispersion into the polymer matrix and interaction between the matrix and nanotubes. Thus functionalization of CNTs surface is one interesting way to improve both the ability to disperse the nanotubes homogeneously throughout the matrix and the load transfer from the matrix to nanotubes In this work, two main approaches are considered for fabricating polyethylene (PE)-CNTs and polyetheretherketone (PEEK)-CNTs composites. In the first case, used as reference, CNTs have been embedded in Polymer matrix without any surface modifications, which consist of non covalent attachment of nanotubes and the polymer. The advantage of such way is that the structure of nanotubes is preserved. Thus, their mechanical properties should not be altered. However, the low forces existing between the wrapping macromolecules and nanotubes can be considered as a disadvantage to the load transfer between them. In order to obtain a covalent linking between nanotubes and the matrix, an other approach has been tested. It's based on the use of both chemically modified CNTs and polymer. Then, the attachment of oxidized SWNTs and polymer can be possible by using a bi-functional molecule such as diamine. The nature of the binding between CNT and polymer chains has been studied using FT-IR, TEM SEM and DRX. Furthermore, mechanical tests have been carried out in order to evaluate if the properties of the polymer were improved by the CNTs addition. The study of the effect of adding CNTs on the thermal degradation of the composite is presented.