Exploration and analysis of nano fillers as secondary reinforcement in polymer composites

A composite material is a material made from two or more constituent materials with significantly different physical or chemical properties that, when combined, produce a material with characteristics different from the individual components. Nanofillers are basically understood to be additives in solid form, improvements in certain mechanical or physical properties. The activity of active fillers filling of a certain volume and disruption of the conformational position of a polymer matrix, and also the immobilization of adjacent molecule groups and possible orientation of the polymer material. Epoxy resins form an important and versatile class of cross-linkable polymers made from monomers containing at least two strained-ring groups called oxiranes. These rings contain one oxygen and two carbon atoms and are attached to a large variety of other aliphatic or aromatic organic molecules. Natural fibers reinforced polymer composites have been prepared by various manufacturing technologies and are widely used for various applications such as automotive, aerospace, construction and so on. Natural fibers possess properties like high strength, flexibility, stiffness and resistance to chemical harm, however they are inferior to synthetic fibres. Each type of natural fibres have unique properties and are used for various applications in the form of polymer composites. The aim of the research is to fabricate epoxy-based hybrid nanocomposites with natural fibres such as hemp and sisal and use nano fillers such as Multiwalled Carbon Nanotubes (MWCNTs) and Graphene in varying compositions of 2 to 10 wt.%. The influence of the varying concentrations of the nanofillers on the mechanical, dynamical mechanical, tribological, thermal properties of the hybrid composites would be investigated and based on the results obtained potential applications would be suggested.