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Surface modification of graphene using organo-silane in the presence of chitosan

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In this study, graphene was functionalized via acid oxidation in the presence of a mixture of concentrated sulfuric acid (H_2SO_4) and nitric acid (HNO_3). Thus oxidized graphene (o-graphene) were silanized using a coupling agent, 3-aminopropyltriethoxysilane (3-APTES) resulting in functionalized graphene (f-graphene). Chitosan/graphene nanocomposites films have been prepared by the mixing aqueous solution of chitosan and multi-performance graphene in the presence of diluted acetic acid. The chemical structure, thermal stability and mechanical properties of the nanocomposite films have been investigated by the wide-angle X-ray diffraction (XRD), Fourier Transform Infrared Spectroscopy (FT-IR), Scanning Electron Microscopy (SEM), Thermogravimetric Analysis (TGA), Atomic Force Microscopy (AFM), and mechanical test via Universal Testing Machine (Instron 8841). The results revealed that chitosan and graphene could mix with each other homogeneously and the mechanical properties of the as-prepared films were improved significantly over that of the pure chitosan film. These composites films have potential applications as biomaterials or packing materials.

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