A NOVEL VERSATILE STRATEGY FOR MAKING POLYMER NANOCOMPOSITES

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Lamellar mesostructured silica (LMS) were mixed with polypropylene modified with maleic anhydride (PP-g-MA) for preparing polymer new generation of polymer nanocomposites (PNCs). These LMS were obtained by supramolecular assembly of cationic surfactants which template the formation of the layered inorganic silica nanoparticles. Through this synthesis mechanism, an organophilic oxide surface was obtained in a single step that promotes the surface compatibility with the hosting polymeric phase. The resulting PNCs showed nanolamellae completely delaminated and individually dispersed in the polymeric matrix as confirmed by TEM and XRD analyses.

This new patented strategy may be extended to a large variety of templated mesostructured nanoparticles (e.g. oxides of transition metals, aluminophosphates, borophosphates, sulfides) for making PNCs with controlling numerous properties such as electron or proton conductivity, thermal resistance, photonic and magnetic properties, etc. Therefore, this wide spectrum of PNC's properties opens new ways for obtaining PNCs potentially usable as photonics, fuel cells, barrier materials for food packaging and gasoline tanks, automotive, medical and aerospace materials. The role of intercalation and exfoliation will be discussed quantitatively.