Faculty of Science

Department:Chemistry

Name: Ahmed Rehab

Title: Polymer-organoclay hybrids by polymerization into montmorillonite vinyl monomer interlayers

Authors: Ahmed Rehab, Ahmed Akelah, Tarek Agag & Mohamed Betiha

Published In: Journal of applied polymer science, 106, 3502, (2007)

Impact Factor: 1.008

Abstract:

A different series of polymer-clay hybrid materials have been prepared by modification of the clay with different vinyl monomers, followed by polymerization of different ratios of vinyl monomers-clay with the monomers, such as methyl methacrylate, hydroxyethyl methacrylate, and styrene-maleic anhydride. The materials were investigated by IR, which confirmed the intercalation of vinyl-cation within the clay interlayers, and by TGA , which illustrated that phosphonium cation has high thermal stability than ammonium cation. Swelling studies of these materials in different organic solvents showed that the swelling degree increases as clay ratio decrease, and also showed higher swelling reltive to vinyl-clay, X-ray diffraction illustrated that the nanocompositives were exfoliated up to a 25% content of organoclay relative to the amount of polymer. SEM and TEM examined the micrograph, which showed good dispersion of the polymers into clay galleries, and for mation of nanosize particles ranged 150-300 °A.

Key word:

Polymer-clay hybrids, nanocomposite materials, PMMA nanocompositive, organic-inorganic composites.

Faculty of Science

Department: Chemistry

Name: Ahmed Rehab

Title: Polyurethane-nanocomposite materials via in-situ polymerization into organoclay interlayers

Authors: Ahmed Rehab, Ahmed Akelah, Tarek Agag & Nasser Shalaby

Published In: Polymer for advanced technologies, 103 (6), (2007)

Impact Factor:1.504

Abstract:

New Nan composite materials based on polyurethane intercalated into organoclay layers have been synthesized via in situ polymerization. The syntheses of polyurethane-organoclay hybrid films were carried out by swelling the organoclay [12-aminododecanoic acid montmorillonite] into different kinds of diols followed by addition of diisocyanate then casting in a film. The homogeneous dispersion of NMT in the polymer matrix is evidenced by scanning electron microscope and x-ray diffraction, which showed the disappearance of the peak characteristic to d_{001} spacing. It was found that the presence of organoclay has improved the thermal, solvent resistance and mechanical propertiles. Also, the tensile strength is increased with increasing the organoclay contents to 20% by the ratio 182% related to the PU with 0% organoclay. On the contrary, the elongation has decreased wih increasing the organoclay contents.

Faculty of Science

Department: Chemistry

Name: A.Rehab

Title: Catalytic activity of polymer-montmorillonite composites in chemical reactions.

Authors: A. Akelah, A.Rehab, E.R.Kenay & M.S. Abou Zeid

Published In: Journal of applied polymer science,101 (2006)

Impact Factor: 1.008

Abstract:

Polymer—clay composite material has been prepared by intercalaction of polymeric ammonium salt onto the montmorillonite (Na-MMT) followed by grafted polymerization of hydroxyethyl methacrylate onto amine-terminated poly (butadiene-co-acrylonitrile)- montmorillonite (ATBN-MMT) intercalate. The hydroxyl groups were modified to chloromethyl groups followed by conversion to onium salts, which are suitable as phase transfer catalysis. The catalytic activities of the supported catalysts were investigated in nucleophilic reactions of thiocyanate and cyanate ions with alkyl and aryl halides. The rates of the reactions have been investigated under different factors such as the nature and structure of the support, the amount of catalyst, the solvent, and the temperature.

Key words:

Catalytic systems; polymer-montmorillonite composite; intercalated catalysis; suber-clay composite; heterolytic catalysis; functional polymer.