Nanoclay/Nanosilicate Composites

Effects of Chemical Treatments and Mixing Methods on Fracture Behaviour of Halloysite-Epoxy Nanocomposites
S Deng, J Zhang, L Ye (Univ of Sydney)
Halloysite-epoxy nanocomposites were fabricated by incorporating halloysite particles, mainly nanotubes, into epoxy resin via chemical treatments and two mixing methods. Their properties were characterized by means of tensile and compact tension (CT) tests and other analysis techniques such as DMA, TEM, SEM and XRD. Noticeable improvements in mechanical performance have been identified and the possible strengthening mechanisms were also elaborated in the paper. (E4:1)

The Fracture of Nanosilica-and Rubber-Toughened Epoxy Fibre Composites
K Masania, AJ Kinloch, AC Taylor (Imperial College London) S Sprenger (Nanoresins AG)
Fibre epoxy composites have been modified with the addition of rubber and nanosilica particles. A synergistic effect has been observed between the nanosilica and rubber, resulting in 50% increase in bulk fracture energy when compared to the rubber modified epoxy. (E4:2)

Thermomechanical Properties of VARTM-Able POSS Modified Room-Temperature Epoxy
J Wiggins, S Tucker, S Kar (Univ of Southern Mississippi)
POSS nano-reinforcements in epoxy matrices have been dispersed and stabilized within room-temperature cure VARTMable epoxy matrices. Mechanical testing conclusively demonstrates POSS modified resins have superior thermomechanical properties compared to conventional networks and show very high rubbery plateau modulus and heat distortion performance. (E4:3)

Interfacial Interactions in PU Foam Nanocomposites
A Wilkinson (Univ of Manchester)
Structure development in cellular polyurethane - clay nanocomposites was studied. Flow micro-calorimetry was used to measure the interactions between the aromatic isocyanate and hydrated clays whilst forced-adiabatic IR spectroscopy was used to determine the effects of these interactions on the kinetics of copolymerisation and phase separation. (E4:4)

The Potential Bio Based Polymer And Their Nanocomposites For Composites Structure
TD Ngo, MTT That (National Research Council Canada) RP Singh, SV Hoa (Concordia Univ)
The bio based vinyl ester (BVE) was synthesized. The nanocomposites from BVE and with different types of nanoclay were studied. The presence of nanoclays results in increase in the mechanical properties, especially the surface hardness and stiffness. The BVE exhibits a good potential for composite application. (E4:5)

Influence of Organoclays on Creep and Impact Behaviour of Thermoplastics
R Válek, J Hell (SVUM)
Microstructure and mechanical properties of polypropylene and polyamide 6 nanocomposite with filler on the base organoclay was investigated. Results of a microstructure assessment, creep and impact testing are presented in the paper. (E4:6)

Mechanical and Thermal Behavior of HDPE-Based Poly(Ethylene-Co-Methacrylic Acid) Nanocomposites
S Labidi, N Azema, D Perrin, J-M Lopez-Cuesta (Ecole des Mines d'Ales)
HDPE-montmorillonites nanocomposites had been prepared using two poly(ethylene-co-methacrylic acid) as compatibilizers. First, ionomers/HDPE blends were prepared using an internal mixer. The effect of ionomers on HDPE rheological, mechanical and thermal properties was considerable. Then, an evolution of morphologies was observed by following the impact of ionomers on clay's dispersion. (E4:7)
Exfoliated and Intercalated PMMA/Clay Nanocomposites Synthesized in Supercritical Carbon Dioxide and Ethanol with the Aid of Water
M Islam, MD Hossain, KT Lim (Pukyong National Univ)
PMMA/montmorillonite clay nanocomposites were synthesized via the free radical polymerization of MMA in the presence of quaternized polysilsesquioxane surfactant-modified clay in scCO2 and ethanol with the aid of water. Organophilization with 3-D surfactant and a small amount of water reduced the surface energy of the clay dramatically, which promoted miscibility of polymer/clay nanocomposites. (E4:8)

Morphology of Polypropylene, Epdm Rubber and Organophilic Clay Nanocomposites
M do Carmo Goncalves, E Lourenco, MI Felisberti (Univ Estadual de Campinas)
In this work, nanocomposites of polypropylene and organophilic clay toughened with poly(ethylene-co-propylene-co-2-ethylidene-5-norbornene) rubber were investigated. The mechanical properties shows a synergic effect due to the presence of the clay, compatibilizer and EPDM reaching values of supertough blends. (E4:9)

Effect of Melt Compounding Conditions and Clay Organic Modifiers on Morphology of Copolyamide Nanocomposites
E Garofalo, GM Russo, L Incarnato, L Di Maio (Univ of Salerno)
Hybrids with different types of organoclay were produced by melt compounding using different extrusion rates, in order to point out the effects of both processing conditions and hybrid composition on morphology of nanocomposites. All melt-intercalated samples were submitted to rheological, structural (TEM) and thermal measurements. (E4:10)

Development of Clay-Polymer Nanocomposites (PNC) for Industrial Application
M-T Ton-That (National Research Council Canada)
The development of clay-PNCs for various applications including packaging, automotive and construction will be discussed. (E4:11)

Synthesis of Biodegradable Polyurethanes Nanocomposites by Functionalization of Reactive Silicates
L Rueda, I Garcia, T Palomares, A Alonso, I Mondragon, A Eceiza (Univ of the Basque Country)
Biodegradable and biocompatible polyether-polyester urethanes with different hard segment contents and their nanocomposites were synthesized using different amounts of modified montmorillonite, Cloisite® 30B (C30B). Analysis of thermal and physical properties as well as morphological characterization was carried out by means of different experimental techniques. Biocompatibility and biodegradability studies were also performed. Keywords: polyurethanes, nanocomposites, functionalization, biocompatibility, atomic force microscopy (AFM). (IE4:1)

A Study on High Temperature Stability of New-Typed Multilayer Insulation
F He, X He, M Li (Harbin Institute of Tech)
New-typed Multilayer insulation (MLI) was prepared by adding silica aerogels super-powder and potassium hexatitanate whiskers into high temperature adhesive. The change of insulated effects after long time and recurrent heat treatment at 800°C and 1000°C were analyzed. The reason is porous structure and decomposition of whiskers. (IE4:2)
NBR/Bentonite Composites: Effect of Treatment of the Filler on Rheometric and Tensile Properties

MN Ichazo, M Hernández (Univ Simón Bolivar) C Albano, J González, W De Sousa (Univ Central de Venezuela)

The use of clear nanometric fillers (montmorillonite, bentonite, etc) for the reinforcement of elastomers is getting more frequent every day [1-2]. This work presents the effect of a filler such as bentonite, used in its untreated and treated form, on the rheometric and mechanical properties of an Acrylonitrile-Butadiene rubber (NBR). (IE4:3)

Modification of Montmorillonite Nano-Clay with Butyl Acrylate (BUA) and Methacrylate (MMA) by ATRP Blends with Poly(BuA-co-MMA)

M Karesoja, H Jokinen, E Karjalainen, P Pulkkinen, M Torkkeli, H Tenhu (Univ of Helsinki) A Soininen, J Ruokolainen (Helsinki Univ of Tech)

ATRP initiator was covalently bound to montmorillonite clay platelets via silylation reactions. The initiator clay was used to polymerise BuA and MMA on the clay surface. Modified clay was blended with poly(BuA-co-MMA). Mechanical properties of the composites were studied by dynamic mechanical analysis showing a considerable improvement of properties with increasing clay content. (IE4:4)

Development of a Nanocomposite to Reduce Hydrocarbon Absorption

J Powell, A Lechevretel, J Wiggers (Pera Innovation Ltd)

The value of incorporating nanoclay particles into polymer matrices and their influence on mechanical and absorption properties of the nanocomposite has been investigated. Techniques to assess absorption of hydrocarbons have been developed and results indicate that nanoclay particles may limit the up-take of hydrocarbons in polyolefin materials. (IE4:5)

Nanocomposites of Polyamide 6, Polyepichlorohydrin Rubber and Organophilic Clay

MI Felisberti, CA Pinotti (Univ Estadual de Campinas)

Nanocomposites of polyamide 6 toughened with polyepichlorohydrin rubber presents an improvement in the Young´s modulus and yielding stress, compared with the blend of polyamide 6 and polyepichlorohydrin. The addition of organoclay to blends can be an important method of control the morphology. (IE4:6)