Electrospinning of Polymer Nanocomposites
T Lekakou (Univ of Surrey)
This study investigates problems in the electrospinning of polymer nanocomposites, such as beading and fibre break up. A comprehensive process model has been developed and computer simulations have been performed to analyse the electrospinning of polymer nanocomposites as compared to the electrospinning of the corresponding polymers. The study focuses on differences in the viscoelastic properties and surface tension. (E7:1)

Preparation and Characterization of Halloysite Nanotubes-EPDM Nanocomposites
P Pasbakhsh, H bin Ismail, AFM Nor, AA Bakar (USM)
The effect of Halloysite nanotubes (HNTs) with hollow nanotubular structures on the Xray diffraction patterns, tensile properties, thermal behaviour and morphological characteristics of ethylene propylene diene monomer (EPDM) composites was investigated. EPDM/HNT nanocomposites were prepared using a two roll mill by adding 0 to 100 phr HNTs. (E7:2)

Processing and Electromechanical Properties of CNF/Ppy Nanocomposites
C Kim, S Zhang (Kyungpook National Univ)
CNF/Ppy composite films were fabricated by a newly invented process. CNF/Ppy composite materials have never been reported before in any other papers. Conductivities of the composite films were obtained by using a four-probe method. Strain was measured by a specially designed instrumentation, while voltages were applied. SEM images were taken. (E7:3)

Laser Sintering vs Melt Compounding: A New Approach for Functionally Graded Polymer Nanocomposites
K Kalaitztidou, S Athreya, C Chu, S Das (Georgia Inst of Tech)
The feasibility of selective laser sintering (SLS) as a fabrication method for functionally-graded polymer nanocomposites is explored. Carbon black reinforced polyamide 12 composites made by SLS are compared in terms of mechanical, thermal and electrical properties; and microstructure to composites made by melt compounding and injection molding. (E7:4)

Influence of Compatibilizer on the Preferential Location of TiO2 Nanoparticles in PET/PP Blend
W Li, AK Schlarb (Univ of Kaiserlautern)
Two types of TiO2 nanoparticles (300nm and 15nm) are incorporated PET/PP blends. In the uncompatibilized blend the TiO2 preferentially locate in PET, while for the compatibilized blend the TiO2 disperse only in PP. This preferential location of TiO2 is attributed to the variation of interfacial tension as a result of compatibilizer. (E7:5)

Carbon Nanotubes with Dual Wall Structure; Properties and Fracture Behavior of Epoxy Nanocomposites
NA Siddiqui, CY Li, J-K Kim (Hong Kong Univ of Sci & Tech)
Epoxy-based nanocomposites were prepared with MWCNT having a unique dual-wall structure. The CNT were subjected to a UV/Ozone treatment; changes in surface functionalities and morphology were characterized. The nanocomposites exhibited improvement in mechanical, electrical, thermal properties and a significant twofold enhancement in impact fracture toughness. The implications and toughening mechanisms are discussed. (E7:6)
Processing and Properties of Multiscale Carbon Nanofibre Filled Carbon/Epoxy Composites
M Sánchez, M Campo, A Jiménez, A Ureña (Univ Rey Juan Carlos)
Multiscale carbon nanofibre (CNF) filled carbon/epoxy composites have been manufactured by hand lay-up and vacuum assisted resin infusion molding (VARIM) processes. The effect of the incorporation of different CNFs contents in thermal and mechanical properties have been studied. (E7:7)

Chemorheology and Cure Kinetics of a Carbon Nanotube Filled Epoxy System
R Pitchumani (Virginia Tech) RJ Johnson (Univ of Connecticut)
This work presents an experimental study to characterize the cure kinetics and chemorheology of a carbon nanotube filled epoxy resin system. The experimental measurements are presented as generalized correlations as functions of the carbon nanotube parameters. (E7:8)

PVC-Based Polymer Nanocomposites: Processing, Fracture and Cyclic Fatigue
KR Kabir, I Kemal, N Saamat, R Burford, M Hoffman (Univ of NSW) A Whittle (Iplex Pipelines Pty Ltd)
Nanoparticulate calcium carbonate was mechanically combined with PVC in varying volume fractions. The bonding strength between the particulate phase and the matrix was also varied. It was found that increasing the particulate content improves the toughness of the composite but this effect is reduced when interfacial bonding between the particles and matrix in improved; strength and stiffness show inverse behaviour. (E7:9)

Manufacturing of Thermoplastic Titanium Dioxide Reinforced Nanocomposites by Twin Screw Extrusion
N Knoer, F Haupert, AK Schlarb (Institut für Verbundwerkstoffe)
This study presents a theoretical description and simulation in combination with an experimental examination of processing conditions for generating nanoparticle reinforced thermoplastic polymers. Different screw configurations and processing steps were investigated and optimized to obtain deagglomerated and well distributed particles inside the thermoplastic matrix and so gaining improved mechanical properties. (E7:9A)

Fabrication of Fe-Ni Alloy Photonic Crystals by Electrodeposition
Y Li, J-P Zhao, X-D Meng (HIT)
We have demonstrated a promising route to fabricate Fe-Ni photonic crystals by electrodeposition into colloidal crystal templates formed by self-assembly of polystyrene (PS) particles. The photonic crystals obtained acts as an air-sphere/FeNi nanocomposite with tuning pore size and a relatively large band gap, which have high application potentials in photonics. (E7:10)

Copolyamide Nanocomposites by Cast and Film Blowing Processes
GM Russo, E Garofalo, L Di Maio, L Incarnato (Univ of Salerno)
Hybrids based on a commercial copolyamide and containing different silicate amounts were initially produced by melt compounding and then submitted to cast and blowing film extrusions. Oxygen permeability and tensile mechanical results were correlated to nanomorphology and crystal structure through rheological, TEM and DSC analyses. (E7:11)

EPDM/Clay Nanocomposites: The Effects of Blending Conditions
M Tanoglu, C Karsal (Izmir Inst of Tech) S Odbas, O Ersoy, N Karakaya (Arcelik Inc)
In this study, layered clay/EPDM nanocomposites were prepared by using Na+ montmorillonite (MMT), EPDM and MA-g-EPDM (maleic anhydride grafted EPDM). The effects of the surface modification of the clay particulates and the blending conditions on the thermal, physical and mechanical properties of the nanocomposites will be presented within the paper. (E7:12)
Exposures to Nanoscale Particles and Fibers during Handling, Processing, and Machining of Nanocomposites and Nano-Engineered Composites Reinforced with Aligned Carbon Nanotubes
D Bello (Univ of Massachusetts) BL Wardle (MIT)
Engineering of advanced hybrid composites which integrate aligned carbon nanotubes (CNTs) into polymer matrices of existing fibrous materials is growing in research labs around the world. Real concerns exist about possible exposures of researchers and laboratory personnel to CNTs, fibers (respirable and nanoscale) and nanoparticles during handling of nanomaterials, as well as during synthesis, processing, post-processing, and machining of these composites. (E7:13)

Quasi-Static and Impact Fracture Behaviors of CFRPs with Nanoclay-Filled Epoxy Matrix
S-U Khan, K Iqbal, J-K Kim, A Munir (Hongkong Univ)
This Paper investigates the influence of nanoclay on the fracture toughness and mechanical properties of nanocomposites and the corresponding carbon fiber-epoxy hybrid composites. The nanoclay augmented both the impact and static fracture toughness, as well as the mechanical properties, such as flexural strength and modulus. The fracture surfaces were examined to identify the pertinent toughening mechanisms involved. (IE7:1)