OP-A-469

Friday, May 13, 2011, 11:10-11:30 am
Room: Fez 1

SPHERICAL SILICA FILLED NANOSTRUCTURED POLYOLEFINES COMPOSITES

Regina Jeziórska, Agnieszka Szadkowska, Barbara Świerz-Motysia, Maria Zielecka

Department of Polymer Technology and Processing, Industrial Chemistry Research Institute, Warsaw, Poland

Nanostructured polyolefines/spherical silica composites were prepared by melt mixing using a co-rotating twin-screw extruder. To improve the dispersion degree of the nanoparticles, glicydyl methacrylate grafted ethylene/n-octene copolymer (EOR-g-GMA) was used as a compatibilizer. From SEM it was found that agglomerations of silica particles within the polyolefines matrix increased with increasing silica contents whilst they decreased at higher EOR-g-GMA amounts. It was observed that mechanical properties such as tensile strength, Young's modulus and impact strength increase and are mainly affected by the content of silica as well as by the EOR-g-GMA content. Higher concentrations of EOR-g-GMA resulted in a further enhancement of mechanical properties due to silica agglomerate reduction. Evidently the amine functional groups on silica surface of silica nanoparticles react with epoxy functional groups of EOR-g-GMA and lead to a finer dispersion of individual silica particles in the polyolefines matrix. Storage modulus values measured by DMTA were sensitive to the microstructure of the nanocomposites. Higher storage modulus is evidence revealing that the nanocomposites became stiffer. By adding EOR-g-GMA further increases of storage modulus were observed due to the finer dispersion of the silica in the matrix and increased interfacial adhesion. Both permitted a much more efficient transfer of stress from the polymer matrix to the silica nanoparticles. Moreover, an enhancement in gas barrier properties was observed.