OP-3-679

Thursday, May 12, 2011, 03:35-03:55 pm
Room: Ambassadeurs

BI-COMPONENT INJECTION MOULDING OF CARBON NANOFIBRE /POLYPROPYLENE COMPOSITES: MORPHOLOGY EVALUATION AND CORRELATION WITH MECHANICAL AND ELECTRICAL PROPERTIES

Ângela Rodrigues, Eduarda Carvalho, Conceição Paiva[a], Carla I Martins[b]

Institute for Polymers and Composites/I3N University of Minho, 4800-058 Guimarães, Portugal

[a]mcpaiva@dep.uminho.pt, [b]cmartins@dep.uminho.pt

The work reports the preparation of polypropylene (PP)/carbon nanofibre (CNF) composites with different compositions, a PP/CNF/carbon nanotube (CNT) composite, and the production of bi-component injection moulded plaques using these materials. The plaques were formed with a composite inner core and a surface layer of PP, and inversely, with a PP core and a composite surface layer. Samples were also prepared with plain PP and plain composite for comparison. The dispersion of CNF and CNT, the distribution of the polymer/composite layers along the plates formed, and the interaction between the layers, were studied by optical and electron microscopy (OM and SEM). Mechanical properties and electrical resistivity of samples cut from the plaques were measured, and compared with those of standard injection moulded dog-bone specimens with the same composition. OM and SEM showed good dispersion of the CNF and CNT in the polymer matrix, and the presence of some agglomerates, mostly of CNT. An increase in CNF content (max. 8 wt%) on PP composites improved the tensile strength and reduced its volume electrical resistivity to about 10^7 □m. However, a reduction on the maximum CNF content and the incorporation of a small amount of CNT in the composite (4,5wt% of total nanofiller content, distributed approximately as 3,5% CNF + 1% CNT) have maintained the mechanical performance of the composite and reduced its electrical resistivity to about 10^4 □m. All bi-component systems studied showed improved mechanical properties relative to PP itself. For the PP/4,5wt% of (CNF+CNT)/PP, the mechanical and electrical properties were equivalent to those of the model plain composite.