OP-1-1317

Tuesday, May 10, 2011, 05:40-06:00 pm
Room: Karam 1

ROTATIONAL MOULDING OF PA6 AND PBT NANOCOMPOSITES

A. Greco[1]*, A. Maffezzoli[1], E. Calò[1], C. Massaro[2], R. Terzi[2],A. Salomi[3]

[1]*Department of Engineering for Innovation, University of Salento, via per Arnesano 73100- Lecce, Italy, 2ENEA CR, Brindisi, Italy and 3TELCOM S.p.A, Ostuni (BR), Italy*

**Corresponding author: antonio.greco@unisalento.it*

The aim of the present work is the development of innovative materials for the production of fuel tanks by rotational molding. The materials used are based on PA6 and PBT, modified by the addition of nanofillers for the improvement of the mechanical and permeability properties. The materials used are standard grade injection molding materials, modified by melt intercalation for the production of nanocomposites. X-ray analysis showed that the inorganic nanofiller can be efficiently dispersed in the PA 6 matrix, whereas the PBT nanocomposites show a lower degree of intercalation. Rheological analysis further confirms the nanoscale dispersion since the viscosity of both matrices is significantly increased by the addition of a small amount of nanofiller. The PA6 was further modified with copper salts thermal stabilizer, in order to improve the thermal stability during the rotational molding cycle.
The materials were characterized at first in terms of their sintering ability, by means of thermomechanical analysis (TMA), showing that for both matrices the addition of the nanofiller involves a significant increase of the sintering temperature, due to the increased viscosity of the material. For the PBT matrix, the TMA analysis reveals the existence of a sufficiently wide processing window, in which a fully densified product is obtained in the absence of any degradation phenomena. Instead, for the PA 6 matrix, degradation takes place during the sintering process. Addition of the thermal stabilizer shifts the onset of degradation at higher temperatures which allows to obtain a sufficiently wide processing window. Prototypes were built by rotational molding of thermo-stabilized PA 6 and PBT nanocomposites. Samples extracted by the rotomolded articles were characterized in terms of physical, mechanical, fuel permeability and fire behavior properties, showing that the incorporation of the nanofiller can significantly improve the properties of the matrix.