عنوان مقاله:

Effect of multi-walled carbon nanotube onmechanical and rheological properties of silanemodifed EPDM rubber

محل انتشار:

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خلاصه مقاله:

Anovel approach for achieving a good dispersion of multi-walled carbon nanotubes (MWCNTs) within the ethylene-propylene diene monomer (EPDM) matrix has been investigated. In this approach, EPDM wasmodifed with vinyltrimethoxysilane (VTMS) through a melt mixing process. In addition, the effect of MWCNTsconcentration on the mechanical and rheological properties of the modifed EPDM has been studied. The formulatedcomposites exhibited signifcantly enhanced physical properties even at very low nanotube concentrations. Theoccurrence of the grafting reaction was confrmed by the Fourier transform infrared spectroscopy (FTIR) peaksat 1070 and 1250 cm-1 according to the Si-O and Si-C vibrations. The state of dispersion of the fllers in thepolymer matrix was evaluated through transmission electron microscopy (TEM) and scanning electron microscopy(SEM), in addition surface topology was studied by atomic force microscopy (AFM). The results showed thatthe VTMS grafted on the EPDM surface improved the dispersion of MWCNTs in the matrix. The rheologicalcharacteristics have been studied by rubber process analyzer (RPA). At the low frequencies, the effect of increasingthe MWCNT content was signifcantly high so that the storage modulus (G) and complex viscosity (η*) increasedbut the difference in storage modulus and complex viscosity values reduced as the frequency was increased. It wasfound that at concentration of 1.5 wt% of MWCNT, the nanocomposites exhibited remarkable improvements in themechanical properties such as modulus and tensile strength. Polyolefns J (2016) 3: 69-77

کلمات کلیدی:

EPDM; multi-walled carbon nanotube; rheological characteristic; mechanical properties