OP-3-1051

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

EVALUATION OF FLOW INDUCED NANOCLAY ORIENTATION IN POLYPROPYLENE/ PP-G-MAH/ORGANOCLAY BY MEANS OF RHEOLOGICAL AND BIREFRINGENCE TECHNIQUES

Shima Akbarpoursarabi [1], Hossein Nazockdast[2], Mahmood Masoomi[1]
[1]Isfahan university of technology, [2]Amirkabir university of technology
email : shima_000123@yahoo.com

The relationship between the flow induced nanoclay orientation and the melt linear and non-linear viscoelastic behavior of Polypropylene/ organoclay nanocomposite films was studied. An attempt was also made to compare these results with the results obtained from the birefringence measurements. The elongational flow rate, nanoclay (cloisite 15A) loading and compatibilizer(PP-g-MAH) content were among affecting parameters investigated. All the samples were prepared by using the melt compounding and compatibilizer based masterbatch feeding method. The nanocomposite films were prepared at three elongation flow rate using a single screw extruder equipped with a slit die and a drawing devise. The W-Xry results together with pronounced non-terminal storage modulus and viscosity upturn at low frequency range revealed a highly intercalated morphology for the compatibilized nanocomposite samples. The results of similar linear viscoelastic measurements performed on the films showed a decrease low frequency storage modulus plateau value whose extend was found to be reduced by increasing the draw ratio. These results could be attributed to reducing the network microstructure contribution in the favor of organoclay orientation. This was supported by the results of hot stage polarized microscope, which showed a distinct birefringence pattern at elevated temperature whose value was found to be increased drawing ratio. The results of stress transient tests showed a decrease in stress overshoot of the nanocomposites films with increasing elongational flow rate. Based on these results and the results of start-up flow test related to organoclay reorientation, the contribution of the 3-D network and nanoclay orientation in the stress overshoot values could be evaluated.