

Preparation and characterization of PE-b-PEO block copolymer and HOBC or EBBA liquid crystals polymeric blends

S. Carrasco-Hernandez, L. Cano, J. Gutierrez, R. Fernandez, A. Tercjak

Group Materials + Technologies, Chemical Engineering and Environmental Department, Polytechnic School, University of the Basque Country (UPV/EHU), Plaza de Europa 1, 20018 Donostia- San Sebastián, Spain.
sheyla.carrasco@ehu.es

Abstract

The polymer blend technology is one of the main areas of research and development in polymer science. This technology leads to developed novel materials with interesting applications. The polymer blends offer opportunities to create novel materials with tailored properties, which can improve their properties if compare with properties of the neat components. As it is well known, organic low molecular weight molecules can provoke higher miscibility in polymer blends. Consequently, low molecular weight liquid crystals were in many occasions used as one of the component of the polymeric blends [1-4].

In the present work, polymeric blends based on PE-b-PEO block copolymer with two different types of low molecular weight liquid crystals, 4'-(hexyloxy)-4-biphenylcarbonitrile (HOBC) and N-(4-etoixibenciliden) 4-butylaniline (EBBA) was fabricated and investigated. Different advanced techniques were employed to study miscibility and thermal stability of design polymeric materials; Fourier transform infrared spectroscopy (FTIR), optical microscopy (OM), differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). OM micrographs taken in the same temperature for different content of HOBC or EBBA liquid crystals are shown in the Figure 1. As expected different types of spherulites of HOBC or EBBA rich phase was detected suggesting different miscibility between liquid crystals and blocks of PE-b-PEO block copolymer.

References

- [1] Gao C., Zhang S., Li X., Zhu S., Jiang Z., *Polymer*, **55** (2014) 119-125.
- [2] Panapitiya N. P., Wijenayake S. N., Huang Y., Bushdiecker D., Nguyen D., Ratanawanate C., Kalaw G. J., Gilpin C. J., Musselman I. H., Balkus Jr K. J., Ferraris J. P., *Polymer*, **55** (2014) 2028-2034.
- [3] Tercjak A., Serrano E., Larrañaga M., Mondragon I., *Journal of Applied Polymer Science*, **108** (2008) 1116-1125.
- [4] Yang D., Lin J., Li T., Lin S., Tian X., *European Polymer Journal*, **40** (2004) 1823-1832.

Figures

a)



b)



Figure 1. OM micrographs of a1) HOBC and PE-b-PEO/HOBC blends with 2) 5, 3) 10, 4) 20 and 5) 50 wt % of PE-b-PEO block copolymer and b1) EBBA and PE-b-PEO/EBBA blends with 2) 5, 3) 10, 4) 20 and 5) 50 wt % of PE-b-PEO block copolymer.

Acknowledgements

Financial support from Spanish Ministry of Economy and Competitiveness in the frame of MAT2012-31675 project and from the Basque Government funded Grupos Consolidados project (IT776-13) is gratefully acknowledged. S. C.-H. thanks Spanish Ministry of Economy and Competitiveness for the PhD Fellowship BES-2013-066734.