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BOOK OF ABSTRACTS

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SURFACE CHARACTERISTICS OF POLYURETHANE/ORGANOCLAY NANOCOMPOSITES

Milena Rašljić-Rafajilović[1], Dana Vasiljević-Radović[1], Milena Špírková[2], Gordana Gojgić-Cvijović[1], Marija V. Pergal[1]

[1]Institute of Chemistry, Technology and Metallurgy, University of Belgrade, Belgrade, Serbia
[2]Institute of Macromolecular Chemistry AS CR, v.v.i. (IMC), Prague, Czech Republic
Corresponding author e-mail: marijav@chem.bg.ac.rs

Abstract

Polyurethanes (PUs) are widely used polymers, with specific production able to be aimed at their notable industrial and biomedical applications by carefully changing their ingredients, their ratios and their preparation procedures. The popularity of PU nanocomposites is caused mainly by the simplicity of tuning their functional properties. The choice of nanofillers, for example, clay, graphene oxide, carbon nanotubes, silicon dioxide, nanosilver or nanoferrite is miscellaneous. In this work, PU/clay nanocomposites were prepared by *in situ* polymerization in the presence of organically modified clay (Cloisite 30B) with clay loading of 0.5 wt.%. We used hyperbranched polyester and 4,4'-methylenediphenyldiisocyanate as hard segment components, while poly(dimethylsiloxane) macrodiol as soft segment. The influence of the soft segment content on the properties of nanocomposites was investigated by swelling behavior, crosslinking density, degree of phase separation, water absorption and contact angle measurements as well as surface free energy determination. FTIR results showed the higher degree of phase separation in nanocomposites as soft segment content decreased. Moreover, the results showed that equilibrium swelling degree of PU nanocomposites decreases, while crosslinking density increases with decreasing soft segment content. Hydrophobicity of the PU nanocomposites increases with increasing soft segment content, due to the hydrophobic character of PDMS. Namely, the surface free energy of nanocomposites films decreases in the range of 39.8 to 28.0 mJ/m^2 with increasing soft segment content, confirming good surface hydrophobicity. Therefore, PU nanocomposites could be considered as promising materials suitable for coating applications.

Keywords: polyurethanes, clay nanofiller, crosslinking density, contact angles, surface free energy.

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