POLYMER COMPOSITES BASED ON STYRENE-MALEIC ANHYDRIDE COPOLYMER WITH POLYANILINE

Dutka V. S., Aksimentyeva O. I., Oshchapovska N. V., Tkachyk N. A.

Ivan Franko National University of Lviv,
6, Kyryla&Mefodia Str., Lviv 79005, Ukraine.
E-mail: vdutka@ukr.net

Polymer-polymer composites (PPC) derivatives of polyaniline and vinyl polymers have unique physical and chemical properties. Along with good film forming properties these PPC have electrical conductivity which makes them perspective platforms for designing various sensor devices. In this paper we received and studied the physicochemical properties of PPC, derived from styrene-maleic anhydride copolymer (SMA) and polyaniline (PANI). SMA copolymer, obtained by radical polymerization of equimolar mixture of monomers at presence of benzoyl peroxide dissolved in dioxane. During polymerization copolymer with alternating styrene and maleic anhydride units is formed. Synthesis of PPC performed in water- dioxane solutions at presence of a certain amount of SMA and derivatives of aniline. Adding ammonium persulfate to this mixture leads to oxidative polycondensation of aniline and in SMA matrix PANI is formed. The obtained composites were precipitated and dried. Thermomechanical properties of obtained PPC were studied. It is shown that the introduction of polyaniline into the SMA matrix leading to the displacement of transition temperature vitreous-highly elastic state.

Kinetics of oxidative polycondensation of aniline at presence of SMA was studied. It was shown by using viscometry and conductivity measurements of water- dioxane solutions of SMA with adding aniline that polymer macromolecules and poly-aniline have interaction that leads to an increase in viscosity and electrical conductivity. Hydrolysis of maleic anhydride units of SMA is possible in water- dioxane solutions, which will lead to the formation of copolymer of styrene and maleic acid. An nteraction between aniline and carbonyl groups of maleic acid is possible, which will influence the speed of oxidative polycondensation.

We studied the electrical conductivity of obtained PPC. Increasing the number of PAN content in the composite leads to an increase of its electrical conductivity. We have studied temperature dependence of electrical conductivity, which allowed to find the activation energy of charge transfer.