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SYNTHESIS AND PHYSICO-CHEMICAL PROPERTIES OF COMPOSITES OF CONJUGATED POLYAMINOARENES WITH DIELECTRIC POLYMERIC MATRICES

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Conductive polymers and composites cause an increased scientific interest in an connection with the development of new fields of science and technology, including nanotechnologies, display products, sensors, power converters by new type. However, widespread practical use of such materials is hampered by imperfect mechanical and thermo-mechanical properties, which hinders of their widespread practical use. An improvement of physical and chemical properties of conducting polymers can be achieved by the creation of composites with plastic or thermoplastic polymers, which are mainly dielectrics. In these composites, conductive polymer fillers can provide the transition "insulator–conductor" at much lower contents as compared to the metal and carbon fillers.

The aim of this work was to study the mutual influence of conjugated polyaminoarenes (polyaniline, polyorthotoluidine, polyorthomethoxyaniline) and dielectric polymer matrices such as polymethylmethacrylate, polyvinyl alcohol, polybuthylmethacrylate, polyacrylic and polymetacrylic acids on the regularities of the charge transport, mechanical and thermo-mechanical properties of polymer–polymeric composites. It was found that the dependence of specific conductivity of the composites on the conducting polymer content has a percolation character with extremely low "threshold" (2-5 vol %). The high values of conductivity and low percolation threshold are due to the formation of nanostructure similar to the mutually penetrating networks, where along with cross-linked polymeric matrix the conducting filler forms own net. Thus formed continuous matrix of conducting polymer is evenly distributed throughout the volume of the polymer composite. The structure of this type provides highly saving properties inherent to the investigated polymeric matrix and does not violate semiconductor conductivity of the polyaminoarenes. Based on the temperature dependence of EPR in an interval of 4.2-300 K, a stronger delocalization of charge carries in the composites as compared to individual polyaminoarenes has been manifested.

Probably, here a structural matrix effect appears which consists in the ability of the polymeric matrix to influence the length and structure of polymer chains of polyaminoarene, including their spatial structure, causing a certain impact on the conductivity, physicochemical and thermo-mechanical properties of polymer nanocomposites.

Наукове видання

КИЇВ-ТУЛУЗА

ДЕВ'ЯТА МІЖНАРОДНА НАУКОВА КОНФЕРЕНЦІЯ З ХІМІЇ (КИЇВ, 4 – 9 ЧЕРВНЯ 2017)

МАТЕРІАЛИ ТЕЗ ДОПОВІДЕЙ ТА ВИСТУПІВ

(АНГЛІЙСЬКОЮ МОВОЮ)

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