Nanotechnology and nanomaterials

The influence of magnetic fields on the structure and properties epoxy composites

[1]Bardadym Y., [2]Sporyagin E.

[1]Institute of Macromolecular Chemistry of NAS of Ukraine Kiev, Ukraine
Kharkiv highway, 48, Kyiv-160, 02160, Ukraine
E-mail: ferocen@i.ua

[2]Oles Honchar Dnipro National University
Kazakova str. 22, Dnipro, 49050, Ukraine

The use of magnetic fields is quite cheap and safer method. Functional materials with distinct physical and chemical properties can be obtained. The resulting material can be used for the production of thermistors, switches ionic current elements of microelectronics and supercapacitors. But despite considerable interest of researchers the mechanism and magnetic and electric fields of polymeric materials is not well understood [1]. Samples of composites were formed from epoxy resin ED-20 (Russia) and hardener – triethylenetetramine (TETA) company "Fluka" (USA). Stoichiometric ratio was 1 mole of epoxy resins to 0,18 mol TETA. Powder PbO company «Merck Chemicals» (USA) were used as fillers. Particle size of metal oxides evaluation was performed by laser granulometry on the device «Zetasizer HS 1000" company Malvern (UK). The method of obtaining of composite materials has been presented in the manuscript [5]. The content of metal oxide was 3 vol. %. Samples were subjected to hardening under normal conditions (NU), and under the influence a constant magnetic field (CMF) with intensity H = 2·105 A/m for 24 hours and the temperature of 293 – 297 K. Created polymeric composites subjected to temperature stabilization at 333 ± 2 K within 24 h, after which the sample was considered ready for research. There were determination of the sol-fraction in the epoxy polymer samples and its composites with metal oxides formed under different conditions of curing. For the analysis of the structural behavior of composites was conducted electron microscopy study of composite materials. Effect of constant magnetic field causes displacement and orientation of macromolecules across the gradient field. As a result, formed crosslinked anisotropic structure elongated direction perpendicular to the field lines of constant magnetic field [2].

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2. *Бардадим Ю. В., Віленський В. О.* Вплив фізичних полів на теплофізичні і діелектричні властивості епоксидних композитів // Фізика і хімія твердого тіла. – 2016. – Т. 17, № 4. – С. 533 – 539.