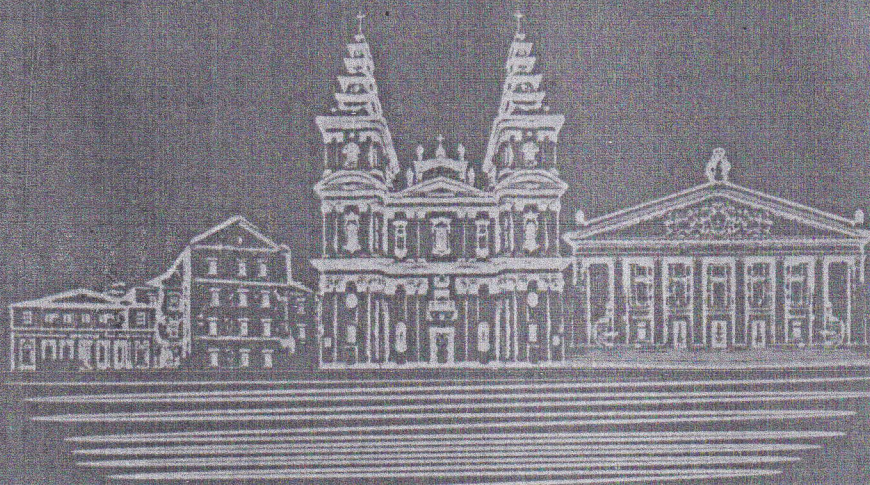


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ABSTRACT



ELECTRONIC PROCESSES IN ORGANIC AND INORGANIC MANERIALS

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THE INFLUENCE OF DIELECTRIC POLYMER MATRIX ON THE CHARGE TRANSPORT IN NANOCOMPOSITES WITH CONDUCTING POLYMERS

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Interest to conductive polymeric materials is caused by the development of new areas of technology, in particular, organic or "plastic" electronics, sensors, flexible power converters, antistatic protection [1]. However, widespread practical use of such materials is hampered by imperfect mechanical properties, poor ability to thermoplastic processing, which can be eliminated by creating their composites with industrial plastic polymers.

In present work have been studied the conditions of formation and physicochemical properties of nanocomposites of conjugated polyaminoarenes (polytoluidine, polyanisidine, polyaniline) in polymer matrices of polymethylmethacrylate (PMMA), polyvinyl alcohol (PVA), polyacrylic (PAA) and polymetacrylic (PMAA) acids and polystyrene (PS). A method of polymerization "in situ" of aminoarenes by using of "soft template" has been working out [2]. It found the dependence of specific conductivity of composites on the conducting polymer content has a percolation character with extremely low "threshold" (2-5 vol. %). In small contents of conjugated polymer (1.7-2.8 %) for composites based on PVA and 2 % for composites of PMMA the conductivity increases by 8-10 orders in comparison to polymer matrix. Such high values of conductivity and low percolation threshold due to the formation of nanostructure similar to the mutually penetrating networks, where, along with cross-linked polymer matrix the conducting filler forming own net [3]. One can assume that thus formed continuous matrix of conducting polymer (cluster of conductivity), which is evenly distributed throughout the volume of the polymer composite. The structure of this type provides highly saving properties inherent investigated polymer matrix and does not violate semiconductor conductivity of the polyaminoarenes. In composites with polymer electrolytes (PAA, PMAA) on the contrary, even improves the transport of charge. Based on the temperature dependence of EPR in the interval of 4.2-300 K a stronger delocalization of charge carries in composites compared with individual polyaminoarenes has been manifested.

Probably, there a structural matrix effect appears which consist in the ability of the polymer matrix to influence the length and structure of the polymer chains of polyaminoarene, including their spatial structure, causing a certain impact on the conductivity, physicochemical and thermomechanical properties of polymer nanocomposites.

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[3]. Leclerc Ph., Surin M., Brocorens P. [et al.] *Mater. Sci. Engin. R*. 55 (2006) 1-56.