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On the protons involvement in the electrical conductivity of the urea-based linear supramolecular polymers

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ABSTRACT

The correlations between the dc conductivity or the charge relaxation time and the dipolar relaxation time have been found in such range of *N,N'*-diethylurea concentrations in nonpolar solvent, (mol. fr. > 0.04), where the dipolar reorientation process concerns already not the whole supramolecular polymers chains, but their fragments resulting from the thermal breaking of the hydrogen bonds. That experimental fact seems to be an important evidence for the participation of the protons in the electrical conductivity of the supramolecular system. The most probable, in the conductivity process are involved the parts of the polymers chains formed by cracking of the hydrogen bonds $C=O-H^+ \cdots N^-$ with the transferred protons in their double potential well. The cascading rotation of the protonated fragments spreading along the chains can be an efficient way of proton transport in the linear supramolecular polymers. It is just the case, where one can expect the compatibility of the time constants in the dipolar and the electric charge dynamics, what was found in our experiment.

Keywords:

supramolecular polymers; hydrogen bonds; electrical conductivity; dielectric relaxation

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