PHYSICAL AND ELECTROCHEMICAL PROPERTIES OF GEL ELECTROLYTES BASED ON PMMA-PC BLENDS

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Gel electrolytes were prepared by the action of polymerization agent (ABIN or BEE) on a mixture of methyl methacrylate and anhydrous lithium or sodium salts dissolved in propylene carbonate (PC). Various glycol ether dimethacrylates were used as cross-linking agents.

The conductivity expressed as polar conductivity does not obey usual rules neither for solid nor liquid systems. The influence of cross-linking molecules and the number of oxygen bridges in them seems to have a marginal effect only.

The change of molar conductivity follows the changes of Young module of elasticity.

Moreover, the capacity of a glassy carbon electrode is rather similar to that of glassy carbon in liquid solutions of the same electrolytes in PC and even the numeric values do not differ from each other. The differential capacity passes through a minimum in the vicinity of +0.2 V (against Cd/Cd redox couple in similar gelous system).

The process of solidification was monitored by NMR spectroscopy using 7Li, 23Na or 17F signals; they showed continuous decreasing of mobility and broadening the lines caused by the formation of a quasisolid system.

The gel should be regarded as a “physical” composite in which the liquid component is saturated by dissolved molecules and is anchored between the chains of rather inert macromolecules. This could explain even the conductivity of gels formed from weakly polar polyvinylchloride.


Reference