TEMPERATURE DEPENDENCE OF ACTIVE AND REACTIVE IMPEDANCES OF PMMA-EC-LITF$_2$ SOLID POLYMER ELECTROLYTES

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Abstract

In this work, PMMA-EC-LiTf$_2$ samples were prepared at a concentration of 20%. Using Nyquist coordinates, results were obtained for active and reactive impedances at temperatures from 298K to 373 K minus. The following chemicals and solutions were used in the preparation of the electrolytes [1].

PMMA-EC-LiTf$_2$ samples from 298 K to 373K temperatures. We found that the reactive impedance varies from 430 to 0.92 and the active impedance from 1180 to 86 in Nyquist coordinates. (Figure 1).

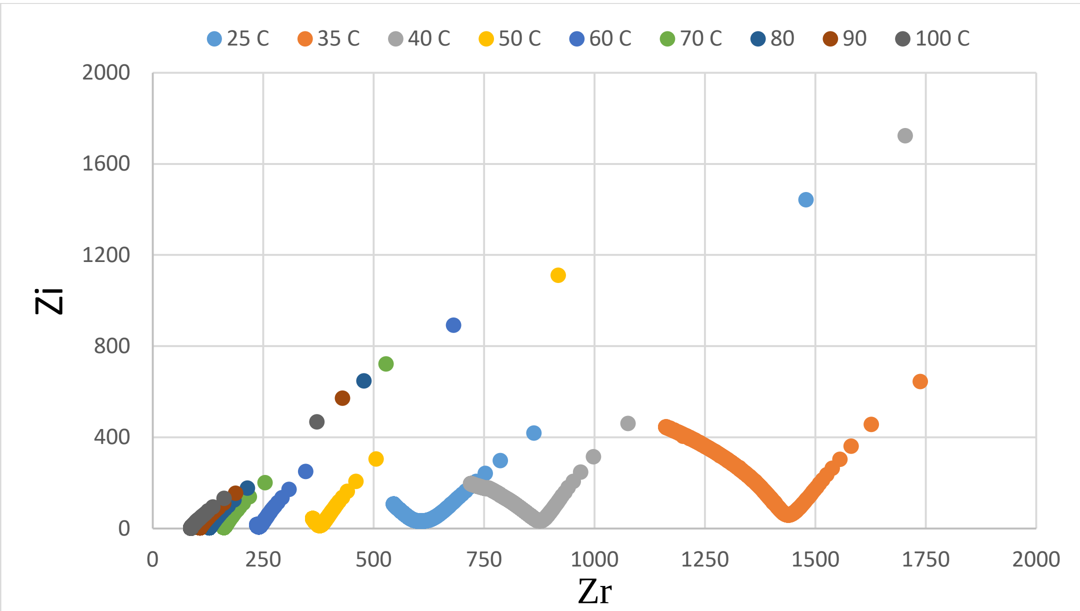

Figure 1. Graph of electrochemical impedance spectroscopy of LiTf2-based solid polymer electrolyte in the temperature range 298-373K.

In the experiment, it was observed that the impedances of the solid polymer electrolyte obtained at the same concentration containing the salts LiTf$_2$ and MgTf$_2$ were not the same. We found that MgTf$_2$ has a better conductivity than LiTf$_2$ due to the small active and reactive impedance of the sample.

References

1. O. Mamatkarimov, B. Uktamaliyev, and A. Abdukarimov. "Determination of ionic conductivity of polymer electrolytes in li-ion batteries using electrochemical impedance spectroscopy." ACADEMICIA: An International Multidisciplinary Research Journal 11, no. 7 (2021): 141-146.

APPLICATION SILICON DOPED WITH ERBIUM IN OPTOELECTRONICS

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In connection with the search for new semiconductor materials that are stable under the influence of heat and resistant to various radiation, interest in the study of the state of rare earth elements (REE) in silicon has recently increased.

One of the current issues in semiconductor electronics is the development of optoelectronic devices based on the use of silicon luminescent structures. It is known that pure monocrystalline silicon is a non-zonal semiconductor material that prevents effective, inter-zonal irradiated recombination. One way to create silicon-based light-emitting structures is to incorporate unique earth elements into it.

In 1983 and 1985, photoluminescence and electrolyuminescence were successfully observed for the first time at a temperature of 77 K based on the reaction of the rare earth element Er to Si [1,2]. The development of Si <Er> structural light emitting elements and the widespread use of devices based on them in optoelectronics is one of the promising areas of scientific research.

The aim of the research is to develop technology and study the electrophysical and optical properties of silicon alloyed with erbium, which is a new material for optoelectronics.

Si samples of n- and p-types were formed by the Czochralski method in the crystallographic directions (100) and (111), as well as in samples with a specific resistance of 1-20 Ohm·cm. The introduction of Er into Si was carried out by the diffusion method, in diffusion furnaces at an temperature of 800-1250 ^{o}C in an inert gas environment.

Structural defects were explored by X-ray diffraction (Empyrean Malvern PANalytical L.T.D) method. The distribution profiles of the electrically active centers were measured using the methods of differential conductivity and volt-