**Kinetics of the Phase Transformation under Pressure**

**Studied by Impedance Spectroscopy**

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Knowledge of kinetics of phase transitions induced in condensed matter by pressure is vital because it allows the understanding of the phase transformation mechanisms and the processes that control the formation of phases with unique properties. A better understanding of these processes is the basis of the development of new materials suitable for target applications. The kinetics of the pressure-induced transformations has not been studied as extensively as the temperature-induced ones, mainly because of the difficulties related to high-pressure experiments.

The present contribution's overriding objective was to determine whether subtle changes in proton dynamics generated by the pressure-induced structural changes are reflected in the ac conductivity spectra. The effect of various thermodynamic conditions (temperature and pressure) on the impedance spectra and electrical conductivity of superprotonic (NH4)4H2(SeO4)3 (abbreviated TeAHSe) was investigated and discussed. The pressure effect on the ac conductivity spectra was similar to that caused by temperature, which means that both stimuli lead to an acceleration of protons' dynamics and, consequently, to an increase in conductivity. The p‑T phase diagram of TeAHSe obtained for different temperatures in isobaric conditions is linear, in the pressure range of the experiment, with the pressure coefficient value dTs/dp=-0.023 K/MPa. It corresponds to the extension of the range of the superionic phase under the pressure impact.

This contribution also aims to determine the phase transition's kinetics in the TeAHSe crystal induced by external pressure. It has been established that the kinetics of this transformation can be described by the Avrami model with an effective Avrami index of about 4, which corresponds to the classical value associated with the homogeneous nucleation and three‑dimensional growth of a new phase.

It should be emphasized that besides its usefulness to study the electrical inhomogeneity of the crystal at phase transition induced by an external stimulus, impedance spectroscopy can be a susceptible tool for studying complex microscopic behavior underlying the observed macroscopic response to the change in thermodynamic conditions.

**Keywords :** kinetics, Impedance Spectroscopy , pressure, ionics