AC ELECTRIC CONDUCTIVITY OF NEUTRON IRRADIATED $GeS_{1.35}$ glass

ЭЛЕКТРИЧЕСКАЯ ПРОВОДИМОСТЬ НА ПЕРЕМЕННОМ ТОКЕ СТЕКЛА $GeS_{1.35}$ ОБЛУЧЕННЫХ НЕЙТРОНАМИ

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Our recent papers which included a large amount of experimental data have shown great influence of the bombardment by fast neutrons causing changes in all the investigated electric parameters of the GeS_x glasses. A sharp peak in the course of the electric conductivities at an integrated neutron flux within 10^{17} to 10^{18} ncm^{-2} has been explained by means of the relations between the concentrations of the irradiation defects and the dangling bonds.

A more detailed investigation of a.c. electric conductivity changes as a function of the irradiation dose and especially of frequency, yields the following conclusions:

1. During long-lasting experiments with samples prepared from these glasses it was confirmed that the "mechanical faults" formed in the material by bombarding neutrons provide a lasting effect on the changes of the physical parameters. At $T = 300$ K their relaxation time is in range 10^8 to 10^{10} s.

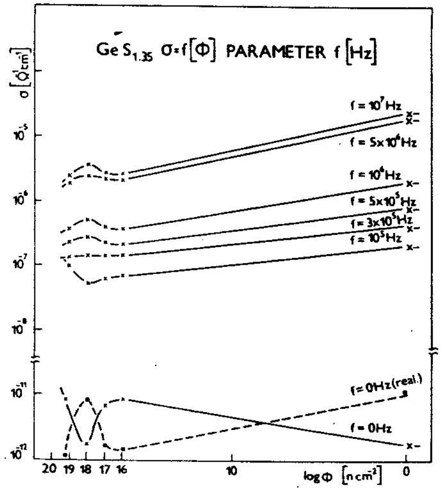

Fig. 1.

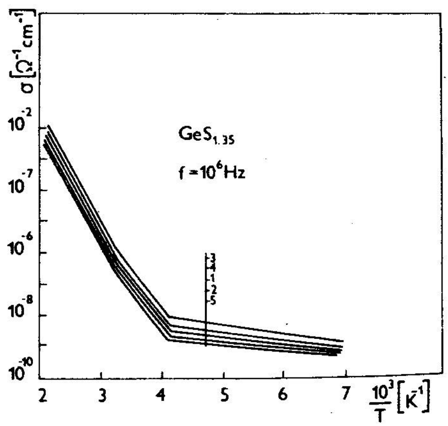

Fig. 2.

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2. In Fig. 1 the experimental dependences of a.c. electric conductivity on an integrated neutron flux are shown for $GeS_{1.35}$ samples at a frequency ranging from 5×10^7 Hz to 10^5 Hz. One can see that with decreasing frequency the maximum in the course of a.c. conductivity inverts at $f = 3 \times 10^5$ Hz to a minimum at the same value of the integrated neutron flux density.

The extrapolation of the frequency dependence of a.c. electric conductivity [1] to $f = 0$ Hz in fig. 1 is represented by a corresponding curve. However, d.c. electric conductivity measurements yield the real dependence at $f = 0$ Hz (dashed line in Fig. 1).

Although it is obvious that the presented extrapolation of a.c. electric conductivity course has no physical foundation, this effect suggests, on the other hand, that in the region of extremely low frequencies there exists at least one frequency interval in which the extreme is again inverting — from minimum to maximum.

A more extensive paper now in preparation aims to prove: a simultaneous action of various transport mechanisms in glasses of a similar type, a change of the type of mechanism (electron to phonon and vice versa) as a function of irradiation and frequency, and the influence of structural changes on the variation of the studied physical parameters.

Fig. 2 exhibits the temperature dependences of a.c. electric conductivity at $f = 10^6$ Hz (integrated neutron flux density being a parameter). The calculated values of the activation energy are identical with those given in [2] for the $GeS_{1.35}$ glasses.

REFERENCES

[1] Macko, P., Macková, V., Czech. J. Phys. *B 27* (1977), 1139.
[2] Macko, P., Macková, V., Acta phys. slov. *28* (1978), 125.

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