USE OF ELECTRON-POSITRON ANNIHILATION IN STUDIES OF EXTENDED DEFECTS OF DISORDERED REGIONS TYPE IN Ge AND Si

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The investigation of evectron-positron annihilation (EPA) has recently found the application in the studies of the nature of radiation-induced point defects and of their evolution /1/. Up to now, however, the potential relief associated with extended defects, for example, with disordered regions (DR) appearing in solids bombarded by sufficiently high-energy radiations was not taken into account.

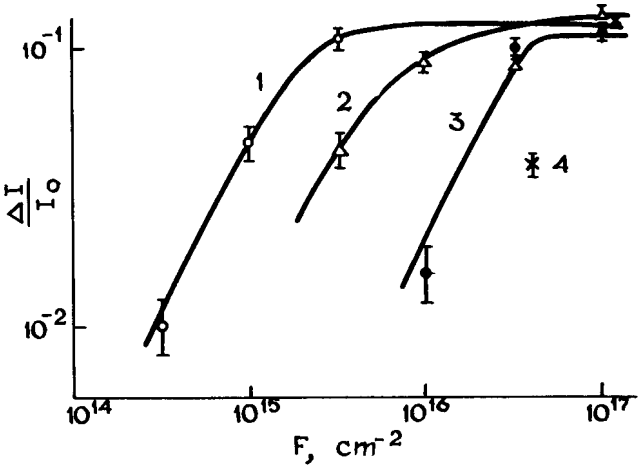

Fig. Dose dependences of the radiation-induced component in the angular distribution of annihilation radiation. Ge; dopant: *1—3* — Sb; *4* — Ga; resistivity, Ohm cm: *1* — 1, *2* — — 0.1, *3* — 0.05, *4* — 0.01. F — fast (E>0.5 MeV) neutron fluens

The present paper shows that the study of the dynamics of positron capture and other EPA characteristics can shed light on the nature of extended defects in various materials. Semiconductors represent a convenient object for such studies due to the possibility of affecting the DR-associated potential relief by changing the doping type. In particular, in n—Ge the DR represents a potential well for positrons which manifests itself experimentally in a large cross section for positron capture /2/.

A dependence of the positron capture dynamics on doping type and level has been revealed for the first time (see fig.). The DR formation cross sections of $3.4 \cdot 10^{-3}$, $4.2 \cdot 10^{-2}$, and $7 \cdot 10^{-2}$ cm^{-1} for n—Ge, p—Ge, and Si, respectively, and the DR parameters in Ge and Si have been determined.

An analysis reveals the differences in the mechanism of stable DR formation in Ge and Si which are in agreement with the results of other authors /3,4/. Preliminary indications have been obtained about the effect of a drift on the spread of a primary distorted region in n—Ge.

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