

of a conductive current filament, which was observed by many authors^{1,2)*}. By analogy with memory switching in gallium telluride single crystals^{1,3)}, where the filament was found to be built from gallium crystallites, one can expect the formation of an indium or at least indium-rich filament in the case of InSe single crystals;

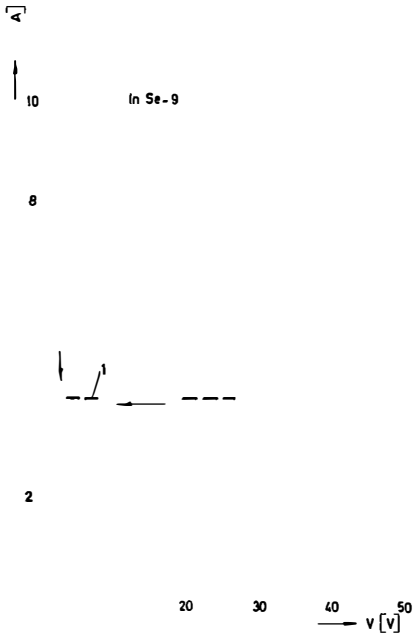


Fig. 4. The OFF-state and the corresponding ON-state I—V characteristics (the OFF-state curve is presented in Fig. 2, curve 1).

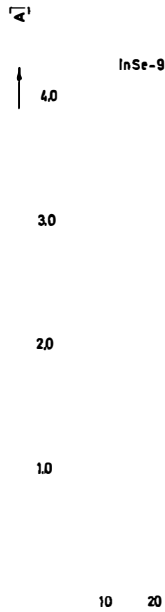


Fig. 5. «Degenerate» I—V characteristics of the sample presented in Figs. 1—4, after its destruction by switching cycling.

the R_{OFF}/R_{ON} ratio of $\sim 10^3$, observed in our case, could support this assumption. It should be pointed out that the change of contact material (e. g. silver dispersion instead of indium) does not influence switching phenomena in InSe. Application of a sufficiently high current pulse or the observed rapid decrease of the sufficiently high ON-state current which both lead to the restoration of the OFF state, show that heating to sufficiently high temperatures followed by rapid cooling is necessary for the re-establishment of the high-resistivity state, presumably through the rupture of the indium or indium-rich filament. It is also an open question what is the nature of processes leading to the reorganization of atoms during the transitions between the OFF and the ON states in indium selenide single crystals.

* See Ref. 4) or Ref. 8).

Both electronic and thermal processes might be included in this phenomenon. Phase transformation studies, the search for polar effects, role of the electrode material, must be done in order to explain these problems.

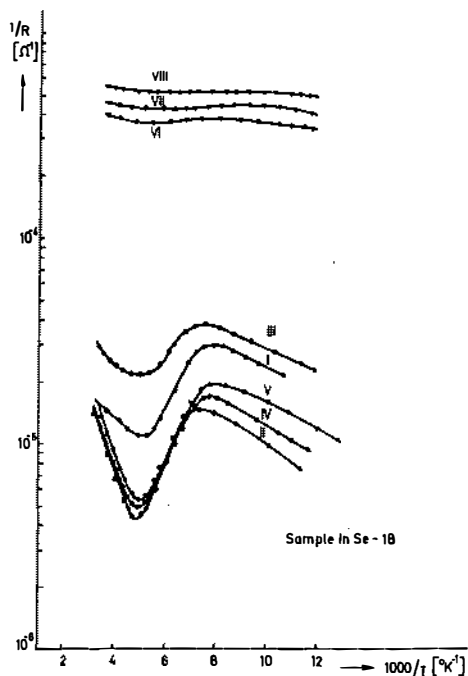


Fig. 6. The OFF-state electrical conductance vs reciprocal temperature dependences of the original sample (curve I), and of the same sample after switching cycling: curve II — after two switching cycles, curve III — after four switching cycles, curve IV — after eight switching cycles, curve V — after sixteen switching cycles, curve VI — after twenty switching cycles, curve VII — after twenty seven switching cycles, curve VIII — after thirty two switching cycles.

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EFEKT MEMORIJSKOG PREKAPČANJA U MONOKRISTALIMA INDIJ SELENIDA (InSe)

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Sadržaj

Ustanovljeno je postojanje efekta memorijskog prekapčanja u slojevitim monokristalima indij selenida sa heksagonalnom strukturom u smjeru paralelnom s osi c kristala kada priključeno vanjsko električno polje ima vrijednost veću od $\sim 1 \cdot 10^4$ V/cm.

I—V karakteristike dobivene uz upotrebu izvora napajanja stalne struje pokazuju područje negativnog diferencijalnog električnog otpora iza kojeg slijedi nagli porast struje i temperature uzorka, koji prethode naglom prijelazu iz visokotpornog ili OFF stanja u niskootporno ili ON stanje uzorka. Omjer električkih otpora u OFF i ON stanju (R_{OFF}/R_{ON}) je reda veličine 10^3 .

OFF stanje može se ponovno uspostaviti primjenom dovoljno jakog strujnog pulsa kroz uzorak ili pak naglim smanjenjem dovoljno jake struje koja teče uzorkom u ON stanju (oko 10 mA ili više). Pretpostavljeno je da primjenjeno električno polje vodi do lokalne preraspodjele atoma između elektroda duž nekog puta paralelnog s osi c uzorka, te do stvaranja visokovodljivog »mosta« odgovornog za niski otpor uzorka u ON stanju.

Pucanje vodljivog »mosta« zagrijavanjem Jouleovom toplinom i naglim hlađenjem vraća uzorak ponovno u visokootporno stanje.