Multiple switching effects in GeSbTe thin-films

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The switching and memory effects in chalcogenide glassy semiconductors are actively studied both experimentally and theoretically during the last years. Possible mechanisms of these effects are widely discussed. In this paper, we present an experimental study of switching and memory effects by an original method with a current generator. In order to measure the I-V curve, triangular current pulses are applied to the sample and the voltage on the sample is measured. The advantage of this method is that it allows to separate the effect of voltage and current on switching and study the conducting state at low current values.

The measurements were carried out on thin-film GeSbTe samples using a top clamping electrode with an area of approximately 10^{-4} cm^2. In the case of such a large electrode, a filament with a high current density is formed in the sample during switching. Subsequently, crystallization occurs inside the current filament, thus the size of the crystalline region is determined by the filament radius. We applied several current pulses with an increasing current amplitude to the same point of the sample and observed multiple sequential switchings. This phenomenon can be explained by the fact that, the voltage on the sample increases due to the small size of the crystalline filament, and a new switching occurs in the region near the filament with higher temperature. Therefore, the new switching occurs at a lower threshold voltage, which agrees with the electronic-thermal model of the switching effect. Also we obtained that the resistance of the current filament is inversely proportional to the maximum current in the pulse, which is the evidence of the constant current density in the filament. Obtained results are important for understanding the mechanism of the switching effect.

Photoconductivity of chalcogenide thin film heterostructures

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Arsenic selenide and sulfide glasses are well known as high photosensitive materials with a wide application in photonics, optoelectronics and information storage systems. In the present paper the experimental results on steady-state and transient photoconductivity of amorphous heterostructures Al- $As_{0.4}S_{0.3}Se_{0.3}$/$Ge_{0.09}As_{0.09}Se_{0.82}$/$Ge_{0.30}As_{0.04}S_{0.66}$-Al at different values of the