Electrical switching in bulk chalcogenide glasses- The correlation between switching behavior and other material properties

S. Asokan
Department of Instrumentation,
Indian Institute of Science,
Bangalore 560012, India

ABSTRACT

The phenomenon of electrical switching, one of the most fascinating properties of chalcogenide glasses was discovered by Ovshinsky nearly three decades ago. Since then there has been a tremendous interest in understanding the switching behavior and its dependence on other material properties and also to exploit the phenomenon for different applications including phase change memories.

One of the major problems which restricted the promised applications of chalcogenide memories is the degradation of the material. Sustained efforts have been made in our laboratory, in the last two decades, to understand the phenomenon of switching, finding compositions which can withstand many switching cycles without degrading and exploring the relation between switching parameters & other properties. This talk will provide an overview of the results obtained on the correlation between the switching behavior of glassy chalcogenides and the composition, the network connectivity & network rigidity, the coordination number of the constituents, etc. The crucial role played by thermal properties such as glass transition & crystallization temperature, stability against devitrification, thermal diffusivity, etc. on the electrical switching is also discussed. The recent results on the optoelectronic switching in chalcogenide glasses will also be presented.