

STRUCTURE AND SWITCHING PROPERTIES IN CHALCOGENIDE SYSTEMS AT THE BORDER OF GLASS FORMATION DOMAIN

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Abstract. *The switching properties in chalcogenide systems are related to the glass formation ability, while the peaking of the switching properties is related to the border of glass formation domain (GFD). Some of the intermediate phase windows in the literature have also been evidenced near the GFD. We have remarked a narrow domain of average electronegativity (centred on 2.38) for the chalcogenides compositions with intermediate phase situated close to the border of GFD. This feature led us to the possibility to predict new memory switching compositions.*

Keywords: Chalcogenide materials, Glass forming domain, Memory switching, Intermediate phase

1. Introduction

In the network glasses including chalcogenide systems the glass formation domain (GFD) has been widely investigated. A careful examination of the phase diagrams in the ternary chalcogenides has revealed one or two glass formation domains well separated from the rest of the diagrams. What is special with the demarcation line between GFD and the remained domain of hardly amorphizable compositions? We have observed that near- or across the border line between these domains one may often find compositions with memory switching properties (phase change materials) or compositions with special thermal properties (intermediate phases). A discussion about intermediate phases and memory switching materials can be found in [1].

2. Glass formation ability

The glass formation ability was a top subject for many years in glass science. Many scientists tried to characterize the easiness to form glasses in different materials, based on various crystallo-chemical properties, especially the type of inter-atomic bonding.

It is well known that, in the same conditions of preparation (cooling rate, deposition rate, etc.), some materials can be frozen in the glassy state and others cannot. Why the melts of various alloys behave so differently during cooling?

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