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Study of Sulfur dopped kinetics parameters on $Se_{95-x}S_xZn_5$ for Chalcogenide Nanostructures

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ABSTRACT

The kinetics parameters of $Se_{95-x}S_xZn_5$ $0.2 \le x \le 10$ *are analyzed by using an isothermal the processes of crystallization kinetics are taken at the temperature (between glass transition temperature and the crystallization temperature). The crystallization temperatures and glass transition temperatures of sample are measured by using the differential scanning calorimeter at the heating rate of* ^{0}*C/min. Annealing at higher temperature leads to the creation of crystalline phase. The order parameter (n) and the activation energy of crystallization (*ΔE_c*) are calculated by fitting the data of extent at crystallization (α) in the Avrami's equation. The temperature dependence dc conductivity of sample is measured for study of conduction mechanism. The dc conductivity is increases with increase of Zn concentration in the glassy alloy.*

Keywords: Chalcogenide Nanostructures; Crystallization; Avrami Index; Activation energy; dc Conductivity.

I.INTRODUCTION

From last few decades the nanosize materials, as a type of new quantum solid materials, have been subjected to extensive research for their unique physical and chemical properties. Selenide sulfur Zinc $Se-S-Zn$ is a promising candidate from II-VI semiconducting materials due to their potential application in optoelectronic devices such as green-blue light emitting diodes (LED), laser diodes (LD) and solar cell, etc. [1–2]. $Se-S-Zn$ is a direct band gap semiconductor material with energy band gap 2.77 eV at room temperature [3]. This makes it a promising material for photo-electronic devices. It can also be used as dielectric mirrors; optically controlled switching devices [4]. Therefore, $Se-S-Zn$ is of great interest as a model material in such form as thin film, quantum wells and bulk crystals [5]. A wide range of applications could be anticipated in the use of nanometer size particles in electronic devices [6]. In current years, due to the number of practical applications in the field of optoelectronics and electro-optics, a great deal of interest has been shown in the study of the dielectric and conduction behavior of various semiconducting materials [7-9]. However, most of the experimental work carried out so far for $Se-S-Zn$ relates to various conduction mechanisms, which only provides information about the nature of transport processes.