PHOTOCRYSTALLIZATION AND OPTICAL PROPERTIES OF AMORPHOUS $Se_{87.5}$ $Sb_{12..5}$ Thin Films

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Dark and photo - conductivity of amorphous $Se_{87.5}$ $Sb_{12.5}$ thin films have been measured. The effect of the exposure time of white light on the crystalization process was studied. The optical constants of these films were determined by transmission and reflection measurements at normal incidence in the spectral range of 550-800 nm. The refractive index has anomalous behaviour in the spectral range of 550-610nm. The allowed optical transitions were found to be indirect with an optical gap of 1.8 eV.

1. Introduction

Amorphous semiconductors have a strong tendency to crystallize. Several factors have already been found to be responsible for amorphous-crystalline transition such as : elevated temperature, light, chemical contamination, mechanical strain, electric field, electron and ion bombradment and ageing. The nature of crystallization largely depends on the structure of the as-deposited amorphous films. Chalcogenide materials exhibit some interesting photoeffects [1], since the structure is flexible and the lone pair electrons are liable to be excited by illumination of visible light. Photocrystallization in amorphous solids was first observed in amorphous selenium by Dresner and Stringfellow [2] and then by other authors [3-5]. They showed that photocrystallization effects result from the production of hole-electron pairs in amorphous phase. The structure changes induced by light soaking in amorphous selenium have been studied [6-9]. The structural bonding between neighbours determines the optical properties. The published data concerning the optical properties of Se-Sb thin films are very limited. The aim of this paper is to study the crystallization of amorphous $Se_{87.5}$ $Sb_{12.5}$ thin films in the presence of light exposure at room temperature and to investigate its optical properties.