THE ELECTRICAL PROPERTIES OF THERMALLY DEPOSITED POLYCRYSTALLINE $ZnIn_2Te_4$ THIN FILMS

M. H. Ali and M. B. El-Den

Physics Department, Faculty of Science, Ain Shams University,

Cairo, Egypt.

$ZnIn_2Te_4$ thin films are grown onto glass substrates by the thermal deposition technique. The electrical properties (electrical resistivity and thermal activation energy) were studied for films with different substrate temperatures ranging from 300 to 623 K. The effect of the substrate temperature on the electrical conductivity can be explained by the improvment of the crystallinity with increasing substrate temperature. Comparison with the electrical properties of the flash deposited films are reported. The implications are discussed.

Introduction

The ternary semiconductor compounds II-III_2-VI_4 (where II= Zn, Cd, Hg; III = Al, In, Ga; VI = S, Se, Te) have been extensively studied with reference to their promising applications as solar cells [1-3], narrow detector in the infrared region, temperature sensor [4], optical filter [5] and switching devices [6,7].

Many authors have reported that, the deposition techique have a significant influence on the properties of the deposited films. Kshirsagar [8] have reported that, the optical properties of the flash deposited $CdGa_2S_4$ and $CdGa_2Se_4$ thin films differs from that of the thermally deposited films.

The growth and the electrical properties of flash deposited $ZnIn_2Te_4$ thin films were reported earlier [9,10] . The growth of thermaly deposited $ZnIn_2Te_4$ thin films revealed that the films had different preferred orientation and larger grain size than that of the flash deposited films [11]. This may affect the electrical properties of the $ZnIn_2Te_4$ thermally deposited films. Hence, the present investigation reports on the electrical properties of thermally deposited $ZnIn_2Te_4$ thin films. Comparism with the electrical properties of the flash deposited films are reported.