"STRUCTURAL STUDIES OF Ga3Te4 AND POLYTYPIC MATERIALS"

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INTRODUCTION

Under normal conditions of the syntheses ,Ga3Te4 crystallizes in to the cubic form of zinc blend structure and to transform with time to a more stable hexagonal form .It is a layered structured compound .Form arising out of the ordering of the cat ion vacancies Ga2Te3 is an most suitable example of these compounds with completely satisfied chemical bonds but with a large number of the cat ion vacancies .In electrical and optical properties of such compounds, a diamond like gallium telluride was found to be of particular interest because complete structural data was not available on this compound, and doping of a small amount of se can change the properties of the material like the band gap and conductivity that is the reason this type of the material can be considered to be the semiconductor. From the limited work reported on the this compound it seems that the compound has growth problems thus our aim is to syntheses the material and study the electrical and structural properties of the material The deviation of the material from the stoictrimetric stoichiometric composition in the semiconductor materials plays a vital role in the determination of the properties of the compound and no systematic study was made on this compound. More over electrical and structural properties are not reported in the literature.

EXPERIMENTAL TECHNIQUES

The polycrystalline compound was prepared from the initial element of mixture of elements of purity 99.999% taken in the stoichimeteric composition in the quartz capsules and then the capsules were heated above the melting temperature of the compounds. The compounds were heated for a period of eight hours and it was annealed for five hours. After some time the lump of the material was allowed to cool in the furnace. PW-Philips 1840 x-ray diffractrometer was used .Band gap was measured with the help of thin film deposited by an ultra clean substrate at the pressure of the 10-6 to lT.

Determination of the Band gap.

For the optical band gap the thin film of thickness (4000A) on ultra clean substarte at the pressure of the 10-6 torr.The absorption vIs wavelength was calculated with the help

of the UV/VIS/NIR spectrophotometer .The optical band gap of Ga3Te4 was measured to be the .89 ev. For the x-ray characterization the lump of the material was crashed in the mortal and pastels PW -1830 Philips X-ray diffractrometer was used X-ray tube was used 35K and 20 ma and powder x-ray data was collected at room temperature .The X ray diffraction pattern consist of sharp peaks Composition analysis technique was used to confirm the composition and the main finding of our work are such as the syntheses of the compound yields to the crystalline and it was calculated the compound G3Te4 is not
stable at lower temperature. It was found that the compound Ga3Te4 occurs in hexagonal form with (a=8.278A),(c=6.906A).

STRUCTURE STUDY OF POL YTYPIC MATERIAL

Polytypic material like lead iodide was purified with the help of the zone refining technique .18 to 22 zones were passes to obtain the single crystal of good quality. It was found that pure crystal was extremely soft .electrical and structural study was made on the pure and doped single crystal.2nd 3% doping was made in pure lead iodide single crystal.. electrical conductivity was measured at room temperature it was found that conductivity increases with temperature. In SEM photograph it was concluded that surface structure consists of the dendritic growth and in the TEM photograph single crystal consists of the circular dendritc growth with periodic manner. In x-ray diffractrogram it was studied that we prepare a polycrystalline material with it was found that there are no polytypic formation taken place and it occurs with hexagonal form. Similarly the cadmium iodide occurs in hexagonal form and the doping of the impurity in cadmium iodide compound can not change the structure of the material

ELECTRICAL AND STRUCTURAL STUDY OF CdI2.

CdI2 material was taken 99.99% pure further purification was made by using the zone refining technique. 12-18 zones were passes to form a good single crystal. The pure single crystal was harder then the doped one. Electrical conductivity was measured at room temperature and it was found that the conductivity increases after doping. X-ray diffractrogram was taken it was found that CdI2 also consist of the hexagonal structure. Electron diffraction photograph were taken by using the TEM which shows the dendritic circular growth in a linear parioddicity. surface structure consist of the dendritic growth.