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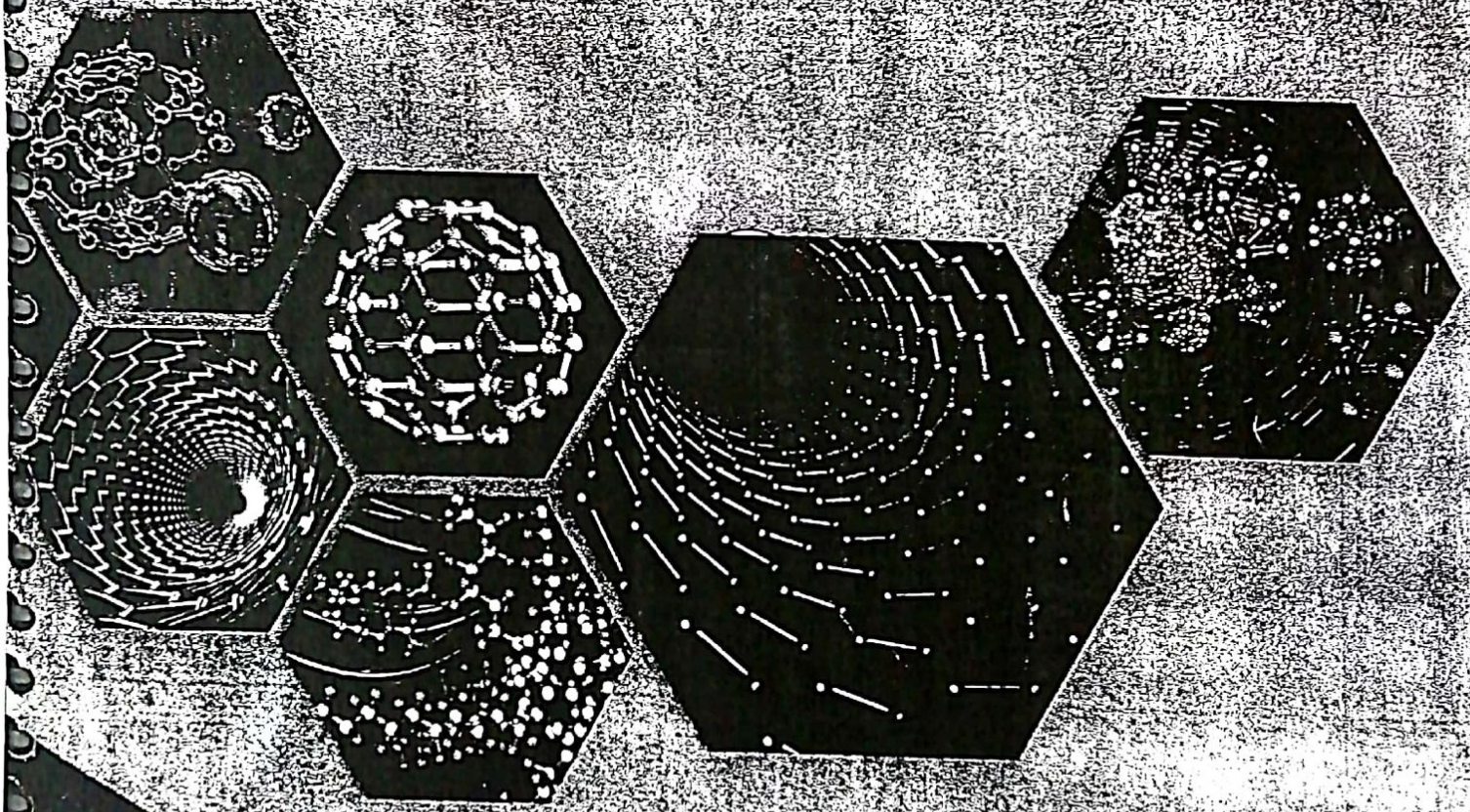

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Electrical Studies In Silver Doped Gallium Oxide Glasses

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ABSTRACT: The glasses of composition xAgI-(100-x)[0.02Ga_2O_3-0.49Ag_2O-0.49B_2O_3] where x=5 to 30 in steps of 5 weight% are prepared by melt quenching technique. XRD, FTIR and DSC investigations are carried out on all glasses to understand physical characteristics of the prepared glasses. Electrical characterization is done in terms of DC and AC conductivities.DC conductivity at room temperature increased from $10^{-4}$to 10^{-2} Scm^{-1} with increasing concentration of AgI. DC activation energy (E_{dc}) is found to decreasefrom 0.36 to 0.19eV with increasing concentration of AgI.From the Impedance spectroscopy real and imaginary parts of impedances (Z', Z") plotsplotted, and by using Z-View equivalent software R-C circuit parameters are obtained from Cole-Cole plots and relaxation times also calculated. The quantitative analysis of these results indicates that the electrical conductivity of these glasses is enhanced by addition of AgI.

Keywords: Electrical properties, oxide; Ga_2O_3 , Ag_2O, XRD

1. Introduction

Portable electronic devices, omnipresent nowadays, requiresmall-size power sources which should be more efficient,durable, reliable and safer for the environment than those availablenow. To meet growing and urgent needs for such powersources it is vital to carry out the research on many prospectiveideas: miniaturized fuel cells, rechargeable microbatteries,etc. One of specific tasks in this research is the development ofsolid electrolytes (polycrystalline, amorphous or composite) forrechargeable silver microbatteries [1,2].Though the ionic conductivity of many silver glasses, especiallythose with high contents of AgI, can be suitable for batteryapplications at moderate temperatures, some disadvantages ofthose glasses such as, e.g. their brittleness or low thermal stabilitythreshold, limit the prospects of their practical use. One ofpossible solutions to circumvent the drawbacks of glassy electrolytesis to produce composites based on these glasses. Therehave been already explored several interesting approaches toprepare composites based on AgI and