

STRUCTURE OF THE CHACOLGENIDE GLASSES BY NEUTRON DIFFRACTION

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The Ge-Se glasses alloyed with Ag have very important practical applications. For example they can be used in thin film form to elaborate electrical memories i.e. the photometallization cells (PMC). A better insight of the structure would help greatly in understanding the electrical properties of these materials. The purpose of this work is to study the change in the structure of the Ge-Se network upon doping with Ag. We report here a neutron diffraction study on three glasses of the system $\text{Ag}_x(\text{Ge}_{0.25}\text{Se}_{0.75})_{100-x}$ with different silver contents ($x = 5, 15$ and 25 at.%) and for three different temperatures (10, 300 and 443 K). The total structure factor $S(Q)$ for the three samples has been measured by neutron diffraction using the two-axis diffractometer dedicated to structural studies of amorphous materials, D4, at the Institut Laue Langevin. We have derived the corresponding radial distribution functions for each sample and each temperature, which gives us an insight about the composition and temperature dependence of the correlation distances and coordination numbers in the short range. Our results are compatible with a model where the $\text{GeSe}_{4/2}$ tetrahedron remains the basic structural unit and the Ag atoms break the corner-shared links between tetrahedra. The neutron diffraction measurements have been complemented by numerical simulations allowing the identification of the main peaks in the total pair correlation functions. We compare our results with previous neutron and X-ray structural data.