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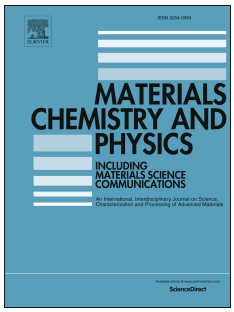

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Anomalous Electrical Conductivity in Selenite Glassy Nanocomposites

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Abstract

CuI doped selenite glass-nanocomposite system has been prepared using melt-quenching route. Their microstructure and electrical transport properties have been studied. It is observed from X-ray diffraction (XRD) study that the size of $CuSeO_3$ nanocrystallite is found to be almost same, but the variation of selenium oxide nanoparticles does not follow any trend. Fourier transform infrared spectra (FT-IR) reveal that major bands are attributed to the Se-O stretching vibration. We have investigated the electrical conductivity of these glass-nanocomposites in a wide frequency and temperature range. Dc conductivity show thermally activated anomalous nature, which may be explained from their structural point of view. Ac conductivity data have been analysed using a power law model. It has been observed that mobile ion concentration is independent of temperature. Conductivity relaxation time has been calculated from the modulus formalism and shows thermally activated nature. The nature of variation of corresponding activation energy indicates that ionic relaxation starts for higher CuI content. A schematic model has been proposed to explain the transformation of chains into clusters in the compositions and formation of more bridging Se-O-Se bonds, which results an enhancement of ionic conductivity of the present glass-nanocomposite system.

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