

Novel Bismuth-Lead-Silver Glasses Doped with Neodymium Ions

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Vitreous systems containing rare earth ions have received a significant attention due to their interesting applications in the field of telecommunications, laser technology and optics [1].

New bismuth-lead-silver glasses doped with neodymium ions have been obtained. Structural and spectroscopic behaviour of the samples was studied by IR spectroscopy, X-ray diffraction, and magnetic susceptibility and density measurements.

The IR spectra obtained for the bismuth-lead-silver glasses doped with neodymium were analyzed to obtain the deconvolution of the absorption bands [2] in order to realize their correct assignment. The IR data permitted the identification of the main structural units that build up the studied vitreous network. These structural units are based on bismuth ions having the 6+ and 4+ valence states, Bi^{6+} and Bi^{4+} . IR spectroscopic data show that addition of neodymium ions produces changes of the structural units in the studied samples, namely the bismuth ions play a network modifier role in the studied vitreous system. These structural changes are generated by the neodymium ions that modify the $\text{Bi}^{6+} \leftrightarrow \text{Bi}^{4+}$ equilibrium in the host bismuth-lead-silver vitreous matrix.

X ray diffraction investigation show the amorphous nature of the samples and, together with the IR spectroscopy, permits to follow the structural modifications produced by the addition of neodymium ions.

The presence of the neodymium ions in the host vitreous matrix induces the magnetic behaviour of the bismuth-lead-silver glasses. Magnetic susceptibility measurements show an antiferromagnetic interaction between the magnetic neodymium. The analysis of the magnetic data evidences an important clustering tendency of neodymium ions.

[1] A.Pann, A.Ghosh, J.Non-Cryst.Solids 271 (2000) 157.

[2] E.Culea, L. Pop, Bosca, I. Bratu, M. Bogdan, Modern Phys.Let. B 21 (3) (2007) 1-7.