

The Structural Changes Induced in Lead-Phosphate Glasses by Addition of Cooper Oxide

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Cooper-doped phosphate glasses have interesting electrical and optical properties that make them suitable for use as super-ionic conductors, solid state lasers, color filters and non-linear optics. The main advantage of phosphate glass over other oxide glasses (e.g. silicate and borate) is its ability to accommodate to high concentration of transition metal ions and to remain amorphous [1].

The $\text{CuO} \cdot (1-x)[2\text{P}_2\text{O}_5\text{PbO}]$ glass system with $0 \leq x \leq 50$ mol% was prepared and characterized by mean of vibrational spectroscopy in order to understand the role of CuO in the local structure. The aim of this work is to study the compositional dependence of different structural units which appear in these glasses with the increasing of the cooper ions content.

The addition of cooper oxide leads to more P=O bond breakage and the formation of the P-O-Cu bonds. We concluded that at high content of CuO it acts in the structure of glasses as a network former. Similar trend was observed in iron-lead-phosphate glasses with addition of iron oxide [2]. The presence of the Cu-O-P and Fe-O-P bonds for higher content of modifier oxide in these glass systems is consistent with the improving of their chemical durability.

[1] E. Metwalli, M. Karabulut, D.L. Sidebottom, M.M.Morsi, R.K.Brow, J.Non-Cryst. Solids 344 (2004) 128.

[2] D.A. Magdas, O. Cozar, V. Chis, I. Ardelean, N. Vedeanu, Vibrational Spectroscopy (in print).