

Nanocomposites and nanomaterials

Magnetic properties of $\text{Fe}_2\text{O}_3\text{-SiO}_2\text{-PbO}$ glasses with nanoparticles.

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$\text{SiO}_2\text{-Fe}_2\text{O}_3\text{-PbO}$ glasses with nanoparticles exhibits interesting magnetic properties [1]. An investigation of magnetic properties of this glasses was performed aiming at checking usefulness as low-losses materials. Thermal properties were investigated by the means of differential scanning calorimetry. Glasses of a composition of $50 \text{ SiO}_2\text{--} x \text{ Fe}_2\text{O}_3\text{--} (50\text{-}x) \text{ PbO}$ (where $x=12.5; 15; 17.5 \text{ mol } \%$) were prepared by a traditional melt-quenching method and by twin rollers fast cooling method. The obtained results show that all the specimens are amorphous. Amorphicity was confirmed by X-ray diffraction (XRD) measurements (Philips X 'Pert Pro MPD) with the $\text{CuK}\alpha$ radiation. Magnetic properties have been studied using magnetic forces microscope (MFM) and physical properties measurement system (PPMS) (Quantum Design PPMS 9). The researched glasses exhibits ferromagnetic properties in room temperature. Magnetic and thermal properties of ferrous lead silica oxide glasses obtained by traditional melt-quenching method and glasses obtained by splat-cooling method have been compared.

1. R.J. Barczyński, N.A. Szreder, J. Karczewski, M. Gazda Electronic conductivity in the $\text{SiO}_2\text{-Fe}_2\text{O}_3\text{-PbO}$ glass containing magnetic nanostructures. Solid State Ionics 262 (2014) 801-805.