



PROJECT "THEORY AND APPLICATIONS OF SINTER-CRYSTALLIZATION" DN 19/7

Crystallization in strontium-substituted barium titanate-containing oxide glass-ceramics – phase composition and microstructure

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Abstract: Glasses with the composition $20.1\text{Na}_2\text{O}/17.1\text{BaO}/6\text{SrO}/23\text{TiO}_2/3\text{Al}_2\text{O}_3/7.6\text{B}_2\text{O}_3/17.4\text{SiO}_2/5.8\text{Fe}_2\text{O}_3$ are synthesized. The prepared samples are thermally treated above the glass transition temperature and the phase composition and microstructure of the obtained materials is analyzed. X-ray diffraction showed the as quenched glasses to contain crystalline BaTiO_3 , $\text{Ba}_{1-x}\text{Sr}_x\text{TiO}_3$, $\text{Ba}_2\text{TiSi}_2\text{O}_8$ and minor quantities of sodium aluminosilicates formed during melt quenching. The microstructure and the elemental composition of the different phases co-existing in the prepared materials are determined by scanning electron microscopy combined with energy dispersive spectroscopy. The formed crystals contain the heavier elements in the composition, i.e. Ba, Ti and Sr



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while the amorphous matrix mainly contains Fe, Na, Si and Al. Additional information on the crystalline phases in the glass-ceramics and their allotropic modification is gathered by electron backscatter diffraction which confirms the results of the X-ray diffraction analyses - cubic barium or barium-strontium titanate is formed.

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