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## Novel solid solutions and glass-ceramics in the system of $Sr_{1-x}Ba_xBi_2B_2O_7$

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The family of non-centrosymmetric borates  $MBi_2B_2O_7$  (M = Ca, Sr (Barbier, Cranswick, 2006), Ba), is known due to their nonlinear optical properties. The size of Sr and Ba atoms have relatively close ionic radii ( $R_{Sr} = 1.32$ Å,  $R_{Ba} = 1.49$  Å for the coordination number 6). Therefore it could be assumed that Sr–Ba substitution is possible. Formation, isomorphic substitutions, thermal expansion, melting and glass forming behavior of the solid solutions Sr<sub>1-x</sub>Ba<sub>x</sub>Bi<sub>2</sub>B<sub>2</sub>O<sub>7</sub> (x = 0-1) were studied by powder X-ray diffraction at room and elevated temperatures. Solid solutions Sr<sub>1-x</sub>Ba<sub>x</sub>Bi<sub>2</sub>B<sub>2</sub>O<sub>7</sub> (x = 0.0; 0.25; 0.50; 0.65 0.75; 0.85, 1.0) were prepared by crystallization of glasses at 600 °C for 10 hours. The samples obtained by quick cooling of melt were investigated by electron microscopy.

Studied solid solutions crystallize in hexagonal system. Unit cell parameters and cell volume increase linearly with increasing of Ba content, a parameter increase more intensive than c parameter. Melting temperature decreases from 827 to 677 °C in the series with increasing of cation size.

For Sr-rich samples (x = 0.0 and 0.25) the glass transition and crystallization effects are purely seen. However for the samples with x>0.5 the effects are clearly observed. The probe with x = 0.65 is not coincide with dependencies obtained by DSC and XRD. Therefore it could be assumed that a narrow area of immiscibility is present near this composition.

Solid solutions (x = 0, 0.50, 1) obtained by quick cooling of melt contain glass-ceramics; size of crystallites starts from 80 nm.

The obtained result are in agreement with fact that the composition corresponded to  $SrBi_2B_2O_7$  is located out of glassforming region in contrast to  $BaBi_2B_2O_7$  composition localized within glassforming region (Egorysheva et al. 2008; 2009).

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