

**SYNTHESIS, FORMATION ENTHALPIES AND LATTICE ENTHALPIES
OF BISMUTH NIOBATES DOPED WITH YTTERBIUM**

Dobretsov P.A.^(1,2), *Semerikova A.N.*⁽¹⁾, *Matskevich N.I.*^(1,2), *Aparnev A.I.*⁽²⁾

⁽¹⁾ Nikolaev Institute of Inorganic Chemistry SB RAS

630090, Novosibirsk, Acad. Lavrentiev Ave., 3

⁽²⁾ Novosibirsk State Technical University

630073, Novosibirsk, K. Marksa Ave., 20

Bismuth oxides doped by elements of V, VI, VII group and rare-earth metals are promising materials for application in oxygen ceramic generators and as fuel cell electrolytes [1]. This is because one of the bismuth oxide forms (δ -Bi₂O₃) has high ionic conductivity. However, the problem is that this form is stable in a narrow temperature range (730-830° C). In order to expand the stability interval, bismuth oxide is doped by other elements. One of the promising compounds in this class is bismuth niobates doped by rare-earth elements. It is necessary to perform wide physical-chemical, in particular, thermodynamic investigations for effectively application of these compounds.

The purpose of our paper is solid state synthesis and thermodynamic investigation of compounds Bi₃Nb_xYb_{1-x}O_y (x = 0.1; 0.2) by solution calorimetry.

Compounds Bi₃Nb_{0.2}Yb_{0.8}O_{6.2} and Bi₃Nb_{0.1}Yb_{0.9}O_{6.1} were obtained by solid state synthesis. High purity precursors Bi₂O₃, Nb₂O₅ and Yb₂O₃ were used for preparation. Planetary mill Fritsch Pulverisette 6 with corundum grinding glass and balls, hydraulic press (PGR-400), a furnace SNOL 4/1300 were used to prepare Bi₃Nb_{0.2}Yb_{0.8}O_{6.2} and Bi₃Nb_{0.1}Yb_{0.9}O_{6.1}. Stoichiometric amounts of precursors were grinded for 10 cycles (160-200 rpm), total time was 10 h. A mixture was pressed and heating in furnace at 700° C during 72 h. Samples were characterized by X-ray diffraction method (Tongda TD-3700, 5–70 2θ, Cu Kα). X-ray diffraction shown that samples were single phase with fluorite structure, space group Fm3m.

Solution calorimetry was used to determine formation enthalpies, lattice enthalpies and stabilization energies of Bi₃Nb_{0.2}Yb_{0.8}O_{6.2} and Bi₃Nb_{0.1}Yb_{0.9}O_{6.1}. 4 M HCl was used as solvent. It was shown that compounds were stable in respect to decomposition on simple oxides.

1. Liu X. et al. A neutron total scattering study of defect structure Bi₃Nb_{0.5}Y_{0.5}O_{6.5} // Solid State Ion. 2011. Vol 192. P. 176–180.

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