

**22nd International Symposium on Metastable,
Amorphous and Nanostructured Materials**

**BOOK OF
ABSTRACTS**

ISMANAM 2015

Paris, France

July 13th - 17th, 2015

**22nd International Symposium on Metastable,
Amorphous and Nanostructured Materials**



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A. R. Yavari and K. Georgarakis**

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POSTER PRESENTATIONS

POSTER SESSION 1

Synthesis of New Rare Earth Orthoborates of $\text{KBaR}(\text{BO}_3)_2$ Family, $\text{R}=\text{Yb, Tm, Ho, Dy, Eu}$ and Sm

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PS1-011

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Search for new boron-containing crystalline materials for practical applications is essential. New orthoborates $\text{KBaY}(\text{BO}_3)_2$ and $\text{KBaTbB}_2\text{O}_6$ were reported in previous studies [1-3]. These compounds characterized by photoluminescent properties and potentially can be used as luminophores.

The aim of this study was to prepare new compounds in the $\text{KBaR}(\text{BO}_3)_2$ family with other rare earth cations R by using the high temperature solid-state method and their characterization.

Solid state synthesis was performed by two-step procedure. In the first step of synthesis the reactants K_2CO_3 , BaCO_3 , H_3BO_3 and oxides of rare earth elements were weighed at the stoichiometric ratio in accordance with the formula $\text{KBaR}(\text{BO}_3)_2$ (boric acid was taken in excess of 3 mass %), mixed thoroughly and ground into fine powder in an agate mortar. Obtained mixtures in platinum crucible were kept and heated at 700°C for 24 h to decompose the carbonates and boron acid. The conditions of the second stage were achieved by increasing the temperature in steps of 50°C. After each heating step, intermediate reaction products were sampled and identified by grinding following X-ray powder diffraction analysis to identify crystal forms.

Six new rare-earth orthoborates belonging to $\text{KBaR}(\text{BO}_3)_2$ crystal family were formed with rare earth elements Yb, Tm, Ho, Dy, Eu and Sm. The structure of synthesized compounds are isostructural to $\text{KBaY}(\text{BO}_3)_2$ and $\text{KBaTbB}_2\text{O}_6$ and isotopic with the mineral bütschliite, $\text{K}_2\text{Ca}(\text{CO}_3)_2$, crystallizing with the space group R-3m. It has been shown that lattice parameters of synthesized borates regular depend on radius of rare earth cations.

[1] Gao J., Song L., Hu X., and Zhang D., *Solid State Sciences*, 2011, 13, 115.

[2] Lian Zh., Sun J., Zhang L. et al., *RSC Adv.*, 2013, 3, 16534.

[3] Lian Zh., Sun J., Ma Zh. et al., *Journal of Crystal Growth*, 2014, 401, 334.