

# Accepted Manuscript

Congruent melt terbium-rich borate  $\text{Na}_2\text{Tb}_2\text{B}_2\text{O}_7$ : Synthesis, crystal structure, optical and magnetic properties

Zhen Jia, Mingjun Xia



PII: S0925-8388(18)30461-4

DOI: [10.1016/j.jallcom.2018.02.031](https://doi.org/10.1016/j.jallcom.2018.02.031)

Reference: JALCOM 44907

To appear in: *Journal of Alloys and Compounds*

Received Date: 17 November 2017

Revised Date: 1 February 2018

Accepted Date: 4 February 2018

Please cite this article as: Z. Jia, M. Xia, Congruent melt terbium-rich borate  $\text{Na}_2\text{Tb}_2\text{B}_2\text{O}_7$ : Synthesis, crystal structure, optical and magnetic properties, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.02.031.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Congruent melt terbium-rich borate $\text{Na}_2\text{Tb}_2\text{B}_2\text{O}_7$ : Synthesis, crystal structure, optical and magnetic properties

Zhen Jia<sup>a,b,c</sup> and Mingjun Xia<sup>b,\*</sup>

<sup>a</sup> Department of Chemistry, Dezhou University, Dezhou, 253023, China.

<sup>b</sup> Beijing Center for Crystal Research and Development, Key Laboratory of Functional Crystals and Laser Technology, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing, 100190, China.

<sup>c</sup> State Key Laboratory of Crystal Materials, Shandong University, Jinan, 250100, China.

**Abstract:** Single crystals of  $\text{Na}_2\text{Tb}_2\text{B}_2\text{O}_7$  were successfully grown from a  $\text{Na}_2\text{O}$  -  $\text{B}_2\text{O}_3$  -  $\text{NaF}$  flux, and its lanthanide homotypic compounds were synthesized using the solid-state reaction method and of pure phase according to the refinements of the X-ray diffraction patterns.  $\text{Na}_2\text{Tb}_2\text{B}_2\text{O}_7$  belongs to monoclinic system,  $P2_1/c$  space group, with cell parameters of  $a = 10.643(2)$  Å,  $b = 6.2724(13)$  Å,  $c = 10.247(2)$  Å,  $\beta = 117.72(3)^\circ$  and  $Z = 4$ . In the structure, the terbium atoms coordinate to eight oxygen atoms to form a  $\text{TbO}_8$  polyhedra, which are connected through edge-sharing O atoms to form a layered  $[\text{Tb}_2(\text{BO}_3)_2\text{O}]^{2-}$  sheets in the  $bc$  plane. Then the sheets are further linked along  $a$  direction to build three dimensional framework with the separation of  $\text{Na}^+$  cations.  $\text{Na}_2\text{Tb}_2\text{B}_2\text{O}_7$  exhibits high transparent in the range of 500 - 1500 nm. Meanwhile, it shows a green-emitting band due to the characteristic electronic  $^5\text{D}_4$  to  $^7\text{F}_5$  transitions of  $\text{Tb}^{3+}$  ions. Magnetic measurements show that  $\text{Na}_2\text{Tb}_2\text{B}_2\text{O}_7$  exhibits typical paramagnetic behaviors from 2 K to 300 K.

Keywords: Borate; Crystal structure; Luminescent property; Magnetic property.

Download English Version:

<https://daneshyari.com/en/article/7993303>

Download Persian Version:

<https://daneshyari.com/article/7993303>

[Daneshyari.com](https://daneshyari.com)