

Author's Accepted Manuscript

Low temperature synthesis of Titanium diboride by
carbothermal method

V. Moradi, L. Nikzad, I. Mobasherpour, M. Razavi



PII: S0272-8842(18)31914-X
DOI: <https://doi.org/10.1016/j.ceramint.2018.07.177>
Reference: CERII8899

To appear in: *Ceramics International*

Received date: 3 June 2018
Revised date: 11 July 2018
Accepted date: 19 July 2018

Cite this article as: V. Moradi, L. Nikzad, I. Mobasherpour and M. Razavi, Low temperature synthesis of Titanium diboride by carbothermal method, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.07.177>

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 galley proof before it is published in its final citable 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.

Low temperature synthesis of Titanium diboride by carbothermal method

V. Moradi, L. Nikzad^{*}, I. Mobasherpour, M. Razavi

Ceramic Department, Materials and Energy Research Center, Alborz, Iran

^{*}Corresponding Author. Tel: +98-263-6204131, Fax: +98-2636201888. nikzad_1@merc.ac.ir

Abstract

Titanium diboride powders have been synthesized by means of carbothermal reduction method utilizing Titanium oxide, Boric acid and Graphite. The effect of mechanical activation of mixed raw materials and the use of additional Boric acid on the final phases have been studied. The resultant powders were characterized by X-ray diffraction (XRD) analyzer and Field Emission Scanning Electron Microscope (FESEM). XRD patterns showed that TiB₂, TiC and C phases after heat treatment at stoichiometric ratio of reactants. By increasing the milling time, the unwanted phases such as C and TiC will be reduced. Pure TiB₂ could be synthesized with mechanical activation of raw materials for 24 h at non-stoichiometric ratio (using additional Boric acid).and heat treatment at low temperature of 1380 °C. In this condition, Titanium diboride could be achieved with residual carbon of 0.92 ± 0.09 wt% and mean average particle size of 3.28 μm . Thermal analysis (TGA-DTA) was used to determine the reaction progress and mechanism. Results revealed that the intermediate phase, TiBO₃, played an important role in getting to lower temperature synthesis. This phase was identified after mechanical milling of raw materials and heat treatment at temperature of 1250 °C.

Keywords: Titanium diboride; Carbothermal reduction; Mechanical milling; Thermal analysis (TGA-DTA); TiBO₃

Download English Version:

<https://daneshyari.com/en/article/10155406>

Download Persian Version:

<https://daneshyari.com/article/10155406>

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