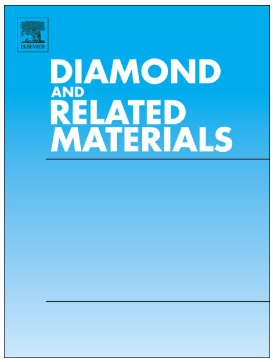

Effect of synthesis conditions of BCNO on the formation and structural ordering of BN at 1200 °C and 1 GPa

Chawon Hwang, Metin Örnek, Kolan Madhav Reddy, Vladislav Domnich, Steve L. Miller, Kevin Hemker, Richard A. Haber

PII: S0925-9635(18)30348-0
DOI: doi:10.1016/j.diamond.2018.06.002
Reference: DIAMAT 7125

To appear in: *Diamond & Related Materials*

Received date: 21 May 2018
Accepted date: 5 June 2018

Please cite this article as: Chawon Hwang, Metin Örnek, Kolan Madhav Reddy, Vladislav Domnich, Steve L. Miller, Kevin Hemker, Richard A. Haber , Effect of synthesis conditions of BCNO on the formation and structural ordering of BN at 1200 °C and 1 GPa. Diamat (2017), doi:10.1016/j.diamond.2018.06.002

Effect of synthesis conditions of BCNO on the formation and structural ordering of BN at 1200°C and 1 GPa

Chawon Hwang[1,*], Metin Örnek[1], Kolan Madhav Reddy[2†], Vladislav Domnich[1], Steve L. Miller[3], Kevin Hemker[2], and Richard A. Haber[1,*]

[1]*Department of Materials Science and Engineering, Rutgers, The State University of New Jersey, Piscataway, NJ 08854, USA.*

[2]*Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD 21218, USA.*

[3]*H&M Analytic Services Inc., Cream Ridge, NJ 08514, USA.*

† Author's present address: *State Key Laboratory of Metal Matrix Composites, School of Materials Science and Engineering, Shanghai Jiao Tong University, Shanghai 200240, China*.

*Corresponding author e-mail: chawon.hwang@rutgers.edu; rich.haber@rutgers.edu, and address: 607 Taylor Road, Piscataway, NJ 08854, USA (Tel: +1(848)445-5924)

Abstract

We investigated the correlation between the synthesis conditions of BCNO compounds and the formation and structure ordering of BN by subjecting BCNO compounds to a post heat-pressure treatment at 1200˚C and 1 GPa. We made a direct observation that BN grains form from BCNO matrix. We found that the formation and structural ordering of BN strongly depend on the synthesis conditions of BCNO compounds. An increase in synthesis temperature promotes the formation of BN since the reaction process involved is endothermic. An increase in boric acid to melamine ratio promotes the formation and structural ordering of BN since i) it reduces the