

Author's Accepted Manuscript

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PII: S0272-8842(18)30052-X
DOI: <https://doi.org/10.1016/j.ceramint.2018.01.041>
Reference: CER117173

To appear in: *Ceramics International*

Received date: 4 December 2017
Revised date: 5 January 2018
Accepted date: 6 January 2018

Cite this article as: Tianfeng Li, Yongjun Chen, Wei Li, Jianbao Li, Lijie Luo, Tao Yang, Longyang Liu and Gaolong Wu, Fabrication and mechanical properties of boron nitride nanotube reinforced silicon nitride ceramics, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.01.041>

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Tianfeng Li, Yongjun Chen, Wei Li, Jianbao Li, Lijie Luo*, Tao Yang,
Longyang Liu, Gaolong Wu

*College of Materials and Chemical Engineering, State Key Laboratory of Marine
Resource Utilization in South China Sea, Hainan University, Haikou 570228, China*

*The corresponding author. Email: luolijie4567@163.com (L.J. Luo)

Abstract In this study, silicon nitride (Si_3N_4) ceramics added with and without boron nitride nanotubes (BNNTs) were fabricated by hot-pressing method. The influence of sintering temperature and BNNTs content on the microstructures and mechanical properties of Si_3N_4 ceramics were investigated. It was found that both flexural strength and fracture toughness of Si_3N_4 were improved when sintering temperature increases. Moreover, α - Si_3N_4 phase could transform into β - Si_3N_4 phase completely when sintering temperature rises to 1800 °C and above. BNNTs can enhance the fracture toughness of Si_3N_4 dramatically, which increases from 7.2 $\text{MPa}\cdot\text{m}^{1/2}$ (no BNNTs) to 10.4 $\text{MPa}\cdot\text{m}^{1/2}$ (0.8 wt.% BNNTs). However, excessive addition of BNNTs would reduce the fracture toughness of Si_3N_4 . Meanwhile, the flexural strength and relative density of Si_3N_4 decreased slightly when BNNTs were added. The related toughening mechanism was also discussed.

Keywords: Silicon nitride; Boron nitride nanotubes; Hot pressing; Mechanical property

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