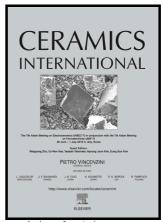
Author's Accepted Manuscript

Microstructure and mechanical properties of in-situ grown mullite toughened 3Y-TZP zirconia ceramics fabricated by gelcasting

Peng-fei Liu, Zhuan Li, Peng Xiao, Heng Luo, Tian-hui Jiang



www.elsevier.com/locate/ceri

PII: S0272-8842(17)32080-1

DOI: http://dx.doi.org/10.1016/j.ceramint.2017.09.151

Reference: CERI16322

To appear in: Ceramics International

Received date: 11 September 2017 Revised date: 18 September 2017 Accepted date: 19 September 2017

Cite this article as: Peng-fei Liu, Zhuan Li, Peng Xiao, Heng Luo and Tian-hui Jiang, Microstructure and mechanical properties of in-situ grown mullite toughened 3Y-TZP zirconia ceramics fabricated by gelcasting, *Ceramics International*, http://dx.doi.org/10.1016/j.ceramint.2017.09.151

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.

ACCEPTED MANUSCRIPT

Microstructure and mechanical properties of in-situ grown mullite toughened 3Y-TZP zirconia ceramics fabricated by gelcasting

Peng-fei Liu^b, Zhuan Li^{a,b}*, Peng Xiao^{a,b}, Heng Luo^c, Tian-hui Jiang^b

^aScience and Technology on High Strength Structural Materials Laboratory, Central South University, Changsha 410083,China

^bState Key Laboratory of Powder Metallurgy, Central South University, Changsha 410083, PR China

^cSchool of Physics and Electronics, Institute of Super-microstructure and Ultrafast Process in Advanced Materials, Central South University, Changsha, 410083, PR China

Abstract: In-situ grown mullite toughened zirconia ceramics (mullite-zirconia ceramics) with excellent mechanical properties for potential applications in dental materials were fabricated by gelcasting combined with pressureless sintering. The effect of sintering temperature on the microstructure and mechanical properties of mullite-zirconia ceramics was investigated. The results indicated that the columnar mullite produced by reaction was evenly distributed in the zirconia matrix and the content and size of that increased with the increase of sintering temperature. Mullite-zirconia ceramics sintered at 1500°C had the optimum content and size of the columnar mullite phase, generating the excellent mechanical properties (the bend strength of 890.4 MPa, the fracture toughness of 10.2 MPa·m^{1/2}, the Vickers hardness of 13.2 GPa and the highest densification). On the other hand, zirconia particles were evenly distributed inside the columnar mullite, which improved the mechanical properties of columnar mullite because of pinning effect. All of this clearly confirmed that zirconia grains strengthened columnar mullite, and thus the columnar mullite

Download English Version:

https://daneshyari.com/en/article/7888724

Download Persian Version:

https://daneshyari.com/article/7888724

<u>Daneshyari.com</u>