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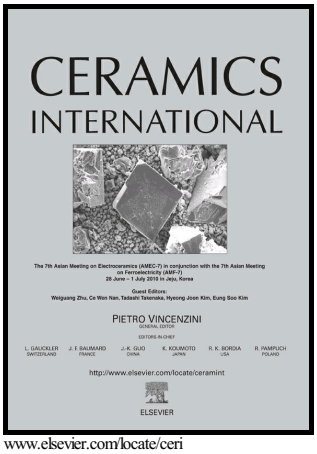


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# The prediction of elastic modulus of the mullite fiber network based on the actual structure architecture

Xiaoxia Hu[1,a], Xiaohui Ma[2,a], Xue Dong[3,a], Chunjie Cao[4,c], Haiyan Du[1,a,*], Zhong Chen[2,b,*]

[a] School of Materials Science and Engineering, Tianjin University, Tianjin 300072, China

[b] School of Materials Science and Engineering, Nanyang Technological University, Singapore 639798

[c] Carle (Shanghai) Management Co., Ltd., Beijing demonstration center

**Abstract**

Accurately establishing the relationship between the network architecture characteristics and performance of fibrous porous ceramics is instructive for structural design and performance control. In the present work, fibrous, high porous (82.87-90.02%), low density (0.247-0.512 g/cm$^3$) and low elastic modulus (50.62-188.56 MPa) mullite ceramics were fabricated by freeze casting. The three dimensional network architectures were characterized by X-ray tomography technique and quantitatively analyzed by 3D image analysis software (imorph, www.imorph.fr). The radius (5.04 μm), types, lengths (64.72-96.49 μm) and orientations (0.87-1.45, anisotropy parameter) of fiber segments in the network architecture were investigated. The extracted results were employed to predict the Young's modulus of the mullite

[2*]Co-corresponding author. E-mail: aszchen@ntu.edu.sg (Z. Chen)
[1*]Corresponding author. Tel.: +86 13512243654; Fax: +86 02227408244.
E-mail: hydu@tju.edu.cn (H. Du).



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