

用碳热还原法制备多孔氮化硅陶瓷

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摘要 以廉价的二氧化硅和活性碳为起始粉料, 用碳热还原法制备了高气孔率, 孔结构均匀的多孔氮化硅陶瓷. 考察了二氧化硅粉末粒径对多孔氮化硅陶瓷微观组织和力学性能的影响. 借助X射线衍射(XRD), 扫描电子显微(SEM)和三点弯曲法对多孔氮化硅陶瓷的微观组织和力学性能进行了研究. XRD分析表明在烧结后的试样中, 除了微量的 α - Si_3N_4 相和晶界结晶相 $\text{Y}_8\text{Si}_4\text{N}_4\text{O}_{14}$ 外, 其余的都是 β - Si_3N_4 相;

SEM分析显示多孔氮化硅陶瓷是由柱状 β - Si_3N_4 晶粒和均匀的孔组成, 通过改变二氧化硅的粒径, 制备了不同孔隙率, 力学性能优异的多孔氮化硅陶瓷.

关键词 [碳热还原法](#) [多孔氮化硅陶瓷](#) [微观组织](#) [力学性能](#)

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Porous Silicon Nitride Ceramics Prepared by Carbothermal Reduction Method

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Abstract Porous silicon nitride ceramics with high porosity and uniform pore structure were prepared by carbothermal reduction reaction between low-cost silicon dioxide and activated carbon. The influence of SiO_2 particle sizes on their microstructures was investigated.

Microstructures and mechanical properties of porous silicon nitride ceramics were studied by XRD, SEM and three-point bending measurement. XRD analysis showed that only β - Si_3N_4 phase, minor of α - Si_3N_4 phase and glass phase $\text{Y}_8\text{Si}_4\text{N}_4\text{O}_{14}$ were detected. SEM analysis showed that porous silicon nitride ceramics obtained were composed of rod-like β - Si_3N_4 grains and uniform pores. Porous silicon nitride ceramics with different porosities and good mechanical properties were fabricated by changing SiO_2 particle sizes.

Key words [carbothermal reduction method](#) [porous silicon nitride](#) [icrostructure](#) [mechanical properties](#)

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