

论文

凝胶浇注成型制备致密 SiC陶瓷材料

张涛^{1,2}, 张兆泉¹, 张景贤¹, 林庆玲¹, 江东亮¹

1. 中国科学院上海硅酸盐研究所高性能陶瓷和超微结构国家重点实验室, 上海 200050; 2. 中国科学院研究生院, 北京 100049

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摘要

采用一种凝胶浇注成型预配液作为陶瓷粉体的分散介质, 将亚微米级SiC粉体和烧结助剂Y₂O₃、Al₂O₃直接混合, 制得了固含量>50vol%的凝胶浇注浆料, 在100s⁻¹的剪切速率下, 浆料粘度<1Pa·s, 可以顺利实现凝胶浇注成型; 对得到的SiC素坯进行了无压烧结. 在2000℃保温1h(氩气氛)的烧结条件下, 烧结体相对密度为(98.1±0.2)%, 抗折强度、硬度和韧性分别为(722±70)MPa、(20.18±0.75)GPa、(4.00±0.20)MPa·m^{1/2}.

关键词 [SiC](#) [凝胶浇注成型](#) [无压烧结](#)

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Preparation of Dense SiC Ceramics by Aqueous Gelcasting

ZHANG Tao^{1,2}, ZHANG Zhao-Quan¹, ZHANG Jing-Xian¹, LIN Qing-Ling, JIANG Dong-Liang¹

1. State Key Laboratory of High Performance Ceramics and Superfine Microstructures, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China; 2. Graduate University of the Chinese Academy of Sciences, Beijing 100049, China

Abstract

Concentrated SiC slurry with Y₂O₃ and Al₂O₃ as sintering assistants was prepared, by using the medium of gelcasting premix solution and pH adjusting reagent of TMAH (tetramethylammonium hydroxide). The measurements of Zeta potential, sedimentation and viscosity show that SiC, Y₂O₃ and Al₂O₃ can disperse well in premix solution at basic region. Rheological study clarifies that concentrated SiC gelcasting slurry has low viscosity and shear stress after adding 0.5wt% TMAH, which is suitable to cast into the mold. The green body formed by gelcasting was pressureless sintered at 2000℃ for 1h. SEM image of SiC ceramic indicates that the structure of SiC sintered body is homogeneous and no obvious defects existing. The relative density, flexural strength, hardness and toughness of SiC sintered body are (98.1±0.2)%, (722±70)MPa, (20.18±0.75)GPa and (4.00±0.20)MPa·m^{1/2}, respectively.

Key words [SiC](#) [gelcasting](#) [pressureless-sintering](#)

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通讯作者 江东亮 dljiang@sunm.shnc.ac.cn

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