

### 论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第9卷 第2期 (总第31期) 1999年06月

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文章编号: 1004-0609(1999)02-0330-05

## 用高岭土合成Sialon粉末的无压烧结

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**摘要:** 概述了Sialon陶瓷材料制备方面的研究。以高岭土为主要原料, 采用碳热还原-氮化法合成的Sialon粉末为主要原料, 分别添加 $Y_2O_3-Al_2O_3$ 系与 $Al_2O_3-MgO$ 系两种烧结助剂后进行充分混合, 混合物粉末在钢模中冷压成两种压坯试样a和b, 然后在 $N_2$ 气氛中进行无压烧结。对烧成温度与烧结体体积密度的关系, 烧结助剂的作用以及Sialon粉末无压烧结致密化过程进行了重点讨论。实验结果表明, 分别添加10%  $Y_2O_3-5\%Al_2O_3$ 和10%  $Al_2O_3-5\%MgO$ (均为质量分数, %)两种烧结助剂的试样a和b分别在1620 °C和1590 °C烧成温度下, 获得了致密的Sialon陶瓷材料。并且建立了Sialon粉末无压烧结致密化模型, 即 $\lg(\Delta V/V_0) \propto \lg t$ , 其致密化过程分为颗粒重排与溶解-析出两个阶段, 且扩散为全过程的控制性步骤。

**关键字:** Sialon粉末 烧结助剂 Sialon陶瓷材料

## PRESSLESS SINTERING OF SIALON POWDER PREPARED FROM KAOLIN

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**Abstract:** The development of technology on sialon ceramic materials was reviewed. The samples made from the mixtures of proper additives, such as  $Y_2O_3-Al_2O_3$  and  $Al_2O_3-MgO$ , and sialon powder prepared from Kaolin through the carbothermal reduction and nitridation process have been sintered under  $N_2$  atmosphere. Relationship between volume density of samples and sintering temperature, effects of sintering additives and the densification procedure of pressless sintering of sialon powder were investigated. The results showed that the densified sialon ceramic materials could be obtained, when 10%  $Y_2O_3+5\%Al_2O_3$  and 10%  $Al_2O_3+5\%MgO$ (all in mass fraction) were added in the mixtures respectively, under  $N_2$  atmosphere, soaking 4h at 1620 °C and 1590 °C respectively. Besides, the densification mode of pressless sintering of sialon powder was established that was  $\lg(\Delta V/V_0) \propto \lg t$ , of which densification procedure included

grains reconstruction and dissolution-precipitation, and the diffusion is the crucial step during the whole densification procedure.

**Key words:** sialon powder sintering additive sialon ceramic materials

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