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Al作为活性填料对前驱体法复相陶瓷性能的影响

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摘要 采用微米级Al粉作为活性填料, SiC微粉作为惰性填料, 聚碳硅烷作为陶瓷前驱体制备SiC基复相陶瓷. 研究了热解温度和保温时间对陶瓷产率、线收缩率、力学性能以及微观结构的影响. 研究表明, 由于活性Al粉颗粒在热解过程中与含碳的有机小分子以及反应性气氛发生氮化和碳化反应, 产生体积膨胀效应, 热解陶瓷表现为小收缩、高产率, 可以满足近净尺寸成型的要求. 在1000℃热解保温1h, 线收缩率为0.08%, 陶瓷产率为99.68%, 材料的三点弯曲强度达到293MPa.

关键词 陶瓷前驱体 活性填料 线收缩率 陶瓷产率

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Effect of Al as Active Filler on Properties of Preceramic-derived Multi-phased Ceramics

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Abstract Al and SiC powders were chosen as active filler and inert filler, respectively, for the fabrication of preceramic-derived multi-phased ceramics, using polycarbosilane as preceramic precursor. The effects of pyrolysis temperature and soaking time on ceramic yield, linear shrinkage, mechanical properties and microstucture were investigated. Volume expansion was observed due to the reaction of Al particles with carbon-containing pyrolysis products and reactive atmosphere. The derived ceramics with small shrinkage and high ceramic yield could meet the demand of near net shaping process. After the ceramic composite was pyrolyzed at 1000℃ for 1h, the bending strength reached 293MPa with the shrinkage of 0.08% and ceramic yield of 99.68%.

Key words preceramic precursor active filler linear shrinkage ceramic yield

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