

论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第18卷 第10期 (总第115期) 2008年10月

 [PDF全文下载]

文章编号: 1004-0609(2008)10-1864-08

碳化硅陶瓷预制体的选区激光烧结及真空压力渗铝

徐志锋, 余欢, 郑玉惠, 蔡长春, 严青松

(南昌航空大学 材料科学与工程学院, 南昌330063)

摘要: 提出采用选区激光烧结法(SLS)制备碳化硅(SiC)陶瓷预制体, 探讨SiC陶瓷表面改性对激光烧结成形性的影响, 进行SiC陶瓷粉末的激光烧结成形工艺实验, 并对SiC陶瓷激光烧结件进行热脱脂和真空压力渗铝。结果表明: SiC陶瓷表面经硅烷偶联剂KH-570(5%)改性处理后的激光烧结成形性得到很大的改善; 同时, 所添加粘结剂中的无机磷酸二氢氨含量控制在8%, 其激光能量密度在0.10-0.12 J/mm²范围内均能烧结成形, 而激光能量密度0.11 J/mm²的烧结件密度为2.31 g/cm³, 抗弯强度达到0.81 MPa。对SiC陶瓷激光烧结件的热脱脂和真空压力渗铝后的XRD和OM分析表明: 脱脂过程中生成的SiP₂O₇是陶瓷预制体的新粘结剂; 而真空浸渗过程中也仅有微量的AlPO₄新生成相, 并没有其它的残留物; 且SiC陶瓷分布均匀, 大小颗粒相互搭配, 组织致密。此外, 其外形形状与CAD模型吻合, 可实现SiC_p/Al复合材料的近净成形。

关键字: 碳化硅陶瓷; 预制体; 选区激光烧结; 表面改性; 激光能量密度

Preform of SiC ceramic particles by SLS and vacuum-pressure infiltration of Aluminium

XU Zhi-feng, YU Huan, ZHENG Yu-hui, CAI Chang-chun, YAN Qing-song

(School of Materials Science and Engineering, Nanchang Hangkong University, Nanchang 330063, China)

Abstract: A novel method for fabricating the silicon carbide ceramic preforms by using selective laser sintering (SLS) technology was proposed. The sintering properties with SiC surface modification, the sintering characteristic of SiC ceramic powders, and the debinding and infiltration process of SiC preforms were studied. The results show that the sintering characteristics of SiC ceramic powders with silane coupling reagent KH-570 are greatly improved. And then the contents of inorganic binder NH₄H₂PO₄ are limited to 8%. The energy density is within the scope of 0.10-0.12 J/mm². The density and bending strength of sintering samples under energy density of 0.11 J/mm² is 2.31 g/cm³ and 0.81 MPa, separately. The prepared samples, when debinded and infiltrated, were characterized by XRD and OM. It can be inferred that the SiP₂O₇ is a sort of new binder in debinding samples, and a few of new AlPO₄ phases are formed in the infiltrated process, and not only the composites dense but also SiC particles are distributed homogenously. In addition, the figure and size of prepared

products are in accord with its CAD model.

Key words: silicon carbide ceramic; preforms; selective laser sintering; surface modification; laser energy density

版权所有：《中国有色金属学报》编辑部

地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-8876765, 8877197, 8830410 传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn