中国有色金属学报
中国有色金属学报(英文版)
中国科学技术协会 主管
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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

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文章编号：1004-0609(2008)10-1885-08

生物玻璃增强多孔羟基磷灰石生物陶瓷的制备及其性能

马 莉，周科朝，李志友，黄苏萍

(中南大学 粉末冶金国家重点实验室，长沙 410083)

摘 要：研究多孔羟基磷灰石(HA)生物陶瓷的制备方法及性能。采用颗粒尺寸为500~600 μm的炭粉，以体系为SiO_2-Na_2O-CaO-MgO-Al_2O_3的生物玻璃为高温粘结剂，通过一定的混料、压制和烧结工艺，可制得孔隙率为30%~48%，抗弯强度达11.65 MPa，大孔孔径约500~600 μm、小孔孔径1~20 μm并孔隙相互连通的多孔陶瓷。采用扫描电镜(SEM)、X射线衍射仪(XRD)、电子万能实验机对样品的微观结构和抗弯强度进行分析，还通过分析天平，采用阿基米德原理对样品孔隙率进行测量。结果表明：随着烧结温度的升高，气孔率逐渐减小，抗弯强度逐渐增加。通过控制炭粉的含量，可以有效的控制多孔烧结体的孔隙率、大孔的分布及孔径。生物玻璃的加入可以促进材料的液相烧结，使多孔羟基磷灰石生物陶瓷致密化，改善其力学性能，同时随着生物玻璃含量的增加孔隙率减少。

关键字： 羟基磷灰石；造孔剂；炭粉；多孔陶瓷；生物玻璃

Porous bioglass reinforced hydroxyapatite materials produced with carbon particles

MA Li, ZHOU Ke-chao, LI Zhi-you, HUANG Shu-ping

（Key State Laboratory of Powder Metallurgy, Central South University, Changsha 410083, China）

Abstract: Carbon particles were used as pore formers to produce porous structures of a SiO2-Na2O- CaO-MgO-Al2O3 glass reinforced hydroxyapatite, and its microstructure and properties were studied. The experimental results show: that porous hydroxyapatite (HA) bioceramics can be obtained with porosity of 30%−48%, and the maximum bending strength of 11.65 MPa. Two separate range distributions of the pores size between 500−600 μm and 1−20 μm were observed. With the sintering temperature increasing, porosity decreases gradually, while bending strength increases. bioglass can improve the mechanical properties of materials, because bioglass will improve densification, thereby reducing porosity. By controlling the content of the carbon can effectively control the porosity, pore size and distribution of pore size. The final microstructure consists of hydroxyapatite, and β-tricalcium phosphate. X-ray diffraction analysis reveals different percentages of phases when porous glass reinforces hydroxyapatite specimens sintering at different temperatures. The biological response of these materials is yet to be tested.

Key words: porous hydroxyapatite; pore formers; carbon; porous ceramic; bioglass

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