

论文

添加微量Ti元素对Diamond/Cu复合材料组织及性能的影响

(1. 北京有色金属研究总院国家有色金属复合材料工程技术研究中心, 北京 100088 | 2. 北京科技大学材料科学与工程学院, 北京 100083)

摘要:

分别采用在Cu基体添加0.1 wt%的Ti元素形成Cu₂Ti合金和在Diamond颗粒表面镀钛(Diamond^{Ti})的方法,制备了含Diamond体积分数为60%的Diamond/Cu₂Ti复合材料和Diamond^{Ti}/Cu复合材料。对比分析了Ti元素对复合材料微观组织、界面结合及性能的影响规律。结果表明:添加0.1 wt%Ti元素能改善Diamond与Cu的界面结合,在界面处观察到明显的碳化物反应层;且以Cu₂Ti合金的方式添加Ti元素改善界面的效果优于在Diamond颗粒表面镀Ti的方式。所制备的Diamond/Cu₂Ti复合材料的热导率为621 W(m·K)⁻¹,而Diamond^{Ti}/Cu复合材料的热导率仅为403.5 W(m·K)⁻¹,但均高于未添加Ti制备的Diamond/Cu复合材料。

关键词: 压力熔渗 Diamond/Cu 复合材料 Ti 合金化 热导率

Effect of Ti on microstructures and properties of Diamond/Copper composites

(1. National Engineering and Technology Center for Nonferrous Metals Matrix Composites, General Research Institute for Nonferrous Metals, Beijing 100088, China ;
2. School of Materials Science and Engineering, University of Science and Technology Beijing, Beijing 100083, China)

Abstract:

Diamond/Cu₂Ti and DiamondTi/Cu composites with 60% volume fraction diamond were manufactured by a pressure infiltration process. The effects of Ti on the microstructure, interface and properties of diamond/copper composites were comparatively analyzed. The results show that the addition of 0.1 wt% Ti can greatly improve the interface bonding between copper and diamond. Carbide lamellae can be observed obviously on the interface. By contrast, the interface of Diamond/Cu₂Ti composites fabricated by adding Ti element in copper to form Cu₂Ti alloy is better than that of Diamond^{Ti}/Cu composites (Diamond^{Ti}: Diamond coated with Ti). The thermal conductivity of Diamond/Cu₂Ti composites is 621 W(m·K)⁻¹ and that of Diamond^{Ti}/Cu composites is 403.5 W(m·K)⁻¹, both of which are higher than the thermal conductivity of Diamond/Cu composites.

Keywords: pressure infiltration Diamond/Cu composites Ti alloy thermal conductivity

收稿日期 2009-06-11 修回日期 2009-10-26 网络版发布日期

DOI:

基金项目:

国家高技术研究发展计划(863计划)资助(2006AA03A135; 2008AA03Z505)

通讯作者: 尹法章, 工程师, 主要从事高导热复合材料的研究与开发

作者简介:

作者Email: yinfazhang96@126.com

参考文献:

本刊中的类似文章

1. 陈富利, 蒋持平. 含非均匀界面相纤维增强复合材料热传导性能预测的递推公式[J]. 复合材料学报, 2009, 26(4): 151-155
2. 钟杰, 郑勇, 张一欣. 功能梯度 Ti(C, N)基金属陶瓷制备技术[J]. 复合材料学报, 2009, 26(3): 111-115

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(3915KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 压力熔渗
- ▶ Diamond/Cu 复合材料
- ▶ Ti
- ▶ 合金化
- ▶ 热导率

本文作者相关文章

PubMed

3. 刘加奇,张立群,杨海波,丁雪佳,陈琪,卢咏来.粒子填充聚合物基复合材料导热性能的数值模拟[J]. 复合材料学报, 2009,26(01): 36-42
4. 乔梁,赵洪强,郑精武,姜力强.片状 Al₂O₃对 Al₂O₃/FEP复合材料热导率的影响[J]. 复合材料学报, 2009,26(6): 37-41
5. 尹法章,郭宏,贾成厂,张习敏,张永忠.放电等离子烧结制备高导热SiC_p/Al 电子封装材料[J]. 复合材料学报, 2010,27(1): 57-61
6. 梁雪冰,褚克,贾成厂.放电等离子烧结制备Diamond/Al复合材料[J]. 复合材料学报, 2008,25(6): 192-197

文章评论

反馈人	<input type="text"/>	邮箱地址	<input type="text"/>
反馈标题	<input type="text"/>	验证码	<input type="text" value="3267"/>
反馈内容	<input type="text"/>		