

论文

断裂方式对氧化铝基复合陶瓷耐磨性的影响

张福成¹, 罗海辉¹, Roberts Steve-G², Todd Richard-I²

1. 燕山大学亚稳材料制备技术与科学国家重点实验室, 秦皇岛 066004;
2. Department of Materials, University of Oxford, Parks Road, Oxford OX1 3PH, UK.

收稿日期 2006-6-16 修回日期 2006-11-1 网络版发布日期 2007-4-30 接受日期

摘要

通过磨粒磨损试验测定了氧化铝陶瓷、氧化铝/碳化硅复合陶瓷和氧化铝/莫来石复合陶瓷的耐磨性. 利用透射电子显微镜(TEM)观察了样品的微观结构, 采用扫描电子显微镜(SEM)分析了样品的断口形貌和磨损表面的剥落情况. 研究了断裂方式对磨损表面剥落和耐磨性的影响. 结果表明: 氧化铝陶瓷的磨损主要由断裂磨损机制控制, 氧化铝/碳化硅复合陶瓷的磨损主要由塑性磨损机制控制, 氧化铝/莫来石复合陶瓷受这两种磨损机制共同作用. 相对于氧化铝陶瓷, 氧化铝/碳化硅复合陶瓷和氧化铝/莫来石复合陶瓷的耐磨性提高2~4倍, 这主要是由于其断裂方式转变为以穿晶断裂为主, 减少了磨损面的脆性剥落.

关键词 [氧化铝](#) [复合陶瓷](#) [耐磨性](#) [断裂方式](#)

分类号 [TQ174](#), [TH117](#)

Effect of Fracture Mode on Wear Resistance of Alumina-based Ceramics

ZHANG Fu-Cheng¹, LUO Hai-Hui¹, Roberts Steve-G², Todd Richard-I²

1. State Key Laboratory of Metastable Materials Science and Technology, Qinhuangdao 066004, China; 2. Department of Materials, University of Oxford, Parks Road, Oxford OX1 3PH, UK

Abstract

Wear resistance of alumina, alumina/silicon carbide composite and alumina/mullite composite was determined by abrasive wear tests. Microstructure of the samples was observed by transmission electron microscope (TEM). Morphologies of the worn and fracture surfaces were analyzed by scanning electron microscope (SEM). The influence of fracture mode and wear surface pullout on wear resistance was studied. The results are listed as follows, the main wear mechanisms of alumina and alumina/silicon carbide are fracture wear and plastic wear respectively, and as alumina/mullite composite is concerned, fracture wear and plastic wear mechanism exerted combined effect. Compared with that of alumina, wear resistance of alumina/silicon carbide composite and alumina/mullite composite is improved by 2--4 times. The primary source for the improvement is the reduction of area fraction of pullout induced by fracture mode transition.

Key words [alumina](#) [ceramic composite](#) [wear resistance](#) [fracture mode](#)

DOI:

通讯作者 张福成 zfc@ysu.edu.cn

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(740KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“氧化铝”的 相关文章](#)
- ▶ [本文作者相关文章](#)

- [张福成](#)
- [罗海辉](#)
- [Roberts Steve-G](#)
- [Todd Richard-I](#)