

研究论文

三种NiAl材料的室温摩擦磨损性能

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摘要:

测试二元NiAl合金、NiAl--Al<sub>2</sub>O<sub>3</sub>--TiC原位内生复合材料以及NiAl--Cr(Mo)--Hf共晶合金的室温摩擦磨损性能,研究了磨损机制.结果表明: NiAl材料的抗磨损性能与材料的硬度和断裂韧性成正比,在磨损过程中硬质陶瓷颗粒能有效地传递应力和起到支撑作用,减轻材料的磨损.因此NiAl--Al<sub>2</sub>O<sub>3</sub>--TiC复合材料的抗磨损性能最好,在相同工况下其磨损率为NiAl--Cr(Mo)--Hf共晶合金的1/4-3/4和二元NiAl合金的1/20-1/10.摩擦系数随着三种NiAl材料硬度的提高而降低.三种NiAl材料的室温干摩擦磨损过程受控于塑性变形,其磨损机制主要是磨粒磨损机制,随着载荷的增加,磨损表面依次呈现出塑性变形、显微剥落和粘着磨损特征,磨损机制的改变对磨损率和摩擦系数具有重要的影响.

关键词: 金属材料 NiAl NiAl-Al<sub>2</sub>O<sub>3</sub>-TiC复合材料 NiAl-Cr(Mo)-Hf共晶合金 摩擦磨损性能 磨损机制

Investigation of friction and wear behavior of NiAl--based alloys at room temperature

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Abstract:

The friction and wear properties of NiAl, NiAl--Cr(Mo)--Hf eutectic alloy and NiAl--Al<sub>2</sub>O<sub>3</sub>--TiC composite were investigated with an MRH-5A friction and wear tester. The results showed that the wear resistance of NiAl-based alloys was directional proportional to their hardness and fracture toughness and the friction coefficient increased with the increasing hardness. Among the above three alloys, NiAl--Al<sub>2</sub>O<sub>3</sub>--TiC composite possessed the best friction and wear properties. The wear mass loss only one-fourth to three-fourths of that of NiAl--Cr(Mo)--Hf eutectic alloy or one-twentieth to one-tenth of that of NiAl alloy, which was attributed to the efficient transferring stress and supporting effect of reinforcing ceramic particles. The wear process of three NiAl materials is dominated by plastic deformation, and the main wear mechanism of the three NiAl--based alloys was abrasive wear. With the increase of load, the wear surfaces exhibit orderly such wear mechanisms as distinct plastic deformation, spalling and adhesion wear. The wear mechanism played an important role in the wear rate and friction coefficient.

Keywords: metallic materials NiAl NiAl--Al<sub>2</sub>O<sub>3</sub>--TiC composite NiAl--Cr(Mo)--Hf eutectic alloy friction and wear behavior wear mechanism

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## 参考文献:

## 本刊中的类似文章

1. 周华锋 杨永进 张劲松. 杂原子MCM-41分子筛的合成和催化性能[J]. 材料研究学报, 2009,23(2): 199-204
2. 张修睦;朱丽红;庄艳散. 在空间(微重力)凝固的金属材料[J]. 材料研究学报, 1998,12(4): 345-351
3. 杜挺. 稀土元素在金属材料中的一些物理化学作用[J]. 材料研究学报, 1997,33(1): 69-77
4. 连肖南 陈鸣才 许凯. 使用硅油--水体系制备纳米氢氧化镁[J]. 材料研究学报, 2009,23(6): 663-667
5. 郝宪朝 陈波 马颖澈 高明 刘奎. 热轧态Inconel690合金中碳化物的溶解和析出[J]. 材料研究学报, 2009,23(6): 668-672
6. 马颖 张洪锋 郝远 陈体军 李元东 高唯. AZ91D镁合金热处理与微弧氧化的交互作用[J]. 材料研究学报, 2009,23(6): 656-662
7. 武彩霞 刘罡 方海涛 李峰 史鹏飞. 杂质离子对非晶态水合氧化钨电化学超电容性能的影响[J]. 材料研究学报, 2009,23(6): 628-634
8. 康晓雪 田彦文 邵忠宝 袁万颂. 掺杂对LiFePO<sub>4</sub>电化学性能的影响[J]. 材料研究学报, 2009,23(6): 646-651
9. 庞永强 程海峰 唐耿平 邢欣. 掺杂SiO<sub>2</sub>对FeCo纳米晶磁粉电磁性能的影响[J]. 材料研究学报, 2009,23(6): 652-655
10. 代伟 吴国松 孙丽丽 汪爱英. 衬底偏压对线性离子束DLC膜微结构和物性的影响[J]. 材料研究学报, 2009,23(6): 598-603