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多壁纳米碳管/Cu基复合材料的摩擦磨损特性

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摘要: 利用销盘式磨损试验机研究了粉末冶金法制备的多壁纳米碳管/Cu基复合材料的稳态摩擦磨损行为, 并用扫描电镜分析了复合材料的磨损形貌。结果表明: 多壁纳米碳管/Cu基复合材料具有较小的摩擦系数, 并随纳米碳管质量分数的增加而逐渐降低; 由于复合材料中纳米碳管的增强和减摩作用, 在低载荷和中等载荷作用下, 随着纳米碳管质量分数的增加, 复合材料的磨损率减小; 而在高载荷作用下, 由于发生表面开裂和片状层剥落, 含纳米碳管质量分数高的复合材料的磨损率增高。

关键字: 多壁纳米碳管; 金属基复合材料; 摩擦系数; 磨损率

Friction and wear behavior of multi-walled carbon nanotube/Cu matrix composites

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Abstract: The friction and wear behavior of multi-walled carbon nanotube/Cu matrix composites fabricated by powder metallurgy were investigated using a pin-on-disk test rig under steady-state conditions and the worn surfaces were analyzed by scanning electron microscopy (SEM). The experimental results indicated that the coefficients of friction for the composites are low and decreased with the carbon nanotube content increasing. At lower and intermediate loads, the wear rate of the composites decreases with increasing the carbon nanotube content due to the effect of reinforcement and reduced friction. Because the surface fracture and fragment of the flake layer occur at higher load, the composites with high carbon nanotube

content exhibit reduced wear resistance.

Key words: multi-walled carbon nanotube; metal matrix composite; coefficient of friction; wear rate

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