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碳纳米管/铅锡新型复合减摩镀层的抗咬合行为

胡正西, 揭晓华, 卢国辉

(广东工业大学 材料与能源学院, 广东 广州, 510006)

摘要: 采用复合电沉积技术制备碳纳米管/铅锡合金新型减摩镀层。在干摩擦条件下, 采用摩擦磨损试验法, 研究镀液中的碳纳米管的质量浓度对复合镀层抗咬合性能的影响和复合镀层摩擦因数的变化, 并用扫描电子显微镜观察普通铅锡镀层和复合镀层的咬合后的形貌。实验结果表明: 当试验机的转速为500 r/min时, 在相同的法向载荷下, 复合镀层的抗咬合时间比普通铅锡镀层的抗咬合时间明显延长; 当镀液中的碳纳米管质量浓度为2 g/L时, 抗咬合性能显著提高, 优于其他复合镀层; 当法向载荷为100 N时, 复合镀层的摩擦因数逐步上升到1.4以上, 而普通铅锡合金镀层的摩擦因数在1.4-1.6之间平稳变化; 碳纳米管可以显著改善铅锡复合镀层的抗咬合性能。

关键字: 碳纳米管; 复合电沉积; 抗咬合性能

Antiseizure performance of carbon nanotubes/Pb-Sn composite coatings

HU Zheng-xi, JIE Xiao-hua, LU Guo-hui

(Faculty of Material and Energy, Guangdong University of Technology, Guangzhou 510006, China)

Abstract: A new kind of carbon nanotubes (CNTs)/Pb-Sn composite antifriction coating was fabricated with composite electrodeposition technique. Under dry friction condition, friction and wear tests were adopted to measure the friction coefficients and the effects of the bath CNTs concentration on the antiseizure performances of the coatings. Worn morphologies of seizure failure were investigated using scanning electronic microscope (SEM). The results indicate that the antiseizure time of composite coatings is longer than that of conventional Pb-Sn alloy coating at the same load when the rotational speed of the tester is 500 r/min. Specially, as the CNTs concentration in the bath is 2 g/L, the antiseizure time of the composite coatings significantly increases and is much longer than that of the other composite coatings. When the normal load is 100 N, the friction coefficients of composite coatings increase up to 1.4 gradually, while the friction coefficient of conventional Pb-Sn alloy coating changes from 1.4 to 1.6 steadily. CNTs can significantly improve the antiseizure performances of Pb-Sn composite coatings.

Key words: carbon nanotube; composite electrodeposition; anti-seizure performance

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地 址：湖南省长沙市中南大学 邮 编： 410083

电 话： 0731-88879765 传 真： 0731-88877727

电子邮箱： zngdxb@mail.csu.edu.cn 湘ICP备09001153号