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热化学反应喷涂Al₂O₃基复合陶瓷涂层的制备及其性能

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摘 要: 使用热化学反应热喷涂技术, 在紫铜表面喷涂制备Al₂O₃基复合陶瓷涂层。利用XRD和SEM分析该复合陶瓷涂层物相组成和组织形貌, 并对其热震性能、抗高温氧化性能和磨损性能进行测试。结果表明: 采用热化学反应喷涂法在紫铜表面制备的陶瓷涂层内部生成陶瓷过渡相Al_{1.4}Si_{0.3}O_{2.7}和Al_{1.9}Si_{0.5}O_{2.95}等, 在陶瓷涂层与Ni-Al过渡层间存在金属间化合物AlNi₃; 该复合陶瓷涂层熔化率较高, 表面呈珊瑚状; 涂层与紫铜基体结合牢靠, 具有优异的高温抗氧化能力, 其磨粒和粘着磨损比紫铜基体分别提高10倍和15倍。

关键字: 紫铜; 复合陶瓷涂层; 化学反应热喷涂

Preparation and properties of Al₂O₃ based composite ceramic coating on pure copper surface by thermo-chemical reaction spraying

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Abstract: Al₂O₃-based composite ceramic coating was prepared on the surface of copper by thermo-chemical reaction spraying. XRD and SEM were used to analyze the composition and morphology of this composite ceramic coating. The thermal shock, high-temperature anti-oxidation and wear properties of the composite ceramic coating were investigated. The results show that the transition phases, such as Al_{1.4}Si_{0.3}O_{2.7} and Al_{1.9}Si_{0.5}O_{2.95}, generate within the ceramic, and AlNi₃ exists between the coating and Ni-Al transition layer. The melting rate of composite ceramic coating with a coral-like surface is high and the combination of the coating and copper matrix is well. Compared with the pure copper base, the coating has excellent high-temperature anti-oxidation capacity, the abrasive wear and adhesive wear are increased by 10 times and 15

times.

Key words: pure copper; composite ceramic coating; thermo-chemical reaction spraying

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