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以蔗糖为前驱体火焰喷涂原位TiC增强Ni基复合涂层的制备

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摘 要：以蔗糖为碳源，采用前驱体热分解技术制备Ni-Ti-C系反应热喷涂混合粉末，通过氧乙炔火焰喷涂技术合成并同时沉积原位TiC颗粒增强的Ni基合金复合涂层。利用XRD和SEM研究混合粉末和涂层的相成分和组织结构，分析TiC/Ni复合涂层的硬度和耐磨性。结果表明：反应火焰喷涂TiC/Ni复合涂层主要由TiC和Ni基体组成，并含少量的Ni_3Ti和Ti_3O_5；涂层由复合强化片层相互叠加而成，复合强化片层中TiC颗粒均匀分布于Ni基体中，TiC颗粒呈球形，粒度达到亚微米级；涂层具有较高的硬度和耐磨性，复合强化片层显微硬度为$HV_{0.2}$ 1 433，涂层的耐磨性能远优于基板材料45号钢和对比涂层Ni60的耐磨性。

关键字： TiC/Ni复合涂层；反应热喷涂；蔗糖；原位TiC颗粒

Preparation of in situ TiC reinforced Ni-based composite coatings by flame spraying using sucrose as carbonaceous precursor

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Abstract:A kind of Ni-Ti-C composite powder for reactive thermal spraying was prepared by thermal decomposition of precursor with sucrose as carbon source. In-situ TiC reinforced Ni-based composite coatings were synthesized and deposited simultaneously by oxyacetylene flame spraying of the composite powder. XRD and SEM were employed to analyze the compositions and microstructures of these composite powders and coatings. The hardness and wear resistance of TiC/Ni composite coatings were investigated. The results show that the composite coating is composed of TiC, Ni and a little Ni3Ti and Ti3O5. The coating is formed by superposition of composite layers in which many TiC particles are uniformly distributed in Ni matrix, and the TiC particles in these layers are spherical or near-spherical with submicron-scale sizes. The microhardness of the composite layers reaches HV0.2 1 433. The wear resistance of TiC/Ni composite coating is much

better than those of 45# steel substrate and Ni60 coating.

Key words: TiC/Ni composite coating; reactive thermal spraying; sucrose; in-situ TiC particle