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激光与光电子技术应用

激光原位碳化铬-镍基复合涂层的组织特征

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摘要: 为了制备陶瓷增强镍基复合涂层，采用激光熔覆技术在45#钢表面原位合成了碳化铬-镍基复合涂层，研究了涂层的显微组织、相结构特征及显微硬度。碳化铬陶瓷的形状主要有四边形（菱形）、六边形和不规则块状；四边形碳化铬为Cr_3C_2，六边形碳化铬为Cr_7C_3，不规则块状碳化铬成分不确定，可能为Cr_3C_2或Cr_7C_3；涂层的平均显微硬度达到基体的3.5倍；涂层具有较高的硬度和致密的组织。结果表明，涂层主要由Cr-Ni-Fe-C，C，Cr_7C_3和Cr_3C_2四相组成，显微组织均匀致密，与基体呈良好的冶金结合。该研究对激光原位碳化铬-镍基复合涂层的理论研究和实际应用是有一定帮助的。

关键词: 激光技术 碳化铬-镍基复合涂层 激光熔覆 微观组织 碳化铬 硬度

Microstructure of in-situ synthesized chromium carbide Ni-base composite coating by laser cladding

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Abstract: In order to prepare ceramic reinforced Ni-base composite coating, chromium carbide Ni-base composite coating was prepared on the surface of 45# steel by laser cladding, the microstructure, phase structure and microhardness of the coating were studied. The shapes of chromium carbide ceramic particles were quadrangular, hexagonal and irregular block. By the analysis, quadrangular chromium carbide was Cr_3C_2, hexagonal chromium carbide was Cr_7C_3,the composition of irregular blocky chromium carbide was indeterminacy, may be Cr_3C_2 or Cr_7C_3.The microhardness of the coating was 3.5 times of the substrate. The coating had high microhardness and dense microstructure. The results indicated that the coating was mainly composed of Cr-Ni-Fe-C, C, Cr_7C_3 and Cr_3C_2.The microstructure of the composite layer was proved to be homogeneous and dense. A good metallurgical combination was formed at the boundary of the coating layer and substrate. The research plays a vital role in theoretical research and practical application of the in-situ synthesized chromium carbide Ni-base composite coating.

Keywords: laser technique chromium carbide Ni-base composite coating laser cladding microstructure chromium carbide microhardness

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