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反应堆工程

316L不锈钢表面双层辉光离子渗金属技术制备Cr_2O_3涂层

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摘要 为改善不锈钢的阻氚渗透性能，采用双层辉光离子渗金属技术在316L不锈钢表面渗铬渗氧制备出了氧化铬涂层，对涂层的组织特征、相组成和合金元素成分分布及渗入机理进行了分析。结果表明，渗铬后表面主要形成Cr的沉积层和Cr在α- Fe中的固溶体相，渗层厚度可达21 μm，铬含量最高可达92%，且由表及里呈梯度分布；随后对渗铬层进行渗氧处理，表面形成以Cr_2O_3为主的陶瓷层，其有效厚度约为45 μm，渗层与基体结合牢固。

关键词 双层辉光离子渗金属技术；316L不锈钢；氧化铬涂层；扩散渗铬

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Preparation of Cr_2O_3 Coating on 316L Stainless Steel Substrate by Double Glow Plasma Surface Alloying Technique

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Abstract Chromium oxide coating was prepared on 316L stainless steel surface by double glow plasma surface alloying technique in order to improve the capability against tritium penetration. The microstructure, composition, alloy element distribution and the formation mechanism were discussed. The results show that the chromized coating consists of Cr and the solid solution of Cr in α- Fe. The content of Cr in the alloying layer is as high as 92% with gradient distribution from surface to interior and the alloying layer's thickness is up to 21 μm. Then, plasma oxygen permeation on the chromized coating was carried on. It is found that the coating mainly consists of Cr_2O_3 with effective thickness of about 45 μm and is firmly bonded to the substrate.

Key words double glow plasma surface alloying technique _ 316L stainless steel _ chromium oxide coating _ diffusion chromising

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通讯作者