

论文
Ti60合金表面电弧离子镀Ti-Al-Cr(Si, Y) 防护涂层的热腐蚀行为

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摘要:

采用电弧离子镀技术在Ti60合金表面制备了Ti-48%Al-12%Cr(0.2%Si, 0.1%Y, 原子分数)防护涂层. 利用XRD, SEM和EDS研究了Ti60合金及Ti-Al-Cr(Si, Y)涂层在Na₂SO₄和75%Na₂SO₄+25%K₂SO₄(质量分数)中800及850℃下的热腐蚀行为. 结果表明, Ti60合金基体在800和850℃的硫酸盐中发生了严重的腐蚀, 腐蚀产物发生了明显剥落. 涂层样品在800和850℃的硫酸盐腐蚀介质中, 表面形成了保护性的氧化膜, 可以有效地保护Ti60合金免受腐蚀破坏. Ti60合金及涂层样品在75%Na₂SO₄+25%K₂SO₄混合硫酸盐中的腐蚀比在纯K₂SO₄中剧烈. Si和Y元素的加入使得Ti-Al-Cr-Si和Ti-Al-Cr-Si-Y涂层在硫酸盐中抗热腐蚀性能优于Ti-Al-Cr涂层.

关键词: 钛合金 Ti-Al-Cr(Si, Y) 涂层 热腐蚀

HOT CORROSION BEHAVIOR OF ARC-ION PLATING Ti-Al-Cr(Si, Y) COATINGS ON Ti60 ALLOY

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Abstract:

High-temperature titanium alloys intended for aero engine compressor applications suffer from high-temperature oxidation and environmental corrosion, which prohibit their long-term service at temperatures above 600 °C. In an attempt to improve the oxidation resistance and corrosion resistance, Ti-48%Al-12%Cr (0.2%Si, 0.1%Y, atomic fraction) protective coatings were plated on the substrate of alloy Ti60 by arc ion plating (AIP) method. The corrosion behavior of the bare alloys and the protective coatings in Na₂SO₄ and 75%Na₂SO₄+25%K₂SO₄ (mass fraction) in air was investigated by XRD, SEM and EDS. The results indicate that Ti60 alloy shows a poor corrosion resistance in the hot corrosion process at 800 and 850 °C due to corrosion product scales spalling. Ti-Al-Cr(Si, Y) coated specimens, however exhibited good hot corrosion resistance at 800 and 850 °C in sulfate. Corrosion in 75% Na₂SO₄+25%K₂SO₄ is more severe than that in Na₂SO₄. Ti60 with Ti-Al-Cr-Si coating or Ti-Al-Cr-Si-Y coating has better hot corrosion resistance than that with Ti-Al-Cr coating.

Keywords: titanium alloy Ti-Al-Cr(Si, Y) coating hot corrosion

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