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碳纤维增强复合材料与高强度金属的接触腐蚀

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CONTACT CORROSION BETWEEN CARBON FIBER REINFORCE COMPOSITE AND HIGH-STRENGTH METALS

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摘要 碳纤维/环氧树脂复合材料(CFRM)与高强度钛合金、铝合金、1Cr18Ni9Ti不锈钢等结构材料连接时,在界面形成了电偶腐蚀和缝隙腐蚀,这首先决定于材料本身的电化性能;同时,也与相互的配偶情况、处理工艺和环境条件有关。电偶腐蚀受配偶材料各自的静态自腐电位($E_{(corr)}$)和电偶电位、电偶电流等闭路动态性能的影响。在3.5%NaCl溶液中,材料电化特性和处理工艺对电偶腐蚀及缝隙腐蚀影响的趋势相同。用浸泡失重法、盐雾试验法及缝隙腐蚀法检验CFRM与阳极化钛合金,以及热水封和铬酸盐封闭的铝合金偶接时,稳定性较好,可满足工程应用的需要。

关键词: CFRM 高强度金属 接触腐蚀 缝隙腐蚀

Abstract: The experimental results show that on the contact boundary the galvanic corrosion and the crevice corrosion are presented while carbon fiber reinforced composite is coupled with high-strength aluminium alloy, or with titanium alloy, or with stainless steel, which are determined by a series of factors such as electrochemical properties, technological process, and environmental situation. It is affected by the static electrochemical properties of these coupled material in open circuit (E_{corr}) and the dynamic electrochemical properties in closed circuit of these couple materials, such as the galvanic current and the galvanic potential. In 3.5%NaCl solution the trend of the effect to galvanic corrosion of these couple materials is similar to that to crevice corrosion. The corrosion stability of the couple material between CFRM and anodized titanium, or between CFRM and anodized aluminium alloy through water and chromate sealing is satisfactory for demand on engineering criterion.

Keywords: ice corrosmn carbon fiber reinforce composite high-strength metals contact corrosion crew

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