

عنوان مقاله:

Investigation of Structure and Corrosion Properties of NiCrBSi Coating with Tungsten Carbide Particles by Flame Spraying on Ductile Cast Iron

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In this study, electrochemical corrosion of composite coating (nickel-chromium-boron-silicon) with and without tungsten carbide particles was investigated by flame spraying on ductile iron. After preparation and preheating substrate, NiCrBSi and NiCrBSi-WC coatings (with 50 % volumetric pre-mixing powder) were applied using a flame sprayer. After coating, re-melting was performed using oxy-acetylene flame. Investigation of microstructure by optical microscopy and scanning electron microscopy equipped with X-ray energy spectroscopy, determination of coating phases by X-ray diffraction and corrosion behavior with potentiodynamic polarization and electrochemical impedance spectroscopy in 3 % wt. saline solution and 2 % wt. of sulfuric acid solution were applied at ambient temperature. The NiCrBSi-WC coating has a smoother surface and less porosity than the NiCrBSi coating. The NiCrBSi-WC interface coating has a better connection with the substrate, and the tungsten carbide is more aggregated in the interface with the substrate. NiCrBSi-WC coating has better corrosion resistance than NiCrBSi coating. The difference in the corrosion current of the two coatings in the NaCl medium is much greater than in the H₂SO₄ medium. In 3 % salt solution, an oxygenabsorbing film is formed on the surface and the surface of the coatings is in the self-passive state. The difference in electrochemical corrosion behavior of the coating containing tungsten carbide is related to the oxidation of this component. Defects and porosity in the coatings cause the electrolyte to reach the substrate surface. Since no protective layer is formed on the coating surface in the H₂SO₄ electrolyte, the difference between the corrosion of the two coatings in the acidic environment is not significant.

کلمات کلیدی:

,Electrochemical Corrosion, Composite Coating, Nickel Base Coating, Flame Spraying, Tungsten Carbide
خوردگی الکتروشیمیایی، پوشش کامپوزیتی، پوشش پایه نیکل، پاشش شعله ای، کاربیدتنگستن

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