Short Communication

The Effect of Thermal Inputs on Microstructure and Corrosion Resistance of WC Particle-Reinforced High Chromium Wear-Resistant Steel

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The purpose of this study is to improve corrosion resistance of WC particle reinforced high-chromium wear-resistant steel by different thermal inputs. The polarization curve and electrochemical impedance spectroscopy of the sample at a low potential in 3.5% NaCl solution were studied by using an electrochemical workstation. Electrochemical changes in the region near the fusion line were examined by scanning vibrating electrode technique (SVET). Micro morphology was explored via an optical microscope (OM). The electrochemical results show that corrosion resistance initially increases and then decreases with increasing thermal inputs. Sample #2 displayed the highest corrosion potential (-0.491 V) and the lowest corrosion current density ($3.78 \times 10^{-4} \mu\text{A} \cdot \text{cm}^2$) of all the conditions. The SVET results and microstructure imply that the excellent electrochemical performance of high-chromium wear-resistant steel is attributed to the reasonably well thermal inputs, which can both provide efficient elemental distribution and promote the dissolution of the WC phase. This work provides new insight into the improvement of corrosion resistance of high-chromium wear-resistant steel.

Keywords: Welding coating, Thermal inputs, microstructure, Electrochemical performance

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