Plasma thermal spray of ceramic oxide coating on carbon steel with enhanced wear and corrosion resistance for oil and gas applications

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Abstract:

In this work, carbon steel surface was coated with Al2O3-40 wt% TiO2 composite using thermal spraying method. The tribological properties of the plasma-sprayed Al2O3-40 wt% TiO2 coating were investigated with a tribometer (pin-on-disc) to evaluate and compare the wear properties of coated and uncoated samples under different loads. Additionally, cumulative weight analysis was done to compare wear loss. The results indicate significant anti-wear improvement with an increase in TiO2 from 13 wt% to 40 wt%. The corrosion on coated and uncoated samples was analyzed using AC and DC methods, namely open circuit potential from potentiodynamic polarization and electrochemical impedance spectroscopy in 3% NaCl solution for 20 days.

Keywords:

Al2O3-40 wt% TiO2; Plasma deposition; Wear; Corrosion

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