Short Communication

Electrochemical Analysis of Corrosion Behavior $\text{Al}_2\text{O}_3\text{-ZrO}_2$ Ceramic Layer Coated Carbon Steel Pipes for Potential Oil Exploitation Application

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$\text{Al}_2\text{O}_3\text{-ZrO}_2$, which is ceramic composite exhibiting high corrosion stability, is coated on the surface of Q235 carbon steel pipes through plasma spray and high velocity oxy-fuel spray (HOVF) methods. The thick and homogenous deposited layers can be generated by these approaches, whereas the influence of these methods on the properties of the materials are negligible. The resistant performance of coated samples to corrosion is studied in the mixture of the simulated seawater and crude oil for 60 days. Then, according to the analysis by electrochemical impedance spectroscopy, the $\text{Al}_2\text{O}_3\text{-ZrO}_2$ coated samples prepared by plasma spray method display high corrosion resistance than those produced by HVOF. However, both these two approaches exhibit a protection on carbon steel in corrosive environment. Based on XRD and SEM analysis, it is demonstrated that the substrate could not be reached by the solution.

Keywords: Plasma coating technique; HOVF; Electrodeposition; EIS; $\text{Al}_2\text{O}_3\text{-ZrO}_2$

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