Short Communication

Application of Electrochemical Impedance Spectroscopy to Evaluate the Corrosion Behavior of 2304 Duplex Stainless Steel Reinforced Rebar in Concrete Exposed in Chloride-Rich Environment

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Corrosion of steel bars embedded in concrete is one of the main causes affecting the long-term performance of reinforced concrete structures. In this study, the corrosion behavior of AISI 2304 stainless steel reinforced calcium silicate cement concrete in chloride-rich environments were evaluated by electrochemical impedance spectroscopy (EIS). The EIS results show that both the immersion time and pH play significant roles in the evolution of the charge transfer processes and film resistance. At pH value of 13, the total impedance increased during the 3 months of immersion time, and then it slightly reduced, indicating the protective ability is being lost. The calcium silicate concrete with steel rebar indicated that the samples remained in the passive state throughout the linear polarization resistance test. The polarization resistance value attained in the pH solutions of 13 are upper than that in other pH values which show higher capability for corrosion prevention in the pH value of 13.

Keywords: Calcium silicate cement; AISI 2304 stainless steel rebar; Chloride-rich environments; Electrochemical impedance spectroscopy; Linear polarization resistance

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