Short Communication

The Influence of Cl^- and Ca^{2+} on the Passive Film of 00Cr10MoV Steel in Simulated Concrete Solution

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The influence of Cl^- and Ca^{2+} on the naturally growing passive film of a new, alloyed stainless steel with 10% Cr and 0% Ni was investigated by electrochemical impedance spectroscopy, Mott-Schottky curves, X-ray photoelectron spectroscopy (XPS), and transmission electron microscopy (TEM). The results showed that Ca^{2+} had an inhabitation effect on passive film dissolution and that Cl^- did not penetrate into the passive film, probably due to adsorption onto lower-energy oxygen vacancies and to the inhabitation effect of the space charge layer with a strong electric field. Local sites in the passive film thickened and the outer layer turned into an amorphous, porous structure due to its structural integrity. Additionally, the passive film remained passive in concrete.

Keywords: corrosion-resistant steel rebar; corrosion; passive films; TEM

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