Effect of Thiosulfate on Corrosion Behavior and Passive Films of Duplex Stainless Steel 2205 in Chloride Solutions

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The effect of $S_2O_3^{2-}$ on the corrosion behavior and passive films of duplex stainless steel 2205 in a Cl^- -containing environment was investigated by potentiodynamic polarization, electrochemical impedance spectroscopy, Mott-Schottky measurements and XPS composition analysis. The results show that the addition of $S_2O_3^{2-}$ decreased the pitting potential of duplex stainless steel 2205 in Cl^- -containing solutions. The corrosion resistance of passive films was influenced by the concentration of $S_2O_3^{2-}$ in Cl^- -containing solutions, but the exhibited n-type and p-type semiconductor characteristics were not affected. The modified stability and the variation in donor and acceptor densities of the passive film with the concentration of $S_2O_3^{2-}$ were detected. The primary components of the passive films on duplex stainless steel 2205 in a Cl^- - $S_2O_3^{2-}$ solution were Cr-oxides and Fe-oxides or hydroxides with small amounts of Ni and Mo oxides.

Keywords: duplex stainless steel, Cl^- , $S_2O_3^{2-}$, corrosion behavior, passive film.

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