Corrosion behavior of AISI321 stainless steel in an ethylene glycol-water solution

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The electrochemical corrosion behaviors of AISI321 stainless steel in a 36% ethylene glycol-water solution are investigated by electrochemical impedance spectroscopy, Mott-Schottky analysis, electrochemical atomic force microscopy and X-ray photoelectron spectroscopy. The results indicated that the calculated donor density increased, as a result of an increasing passive film formation potential, suggesting that the passive film formed at high potential provided much better protection performance. The n-type semiconductor behavior was observed in the potential range from -0.15 to 0.45 V (vs. SCE), however p-type semiconductor behavior was observed in the potential range from 0.45 to 0.75 V, and the carrier density decreased with the increasing potential during the passivation.

Keywords: AISI321 stainless steel; Corrosion; Mott-Schottky analysis; EIS; EC-AFM

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