

Influence of Systematically Changed Martensite Content on the Passive Film Properties of Austenitic Stainless Steel in Neutral Electrolyte

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doi: 10.20964/2020.01.09

Received: 25 June 2019 / Accepted: 13 September 2019 / Published: 30 November 2019

The forming of austenitic stainless steel is often accompanied by a transformation of its crystalline structure into martensite. The effect of martensite content on the steel's passivation behavior is still controversially discussed. To investigate the influence of martensite content on the passive film properties we changed the microstructure of AISI304 samples by plastic deformation. Martensite content was determined by XRD measurements, while the alloy's corrosion resistance was characterized using cyclic voltammetry to measure passive current and charge densities. Passive layer properties were analyzed using electrochemical impedance spectroscopy and Mott-Schottky analysis. Systematic variations of crystalline structure revealed that a formation of a more defective passive layer can explain accelerated electrochemical dissolution at higher martensite content.

Keywords: stainless steel; cyclic voltammetry; EIS; XRD; passive films; passivity

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