Electrochemical and Stress Corrosion Behaviors of 316L Stainless Steel in the Borate solution

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doi: 10.20964/2020.05.44

Received: 20 December 2019 / *Accepted:* 19 February 2020 / *Published:* 10 April 2020

The electrochemical characteristics and stress corrosion behavior of 316L stainless steel in the borate solution with different pH were investigated through electrochemical measurements, slow strain rate tension (SSRT) tests and immersion experiments. The electrochemical measurement results indicated that borate solution will facilitate the passivation film deformation on the surface of 316L stainless steel, and the corrosion resistance of 316L stainless steel decreased with the increased of pH. While the pitting corrosion of 316L stainless steel prone to occurred in the borate solution with the value of pH was 11. At the same immersion time, the number of corrosion pits increased with the pH. Furthermore, the stress corrosion cracking (SCC) susceptibility of 316L stainless steel was tested by SSRT, and suggested that higher pH leads to more sensitive, and tensile fracture morphology showed the characteristic of ductile fracture when pH was 7.

Keywords: 316L Stainless Steel, Borate Solution, pH, Stress Corrosion Cracking

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