The effect of elastic tensile stress on inhibition behavior of N-lauroylsarcosine sodium for 304L stainless steel pitting corrosion

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Abstract: Elastic stress has obviously influence on the passive film characterization and pitting corrosion behavior of stainless steel (SS). The small elastic tensile stress (16.63% $\sigma_{0.2}$) would increase the protective performance of passive film and decrease the pitting corrosion sensitivity of 304 L SS in 3.5 wt% NaCl environment. As the elastic tensile stress increases, the passive film stability and pitting corrosion resistance decrease obviously.

The effect of elastic tensile stress on the inhibition behavior of surfactants for 304 L SS pitting corrosion has the great significance. In this paper, the effect of elastic tensile stress on inhibition behavior of N-LSS of 304 L SS pitting corrosion has been studied by using various electrochemical tests (Potential polarization (PP), Mott-Schottky test (M-S), electrochemical impedance spectra (EIS) and potential of zero charge (PZC)) and surface characterization tests (Acoustic emission monitoring (AE), scanning electron microscope (SEM), contact angles test (CA), Fourier-transform infrared spectroscopy (F-TIR) and microscopic-infrared imaging (M-IR)). And the exploration of the in fluence mechanism of elastic tensile stress on the inhibition behavior of surfactant for 304 L SS pitting corrosion could provide effective measures and the important theoretical basis of SS pitting corrosion protection for industrial practical application. N-lauroylsarcosine sodium is proved to be effective in inhibiting 304 L SS pitting corrosion. Under various elastic tensile stresses, the inhibition behavior of N-LSS on 304 L SS pitting corrosion is studied, and N-LSS increases significantly 304 L SS pitting potential by more than 400 mV. Under small elastic tensile stress (≤16.63 % $\sigma_{0.2}$), the adsorption of N-LSS can inhibit 304 L SS pitting corrosion by enhancing the protection of N-LSS film and specific adsorption effect of N-LSS. Under large elastic tensile stress (≥46.84% $\sigma_{0.2}$), the decrease of N-LSS adsorption effect reduces the inhibition effect of N-LSS specific adsorption for 304 L SS pitting corrosion growth.

Keywords: Pitting corrosion, inhibitor, N-lauroylsarcosine sodium, specific adsorption.