Effect of Deformation-Induced Martensite on Protective Performance of Passive Film on 304 Stainless Steel

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The relationships among the characteristics and electrochemical properties of passive films on the surfaces of 304 stainless steel specimens with different deformation-induced martensite content were examined using X-ray diffraction spectroscopy (XRD), transmission electron microscopy (TEM), X-ray photoelectron spectroscopy (XPS) and electrochemical methods. The compound contents and protective performance of the passive film initially decreased and then increased with increasing deformation-induced martensite content. The passive film on the surface of a stainless steel specimen with an α' -martensite content of 6% was found to have the lowest contents of compounds and the poorest protective performance. When the α' -martensite content was less than 6%, the compound contents and protective performance of the passive film on the surface of the stainless steel decreased with increasing α' -martensite content. When the α' -martensite content exceeded 6%, the compound contents and protective performance of the passive film increased to a certain extent with increasing α' -martensite content.

Keywords: martensite; passive film; 304 stainless steel; protective performance

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