عنوان مقاله:

A Corrosion Study of Grain-Refined ۳۰۴L Stainless Steels Produced by the Martensitic Process

محل انتشار:

مجله ی بین المللی انجمن آهن و فولاد ایران, دوره 12, شماره 2 (سال: 1394)

تعداد صفحات اصل مقاله: 9

نویسندگان:

M. Atapour - *Department of Materials Engineering, Isfahan University of Technology, Isfahan ۸۴۱۵۶- ۸۳۱۱۱, Iran*

M. M Dana - *Department of Materials Engineering, Isfahan University of Technology, Isfahan ۸۴۱۵۶- ۸۳۱۱۱, Iran*

F. Ashrafizadeh - *Department of Materials Engineering, Isfahan University of Technology, Isfahan ۸۴۱۵۶- ۸۳۱۱۱, Iran*

خلاصه مقاله:

AISI ۳۰۴L austenitic stainless steel with different grain sizes of ۰.۵ -۱۲ μm was obtained through the martensitic process. Corrosion behavior of different samples was investigated in a ۰.۵M HCl solution using open circuit potential, potentiodynamic polarization and electrochemical impedance spectroscopy tests. Also, the correlation between the grain size and pitting corrosion resistance was assessed by cyclic polarization experiments and immersion tests combined with optical microscopy. The potentiodynamic polarization results demonstrated that grain refinement had little influence on the corrosion potential and corrosion current density. However, cyclic polarization tests showed that the ultrafine grained steel (۵۰۰ nm grain size) exhibited superior pitting resistance, as compared to the steel with the larger grain size (۱- ۱۲ μm). This behavior was confirmed by immersion tests in the ۰.۵M HCl for ۴۸ hours, thereby showing that the size and the number of pits were decreased by increasing the grain size. The electrochemical impedance spectroscopy results also revealed that grain refinement enhanced the stability of the passive film of ۳۰۴L stainless steel.

کلمات کلیدی:

Ultra-fine grained stainless steel, Corrosion, Pitting corrosion resistance, Grain size