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A Study on the Effects of Anion Addition on the Morphological Change of a Pit Formed on Alloy 600 in Chloride Ion-Containing Solution Using Fractal Geometry

프랙탈 기하학을 이용한 염화이온 함유 수용액에서
음이온의 첨가가 합금 600에 형성된 핏트의 모양 변화에
미치는 영향에 대한 연구

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The present work involves a study on the effect of anion (HCO_3^- , NO_3^- , SO_4^{2-}) addition on the pit morphology of alloy 600 in aqueous 0.5M NaCl solution as functions of anion additive and its concentration in terms of fractal geometry using potentiodynamic polarization experiment, potentiostatic current transient technique, ac-impedance spectroscopy, scanning electron microscopy(SEM) and image analysis method. From the potentiodynamic polarization curves and potentiostatic current transients, it was found that the addition of anion to chloride solution has a inhibiting effect on pitting corrosion of alloy 600. After observation of SEM micrographs of corrosion pits, the pit morphology was quantitatively analyzed by image analysis method to determine fractal dimension with pit depth. During ac-impedance measurement, constant phase element (CPE) was observed in the Bode plot. In this work, the CPE behaviour is due to the increase in the surface roughness of the specimen by the formation and growth of pits with a certain value of fractal dimension. This CPE behaviour of pits was closely related to fractal dimension value determined based upon pit morphology observed by SEM using image analysis method.

Reference

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