

CS07

A Study on the Effect of Solution Temperature on
Inconel 600 Passivity in Thiosulfate Solution
by using Ac-Impedance Spectroscopy

Thiosulfate 이온이 함유된 수용액에서 교류 임피던스법을 이용한
인코넬 600 의 passivity 에 미치는 용액온도의 영향에 대한 연구

박진주, 변수일, 이우진
한국과학기술원 재료공학과

The effect of solution temperature on passivity of Inconel 600 in aqueous 0.1 M $\text{Na}_2\text{S}_2\text{O}_3$ solution between 25° and 90°C was investigated using potentiodynamic polarization experiment, abrading electrode technique and ac-impedance spectroscopy. The potentiodynamic polarization curve showed that the value of current density rose at any given anodic potential with increasing solution temperature. The repassivation rate of the oxide film decreased with solution temperature, which is attributable to the formation of anodic oxide film with many defects as easy paths for the charge transfer in the early stage of repassivation. From the measured impedance spectra, it was observed that the diameters of the impedance spectra decreased with increasing solution temperature and at the same time the impedance spectra obtained at higher solution temperature is depressed substantially compared with those at ambient solution temperature. These results originate from the reduction in fraction of passive oxide film due to the formation of the defect-containing oxide film with increasing solution temperature. Based upon the experimental findings, it is deduced that the loss of passivity of anodic oxide film at elevated solution temperature is mainly caused by the formation of the defect-containing oxide film.