

CS3

Impedance Behaviour of Oxide Formed on Alloy 600 in Cl^- -Ion Containing Solution under Hydrothermal Condition

열수의 염화이온 함유수용액 조건하에서 합금 600에
형성된 산화피막의 임피던스 거동연구

박진주, 변수일

한국과학기술원 재료공학과

Impedance behaviour of surface oxide film formed on alloy 600 was investigated in aqueous $0.1\text{M Na}_2\text{S}_2\text{O}_3 + 0.1\text{M NaCl}$ solution as a function of solution temperature using potentiodynamic polarization experiment, ac-impedance spectroscopy and scanning electron microscopy(SEM). As solution temperature increased, the corrosion rate rose and at the same time the pitting potential decreased on the potentiodynamic polarization curve. After observation of corrosion fronts of stable pits formed on the specimen, the geometry of corrosion fronts was analyzed quantitatively. In the present work ac response of oxide film of alloy 600 has been studied at temperature ranging from 25° to 200°C using autoclave specially designed to carry out the electrochemical experiments under hydrothermal condition. From the measured impedance spectra, it was observed that the Nyquist plots deviate gradually from a perfect semicircle form with increasing solution temperature. The depression of a semicircle in the impedance plane plot can be mainly attributed to roughening of the electrode due to the acceleration of pit propagation at elevated solution temperature. The degree of depression of a impedance spectra was compared with the quantitative analysis of the geometry of corrosion pits.

References

1. J.-S. Bae and S.-I. Pyun, J. Alloys and Comp. 217 (1995) 52.
2. T. Johnsen, A. Jossang, T. Jossang and P. Meakin, Physica A 242 (1997) 356.
3. S.A.M. Refaey and G. Schwitzgebel, Applied Surface Science 135 (1998) 243.