

## CS04

### A Study on the Effect of Solution Temperature on Alloy 600 Passivity in Thiosulfate Solution Using Abrading Electrode Technique

Thiosulfate 이온이 함유된 수용액에서 마모전극법을 이용한  
합금 600 의 passivity 에 미치는 용액온도의 영향에 대한 연구

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The passivity of surface oxide film on alloy 600 was investigated in aqueous 0.1 M  $\text{Na}_2\text{S}_2\text{O}_3$  solution as a function of solution temperature ( $T_s$ ) using potentiodynamic polarization experiment, abrading electrode technique and ac-impedance spectroscopy. The potentiodynamic polarization curves showed that the corrosion rate was enhanced as  $T_s$  increased from 25° to 200°C. For the *in-situ* study on the repassivation kinetics of alloy 600 at elevated  $T_s$ , a new abrading electrode apparatus was specially designed. The logarithmic representation of current transients obtained from the *in-situ* abrading electrode revealed that the bare surface of alloy 600 exposed to the solutions with elevated  $T_s$  is hardly repassivated. This is attributable to the retardation of the formation of passivating oxide film with many defects acting as easy paths for the charge transfer at elevated  $T_s$ . From the lowered oxide film resistance value at elevated  $T_s$ , it is inferred that the passive film is locally collapsed due to the formation of many defects in the film. Based upon the experimental findings, the passivity of alloy 600 was discussed in terms of the fraction of defects formed in the film at elevated  $T_s$ .

#### References

1. J. Robertson, Corrosion Science, 32 (1991) 443.
2. J.-D. Kim and S.-I. Pyun, Electrochim. Acta 40 (1995) 1863.
3. B. Stellwag, Corrosion Science, 40 (1999) 337.