

BF04

Analysis of Open-Circuit Potential Transient and Laser Beam Deflection Transient Simultaneously Measured from Pd Foil Electrode Pre-Charged with Hydrogen

수소로 기충전된 Pd 박막 전극에서 동시에 측정된 개회로전압 천이법과 레이저 빔 반사법의 분석에 대한 연구

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Open-circuit potential (OCP) transient has been analysed as a function of prior hydrogen charging potential with the help of laser beam deflection transient simultaneously measured from Pd foil electrode pre-charged with hydrogen at $0.08 V_{RHE}$ to $0.04 V_{RHE}$ in $0.1 M NaOH$ solution. OCP transient proceeds first in form of potential plateau, followed by an exponential growth, just describing the charge transfer reaction at the surface. OCP is determined by a mixing of the potentials of two simultaneous reactions of anodic hydrogen oxidation and cathodic oxygen reduction and hydrogen underpotential deposition, coupled by a common corrosion rate. The charge-transfer reaction at the surface is a rate-determining step for the hydrogen self-discharge reaction. From the analysis of the tensile deflection transient, it is suggested that the contribution of the α -PdH decomposition to the tensile deflection remains constant in value regardless of prior hydrogen charging potential. The transients of hydrogen surface concentration and hydrogen concentration profile across the electrode are derived from the analysis of simultaneously measured OCP transient and tensile deflection transient, respectively.

References

1. B.E. Conway et al., J. Electrochem. Soc., 130 (1983) 1825.
2. J.-N. Han, S.-I. Pyun and D.-J. Kim, Electrochim. Acta, 44 (1999) 1797.