Current transient 의 분석을 통한 Pd 다공성 전극에서의 수소 이동에 관한 연구

An Investigation of Hydrogen Transport through Pd Porous Electrode by Analysis of Current Transient

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The hydrogen transport through a Pd porous electrode in the coexistence of hydrogen-poor α-phase and -rich β-phase has been investigated during the hydrogen discharging from the electrode by analysing current decay transients. Four kinds of Pd powders having average particle sizes of 22.5, 60, 90 and 141 μm were sintered to pellet at 1312℃ for 2h under vacuum, followed by chemical etching in concentrated nitric acid for 30s. The Pt wire was used as a current collector for the Pd electrode specimen. Two kinds of the current transients were obtained from the electrodes in 0.1M NaOH solution. One is that after hydrogen was galvanostatically charged at various current densities and charging times, the electrode potential was suddenly moved to 0.9 V(RHE). The other involves that the electrode potential of the specimen potentiostatically charged at the potentials ranging from -0.10 to 0.25 V(RHE) was suddenly jumped to 0.9 V(RHE). From this moment, the resulting anodic currents were recorded with time. The discharge hydrogen capacity was calculated by integrating the current decay transients with respect to time. From the dependence of discharge hydrogen capacity on the particle size, the effect of stress field induced by the phase transformation of α-phase into β-phase and vice versa on hydrogen absorption was elucidated. Current decay transients measured from Pd porous electrode with spherical symmetry were compared with those obtained from Pd foil electrode with planar symmetry. The hydrogen transport through a Pd porous electrode was discussed in terms of the hydrogen absorption-induced stress field.

References

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