

전기 화학적 수정 진동자 미소 질량 측정 방법을 이용한
이산화망간 전극의 산화/환원 반응에 대한 연구

**A Study on the Redox Properties of MnO₂ Electrode by Using
Electrochemical Quartz Crystal Microbalance (EQCM) Technique**

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The redox properties of MnO₂ electrode in slightly alkaline solution were investigated by using electrochemical quartz crystal microbalance technique combined with other electrochemical techniques such as cyclic voltammetry and coulometric titration experiment. The MnO₂ was deposited onto quartz/Pt conducting disc (5 mm in diameter) by anodization at a current density of 5 mA cm⁻² in 0.66 M MnSO₄ + 0.5 M H₂SO₄ solution at 95 °C. After deposition, MnO₂ film was carefully rinsed with distilled water and placed in the electrochemical cell with 0.1 M Na₂B₄O₇ solution (pH≈9.4) used as the electrolyte. Then, the gravimetric (mass change) curve and cyclic voltammogram were obtained in the potential range of -0.1 to 0.8 V_{SCE} where several electrochemical reactions containing MnO₂/MnOOH redox reversible reaction take place. In the cathodic sweep, mass decreased and then increased with potential. On the contrary, in the anodic sweep, mass increased and then decreased with potential. This anomalous behaviour, different from monotonous mass increase(or decrease) due to MnO₂ redox reaction, suggested the existence of other (electro)chemical reactions than MnO₂ redox reaction. These experimental results were discussed in terms of MnO₂ redox reaction, water dipole distribution, and adsorption/desorption of product ions, which were confirmed by the gravimetric curves obtained simultaneously with coulometric titration and potentiostatic current transient curves.

References

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