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Transport of Alkaline Cation and Neutral Species through $\text{Ni}(\text{OH})_2/\text{NiOOH}$ Film Electrode during Cyclic Voltammetric Measurement

순환 포텐셜 전류법 동안 $\text{Ni}(\text{OH})_2/\text{NiOOH}$ 박막 전극을 통한
알칼리 양이온과 중성 분자의 이동에 관한 연구

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The transport of alkaline cation and neutral species through $\text{Ni}(\text{OH})_2/\text{NiOOH}$ film electrode during hydrogen extraction and injection has been investigated in various electrolytes by using cyclic voltammetry combined with electrochemical quartz crystal microbalance (EQCM) and laser beam deflection techniques. $\text{Ni}(\text{OH})_2/\text{NiOOH}$ film electrode was cycled in aqueous 0.1 M LiOH, KOH and CsOH solutions in order to clarify the contribution of alkaline cation to the mass change generated during hydrogen discharging and charging. From the changes in the mass of the film electrode during cyclic voltammetric measurement, it is suggested that the hydrogen transport through the film electrode is accompanied by the transfer of alkaline cation and neutral species. The tensile deflection measured during the hydrogen extraction indicates the occurrence of the contraction of the film electrode, which is caused by the smaller molar volume of NiOOH than that of $\text{Ni}(\text{OH})_2$. The tensile deflection was found to be annihilated during the hydrogen injection. The measured voltamassogram and deflection transients have been discussed in terms of the transport of alkaline cation and neutral species as well as the phase transformation of $\text{Ni}(\text{OH})_2$ to NiOOH and vice versa.