초청강연2

Electrochemical Oxidation of Ethanol at Nickel and RuO_2-Modified Nickel Electrodes in Alkaline Media Studied by Electrochemical Impedance Spectroscopy

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Electrochemical oxidation of ethanol has been studied at nickel and RuO_2-modified nickel electrodes in 1 *M* KOH solution using electrochemical impedance spectroscopy. Equivalent circuits have been worked out from simulation of the impedance data to model the oxidation reaction of ethanol as well as the passivation of the electrode. The maximum rate of oxidation of $Ni(OH)_2$ to NiOOH was observed at about 0.37 V *vs.* Ag/AgCl reference electrode, while that for ethanol oxidation was at about 0.42 V at this electrode. Similar results were obtained at the RuO_2-modified electrodes. The charge-transfer resistances for oxidation of these electrodes became smaller in the presence of ethanol than in its absence. These results suggest that the $Ni(OH)_2$/NiOOH, as well as the ruthenate (Ru(VI))/perruthenate (Ru(VII)) couple, acts as an effective electron transfer mediator for ethanol oxidation. The nickel substrate facilitated oxidation of ethanol at the RuO_2-modified nickel electrode. We finally describe the performance of nanosize particular electrodes of the same composition in comparison to those of the bulk electrodes. The nanosize electrodes were obtained by electrodepositing from complexed form of these metal ions with fourth and fifth generation polyamidoamine dendrimers.