Binary Cobalt and Magnesium Hydroxide Catalyst for Oxygen Evolution Reaction in Alkaline Water Electrolysis

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Alkaline water electrolysis has been proposed as an environmentally inoffensive way to supply the anticipated demand for hydrogen gas (H₂) for the prospective hydrogen energy economy. However, in practice, the efficiency of water electrolysis is limited by the large anodic overpotential of the oxygen evolution reaction (OER). Therefore, the development of catalysts having a low overpotential and high activity is required in order to reduce the cost and improve the efficiency of the alkaline OER. Herein, we focused on decreasing the overpotential and increasing the catalyst activity by simultaneous use of synthesized carbon-supported cobalt oxide and magnesium oxide as an electrochemical catalyst for the alkaline OER. The activity of the carbon-supported cobalt and magnesium hydroxide, Co(OH)₂-Mg(OH)₂/C, catalyst was dependent on the pH and metal composition ratio. The highest activity and lowest overpotential were achieved with the catalyst having a Co(OH)₂ to Mg(OH)₂ ratio of 84:16 prepared at pH 9.5.

Keywords: Mg(OH)₂, Co(OH)₂, Oxygen evolution reaction, Alkaline water electrolysis, Carbon

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