An Electrochemical Investigation of the EDTA Influence on the Cobalt-Manganese Electrodeposition in Aqueous Chloride Electrolytes

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After subsequent proper heat treatment, a Co-Mn alloy coating is potentially a protective and conductive coating on ferritic stainless steel interconnects in solid oxide fuel cells. In this paper, we use electrochemical measurements to report the effects of EDTA (disodium ethylenediaminetetraacetate) in a chloride electrolyte on the Co-Mn electrodeposition process. The addition of EDTA to the chloride electrolyte significantly shifts the reduction reaction potential of cobalt in a more negative direction while slightly altering the discharging potential of manganese and most importantly, shortening to a great extent the discharge potential difference between Co^{2+} and Mn^{2+} . Also, it is crucial to control the $[\text{Co}^{2+}]/[\text{EDTA}]$ ratio to form completely complexed cobalt ions and a very small amount of complexed manganese ions, and thus to promote the deposition of the Co-Mn alloy. The addition of EDTA to the chloride electrolyte is a promising way to prepare a Co-Mn alloy coating via electrodeposition.

Keywords: Electrodeposition; Interconnect; Cobalt-manganese; Disodium ethylenediaminetetraacetate; Cyclic voltammetry

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