Dy-doped CoNi Alloy Films Prepared by Electroplating Method

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Dysprosium sulfate was added into the electrolyte to prepare CoNi alloy films by plating technology. The effect of dysprosium doping on electrochemistry process, composition, microstructure and corrosion resistance of CoNi was investigated. It was considered that CoNi alloy films electrodeposition was a kind of anomalous codeposition process. The percentage of cobalt content in CoNi films was higher than that of in the electrolyte. Higher concentration of dysprosium sulfate tended to decrease the cathodic polarization of CoNi electrodeposition resulting in the increase of deposition rate. The cobalt ions discharge was mainly affected by mass diffusion control. The rare earth dysprosium adsorbed on the cathode surface greatly affected the discharge process of cobalt ions to extremely decrease the content of cobalt in the CoNi alloy films. With the increase of dysprosium sulfate concentration in the electrolyte, the diffraction peak intensities of CoNi and cobalt decreased gradually while the surface morphology of CoNi alloy films changed from needle-like to nodular structure. Moreover, CoNi alloy films obtained in the electrolyte with higher dysprosium sulfate concentration possessed smaller grain size and condensed surface morphology that contributed directly to the improvement of anticorrosion performance.

Keywords: CoNi alloy films; dysprosium doping; anticorrosion performance

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