

Electrodeposition of Ni-Based Alloys with an Incorporation of P, Mo and W: An Overview

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Electrodeposited Ni-P, Ni-Mo and Ni-W alloys have been reported in literature as very useful materials for various electronics, automotive, aerospace and other industrial applications. In sophisticated electronics applications these electrodeposited materials are useful as so-called “diffusion barriers”, while in other industrial fields they are very well known as corrosion and wear resistant coatings. Although, the elements such as phosphorous, molybdenum and tungsten cannot be deposited alone from aqueous solutions, they can readily be co-deposited with iron group of metals i.e. Fe, Co and Ni.. This phenomenon was earlier defined by Brenner as an induced co-deposition.

In this work, the experimentally obtained results on Ni-P, Ni-Mo and Ni-W alloys are compared and discussed. The parameters of electrodeposition under the direct current conditions e.g, current density, electrolyte composition, alloying element, temperature etc. is presented.

The effects of the electrodeposition parameters on the properties, such as surface morphology, composition, structure etc. are analyzed. Importantly, effect of the simultaneous hydrogen evolution reaction, as an unavoidable process during the electrodeposition of Ni-P, Ni-Mo and Ni-W alloys, is critically discussed.