

Abstract

Corrosion - a phenomena by which a metal or alloy is degraded or oxidized to its most stable form. Corrosion prevention is an age-old technology but still research is being carried out in this field due to mostly the economic impact and the technical importance. Various methods are available for corrosion prevention and they have found their own commercial applications. Among these various methods electroplating or electrodeposition has established itself as one of the important method to prevent corrosion due to its ease of mass production and adaptability to the environment.

Electrodeposition of Zn metal is one way of obtaining a sacrificial coating, by addition of few noble metals like nickel or cobalt the protective property of these coatings can be increased to a certain extent. In this study an attempt is made to increase the efficiency of the electroplating process by two different agitation processes that is sonication and air agitation.

Experimental results reveal that zinc nickel deposits obtained under sonicated condition has high nickel content when compared to the deposit obtained under air agitated condition. SEM, EDAX, AFM, open circuit potential measurements are the experiments carried out to study the morphological changes induced by the change in mode of agitation.

Sonication of zinc cobalt deposition results in a coating, which is less noble compared to the air agitated coating. At low plating current densities sonication of zinc cobalt deposition leads to a crystalline deposit. AFM results of the zinc nickel deposit obtained under sonicated condition show the deposition of nickel as a separate phase at higher plating current densities. These results prove that the deposition assisted by sonication would become a more viable method of plating. The importance of deposition under sonication would be due to the higher concentration of the nickel at comparatively lower current, in the case of

zinc-nickel alloy deposition. For zinc-cobalt alloy, concentration of cobalt is uniform with variation in plating current densities.

Thin films of multi element metal oxide are grown on mild steel substrate. The film was obtained by spray pyrolysis technique starting materials are zinc nitrate and ferric chloride solution. Thin films were obtained at various temperatures and the changes in the properties of the film with the increase in processing temperature were studied. The film obtained at 400 °C was found to be Zinc Ferrite- a mixed oxide of zinc and iron.