Effcet of Cd on semiconductivity of passive film and corrosion behavior of Zn/Hg Alloy

Mohammad Safi Rahmanifar* and Masoud Kohzadi

Faculty of Basic Sciences, Shahed University, P. O. Box 19575-361, Tehran, Iran
rahmanf_m@yahoo.com, rahmanfm@shahed.ac.ir

Zinc metal is broadly used in industry, but it has low corrosion resistance particularly in acidic media [1-3].Zinc alloy is of great interest owing to improving corrosion resistance properties compare with pure zinc. The electrochemical properties of zinc alloys are of most importance in its production and applications. The electrochemical and corrosion behavior of Zn/Hg and Zn/Hg/Cd alloy in concentrated sulfuric acid medium was investigated by Tafel plot, potentiodynamic and galvanostatic methods at different temperatures. The passive layer was investigated by SEM and energy dispersive X-ray analysis (EDAX). The results shown that, the open-circuit potential (Ecorr) of Zn/Hg/Cd alloy was shifted toward the Negative direction as compared with that in Zn/Hg by 20 mV. The anodic potentiodynamic measurements demonstrated that the polarization curves exhibited active/passive transition.For Zn/Hg/Cd the passive current density was 66 mA cm−2, whereas less than 27 mA cm−2 was detected for Zn/Hg alloy. A small peak of current was found after passivation potential for Zn/Hg/Cd electrode despite of Zn/Hg electrode. The dissolution current in the active potential region increases with increasing electrolyte temperature. EDAX analysis of passive layer of electrodes confirms the presence of Hg-S for Zn/Hg and Hg-Cd for Zn/Hg/Cd samples on the surface of passive electrodes.The passive layer conductance that formed on zinc in sulfuric acid medium is improved by cadmiumcontent of Zn/Hg alloy.

Reference

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