پانزدهمین کنگره شیمی ایران
۱۲-۱۵ شهریور ۱۳۹۰ - دانشگاه بوعلی سینا همدان

Effect of Hg diffusion on Zinc electrochemical behavior

M. Kohzadi[a], M. S. Rahmanifar [*b], M. M. Aghasi[a], A. Karimi[a], Z. Mortazavi[a], H. R. Rashvand[a], S. H. Shekofteh[a]

a- Taban research center Saba Battery Co. Tehran Iran , b- Faculty of Basic Science, Shahed University P.O.Box 19575-361. Tehran.Iran, , rahmanfm@shahed.ac.ir, rahmanf_m@yahoo.com

Diffusion is the process by which atoms move in a material. Many reactions in solids and liquids are diffusion dependent. Structural control in a solid to achieve the optimum properties is also dependent on the rate of diffusion. Atoms are able to move throughout solids because they are not fixed but move rapid, small-amplitude vibrations about their equilibrium position of atoms has sufficient amplitude to move from one atomic position to an adjacent one. The fraction of atoms possessing this amplitude increases markedly with rising temperature [1-2]. In this work, the diffusion of Hg atom in Zinc plate and effect of diffusion condition on Zinc electrochemical properties was investigate. For this propose a Zn surface was modified by means of Hg^{2+} solution and followed by a heat treatment. The depth of Hg diffusion were characterized by Energy-dispersive X-ray spectroscopy (EDAX) and scanning electron microscopy (SEM).The electrochemical properties of Zn-Hg system was studies on concentrated H_2SO_4 solution by means of different electrochemical methods. The results showed temperature has most profound influence on the diffusivity and diffusion rate of Hg in Zn. The electrochemical studies shown the Ecorr of Zn electrode in H_2SO_4solution was increased by Hg diffusion and a passive layer contains Zn, Hg and S was produced on Zn surface in anodic polarization condition.

Reference

[1] H. Mehrer, Diffusion in Solids, Springer, 2007.
[2] D. A. Porter, K. E. Easterling, M. Sherif, Phase Transformations in Metals and Alloys, Third Edition, CRC Press.