Electrochemical Behavior of Zinc-Indium Alloy Electrodes in Concentrated Alkaline Solution

Zhi-lin WANG
Xiao-ge ZHANG
Rong-gui DU
Chang-jian LIN

Recommended Citation
DOI: 10.61558/2993-074X.1843
Available at: https://jelectrochem.xmu.edu.cn/journal/vol13/iss4/10

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王志林1, 章小鸽2, 杜荣归1, 林昌健1*  

1. 电化学工学院, 上海交通大学, 上海 200240; 2. Teck Cominco Metals Ltd.

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Fig. 1 Potentiodynamic anodic polarization curves of the zinc and zinc-indium alloys in 35% KOH solution

(a) potential scan scope: -1.65 to 2.0 V, (b) the local polarization curves at anodic active dissolution at a scan rate 5 mV/s

Fig. 2 Discharging curves of the zinc-indium alloy electrodes with different In content under constant current densities

(a) $i = 200 \text{mA/cm}^2$, (b) $i = 180 \text{mA/cm}^2$
Fig 3 SEM images of the zinc-indium alloys electrodes after discharging for 10 min under constant current density 150 mA/cm².

1) [Zn, In] (0.02% In) 35% KOH 10 min, SEM (i = 150 mA/cm²)

2) [Zn, In] (0.1% In) 35% KOH 10 min, SEM (i = 150 mA/cm²)

3) [Zn, In] (0.5% In) 35% KOH 10 min, SEM (i = 150 mA/cm²)

4) (References)

1) Zhang GX. Corrosion and electrochemistry of zinc [M]. New York: Plenum Publisher, 1996: 36


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WANG Zhi-lin*, ZHANG Xiao-ge, DU Rong-gui

1. State Key Laboratory of Physical Chemistry of Solid Surfaces, Department of Chemistry, Xiamen University, Xiamen 361005, Fujian, China
2. TeckCominco Metals Ltd, Canada

Abstract: The electrochemical behavior of zinc-indium alloy electrodes in 35% KOH solution has been investigated by electrochemical methods including the potentiodynamic polarization and discharge measurements under constant current density. The results indicate that the anodic current density and passive current density increase after the indium addition. The discharge measurement shows that the addition of indium shortens the time to passive state for the Zn alloy compared to pure zinc at a large discharge conditions, that is the addition of indium may enhance the electrochemical activity of Zn alloy electrodes. It is found that the anodic dissolution of zinc-indium alloy electrodes in the concentrated KOH solution occurs along the certain crystalline face, and the surface roughness increases with the increasing of indium addition due to the anodic dissolution. 

Keywords: zinc electrode; zinc-indium alloys; anodic activity; passivation