Effect of Alloys and Coatings on the Electrochemical and Corrosion Properties of Zn Anodes in Zn-Air Batteries

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The metal-air battery is one of the most promising battery technologies. A Zn-air battery can deliver highest specific energy among the various metal-air batteries which can be recharged in aqueous solution. In addition, Zn is widely used as active materials because of its various advantages. It is environmentally benign, cheap, easy to handle, stable in aqueous solution, and has a good electrochemical equivalence of 820 Ah/kg. Also, Zn is safer than Li and can be fully recycled.

The Zn anodes in Zn-air batteries suffer from dendrite formation, shape change, corrosion, and hydrogen evolution reaction (HER). The dendrite formation and shape change can be solved by mechanical replacement or hydraulic recharging system. However, corrosion and HER which lead to self-discharge of the Zn-air batteries are more critical issues because the Zn-air batteries involve aqueous electrolyte.

In this study, we have tried to find alloys and coatings for suppressing corrosion, HER as well as self-discharge. So as to characterize the behaviors of attempted materials, X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM), field emission scanning transmission electron microscopy (FE-TEM), electrochemical storage, gas evolution, and Tafel extrapolation methods have been carried out.

References:

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