High Performance of Monosaccharide Coated Zn Anodes as Bifunctional Corrosion Inhibitors for Zn-Air Batteries

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Recently, metal-air batteries have been studied as a promising energy source, because their energy density is significantly high compared with the other rechargeable batteries. Among metal-air batteries, Zn-air batteries have been attracted due to their advantages such as a high energy density up to 1084 Wh kg^{-1}, cost effectiveness, environmental friendliness, and safety. In addition, it is abundant in the earth and this battery can be handled safely because it uses an aqueous solution as an electrolyte. With those advantages, Zn-air batteries have been commonly used as a primary metal-air batteries. Furthermore, mechanically and electrically rechargeable Zn-air batteries are already proposed.

Despite the high potential of Zn-air batteries, they have a serious degradation behavior due to a corrosion reaction of Zn anode which is defined as a self-discharge reaction. In addition, Zn has a more negative reduction potential than hydrogen, which consequently leads to a hydrogen evolution reaction (HER) on the surface of Zn.

In this study, to suppress the degradation behavior and enhance the discharge performance, we have adopted a monosaccharide as a coating material for Zn-air batteries. The structural and morphological properties of as-prepared materials are characterized by X-ray diffraction (XRD) and field emission transmission electron microscopy (FE-TEM). Also, to measure the self-discharge behaviors, as-prepared materials are characterized immediately after making the single cell and after being stored at room temperature for 24 h.

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