

Title : Development of Anode from Zinc Powder with PVA binder for Using in Solid-State Zinc-air Batteries

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ABSTRACT

An anode for solid-state zinc-air batteries was developed using zinc powder and a polyvinyl alcohol (PVA) binder. Different weight ratios of zinc powder to binder were investigated including 1:0.2, 1:0.1, 1:0.05, and 1:0.025, while keeping the zinc powder constant at 40 grams. The binder was prepared using 10 wt% PVA and 25 vol% glutaraldehyde (GA) as a crosslinking reagent in a ratio of 6:1. After pressing under a compression force of 3000 psi for 10 minutes. The anode performance of the solid-state metal-air battery was tested in a single cell metal-air battery. The battery cell consisted of an anode (zinc powder mixed with PVA binder) and a cathode (oxygen from the air), with a stainless-steel grid as a current conductor, A PVA/PVP blend in a mass ratio of 1:0.5, cross-linked with glutaraldehyde, was immersed in a 7.0 M aqueous KOH solution as a solid electrolyte. Manganese oxide coated on the GDL plate as a catalyst. The battery was discharged at a current density of 2 mA/cm². The experimental results showed that the open-circuit voltage (OCV) of the battery was approximately 1.35 V, and the specific capacity of the battery was around 824.85 mAh/g, calculated based on the theoretical zinc loss. This indicates that the binder quantity had no significant effect on the specific capacity of the battery.