

A Flexible High Energy Density Zn-Air Battery by Screen Printing Technique

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Abstract : This work investigates the development of a high energy density zinc-air battery. Printed and flexible thin film zinc-air battery with an overall thickness of about 350 μm was fabricated by an inexpensive screen-printing technique. Commercial nano-silver ink was used as both current collectors and catalyst layer. Carbon black ink was used to fabricate cathode electrode. Polypropylene membrane was used as the cathode substrate and separator. 9 M KOH was used as the electrolyte. A mixture of Zn powder, ZnO, and Bi₂O₃ was used to prepare the anode electrode. The suitable concentration of Bi₂O₃ and types of binders (styrene-butadiene and sodium silicate) were investigated. Results showed that battery using 20% Bi₂O₃ and sodium silicate binder provided the best performance. The open-circuit voltage and energy density observed were 1.59 V and 690 Wh/kg, respectively. When the battery was discharged at 20 mA/cm², the potential voltage observed was 1.3 V. Furthermore, the battery was tested for its flexibility. Upon bending, no significant loss in performance was observed.

Keywords : flexible, printed battery, screen printing, Zn-air

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