

Thin and Flexible Zn-Air Battery by Inexpensive Screen Printing Technique

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Abstract : This work focuses the development of thin and flexible zinc-air battery. The battery with an overall thickness of about 300 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 and ZnO was used to prepare the anode electrode. Types of conductive materials (Bi_2O_3 , $\text{Na}_2\text{O}_3\text{Si}$ and carbon black) for the anode and its concentration were investigated. Results showed that the battery using 29% carbon black showed the best performance. The open-circuit voltage and energy density observed were 1.6 V and 694 Wh/kg, respectively. When the battery was discharged at 10 mA/cm², the potential voltage observed was 1.35 V. Furthermore, the battery was tested for its flexibility. Upon bending, no significant loss in performance was observed.

Keywords : flexible, Gel Electrolyte, screen printing, thin battery, Zn-Air battery

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