Supplementary Material (ESI) for Energy & Environmental Science

Supporting Information

A novel direct borohydride fuel cell using acid-alkaline hybrid electrolyte

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Experiment Section:

0.5 cm^2 Znic electrode for BH_4^- oxidation was directly cut from a Zn foil. The Pt/ activated carbon composite for H_2O_2 catalytic reduction was prepared by heat treatment of the mixture of ($PtCl_4H_2$) and activated carbon power under Ar/H_2 atmosphere at 400 ^oC. The weight % of Pt within the prepared composite is about 15%. The Pt-based catalyst electrode was prepared as follows: the prepared Pt/ activated carbon composite and polytetrafluoroethylene (PTFE) emulsion was well mixed in a weight ratio of 85:15 (AC: PTFE). Then the mixture was roller-pressed into a sheet. Finally, the sheet was pressed onto a titanium mesh to form a catalytic electrode.

A lithium super-ionic conductor film (LISICON), provided by Ohara Company (Japan), was used to separate anode and cathode compartments of the single DBFC using Zn as the anode materials and Pt as the cathode materials (electrode geometric areas of $\approx$ 0.5 cm^2). The structure or the prepared DBPFC was schematically shown in Fig. 1. The anolyte was a 5 mL alkaline 0.5 M $NaBH_4$ + 2M LiOH + 3M $LiNO_3$ solution, and the catholyte contained 5 mL of a volumetric mix in a ration of 1:2 of H_2O_2(35%) and 1 M HCl.

Cell performance test evaluation tests were conducted at room temperature using Solartron Instrument Model 1287 controlled by a computer.

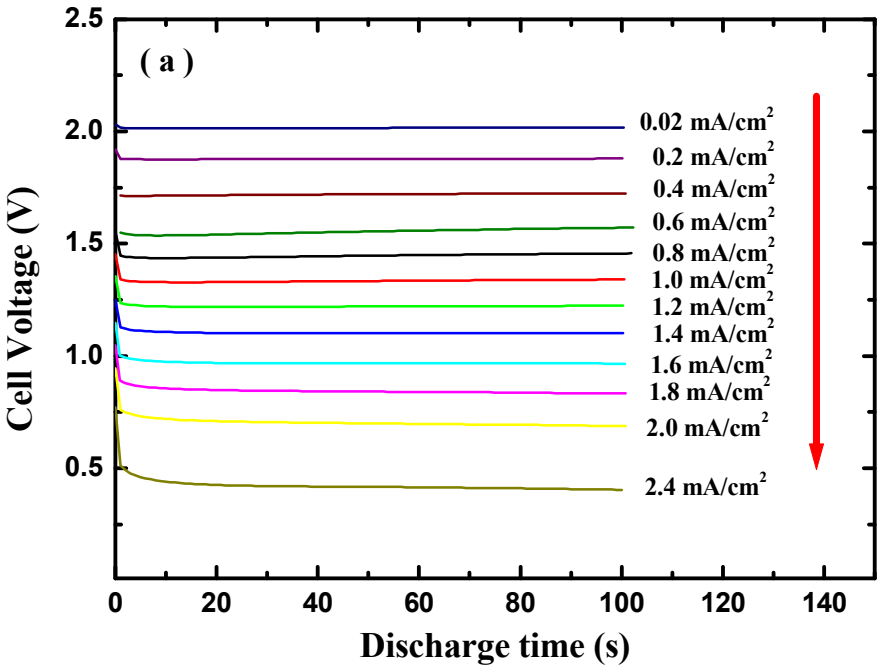

Fig. S1 Discharge curve of the prepared DBPFC at different current densities.