

## A low-cost, high-performance, high-durability fuel cell

**Liang An**

The Hong Kong Polytechnic University, Hong Kong

**I**n this work, we propose to create the cathode potential by introducing a redox couple to the cathode while to use hydrogen peroxide to chemically charge to redox ions, as illustrated. The introduction of the redox couple to the cathode brings the following striking features. First, the absence of hydrogen peroxide in the reduction reaction eliminates the mixed-potential issue. Second, the presence of the redox couple in the reduction reaction significantly improves the electrochemical

kinetics, thereby resulting in a high-performance fuel cell. Lastly, the use of the catalyst-free carbon materials for the reduction reaction makes this fuel cell system more cost-effective. It has been demonstrated that the fuel cell running on ethanol with a redox couple of V (IV)/V(V) yields a peak power density of 450 mW cm<sup>-2</sup> at 60°C, which is 87.5% higher than that of the conventional cell with direct reduction of hydrogen peroxide.

liang.an@polyu.edu.hk