MIXED METAL PHTHALOCYANINE-MODIFIED CARBON NANOTUBES AS BIFUNCTIONAL OXYGEN ELECTROCATALYSTS

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The development of effective bifunctional oxygen electrocatalysts is crucial for improving the performance of sustainable devices. From this aspect, mixed MN_4-type catalysts are good choice.[1,2] Thus, the aim of this study was to develop bifunctional oxygen electrocatalysts using mixed metal (FeNi; FeMn; FeCo) phthalocyanine-modified multi-walled carbon nanotubes (MWCNT) by simple pyrolysis method. The physico-chemical properties of the catalysts were examined with scanning electron microscopy, X-ray diffraction, and X-ray photoelectron spectroscopy.

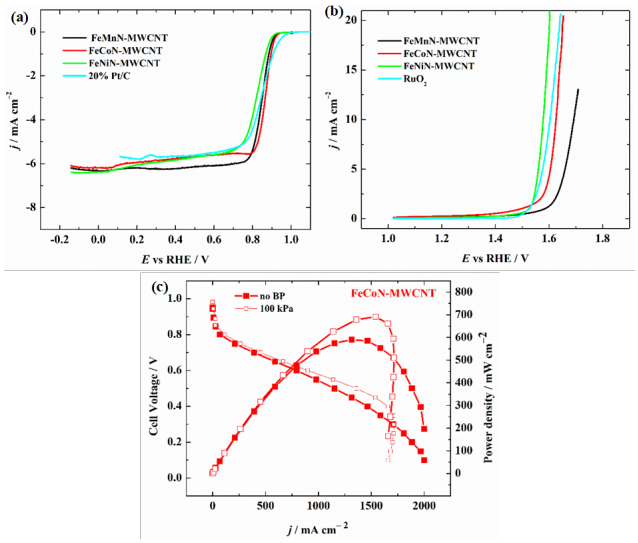

Fig. 1 (a) ORR polarization curves (ω=1900 rpm), (b) OER polarization curves (v=10 mV s^{-1}) of various electrocatalysts recorded in O_2-saturated 0.1 M KOH and (c) H_2-O_2 AEMFC results using FeCoN-MWCNT as cathode.

Amongst the prepared electrocatalysts, FeCoN-MWCNT catalyst showed superior oxygen reduction reaction (ORR) activity (Fig. 1a) with the E_{onset} of 0.93 V and FeNiN-MWCNT catalyst exhibited excellent oxygen evolution reaction (OER) performance (Fig. 1b) with E_{OER} of 1.58 V. In addition, FeCoN-MWCNT was tested in anion-exchange membrane fuel cells (AEMFCs) as cathode material and the peak power density as high as 692 mW cm^{-2} was achieved (Fig. 1c) indicating a great promise of these catalyst materials.

References

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