

Metallo-Octa-Carboxy-Phthalocyanine Coordination Polymers as Efficient Oxygen Evolution Reaction (OER) Electrocatalysts.

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Highlights

Carboxy-phthalocyanine based amorphous coordination polymers; Building-blocks united by first row transition metal ion; Efficient and stable OER electrocatalysts.

Resumo/Abstract

Oxygen evolution reaction (OER) stands as a key challenge for the realization of sustainable energy conversion and storage technologies such as fuel cells and water-splitting. Based on the attractive properties of metalated phthalocyanines (Pc) and coordination polymers (CP), especially of first row transition metal elements in electrocatalysis, noble-metal-free CPs based on iron and cobalt octa-carboxy-phthalocyanines (FeOCPc and CoOCPc) were prepared by bridging them with first row transition metal ions (Fe^{2+} , Co^{2+} and Ni^{2+}). The materials were characterized through FT-IR, WAXS and EDX. The enhanced electrocatalytic activity of these amorphous materials was demonstrated by voltammetric techniques, in 1.0 mol L⁻¹ KOH electrolyte solution. FeOCPc-Ni was the one with the lowest overpotential at 10 mA cm⁻² (299 mV) and Tafel slope (46.4 mV dec⁻¹) among them, whilst also exhibiting stability throughout 15 h of experiment at current density of 10 mA cm⁻². Therefore, showing a promising capability as OER electrocatalyst.

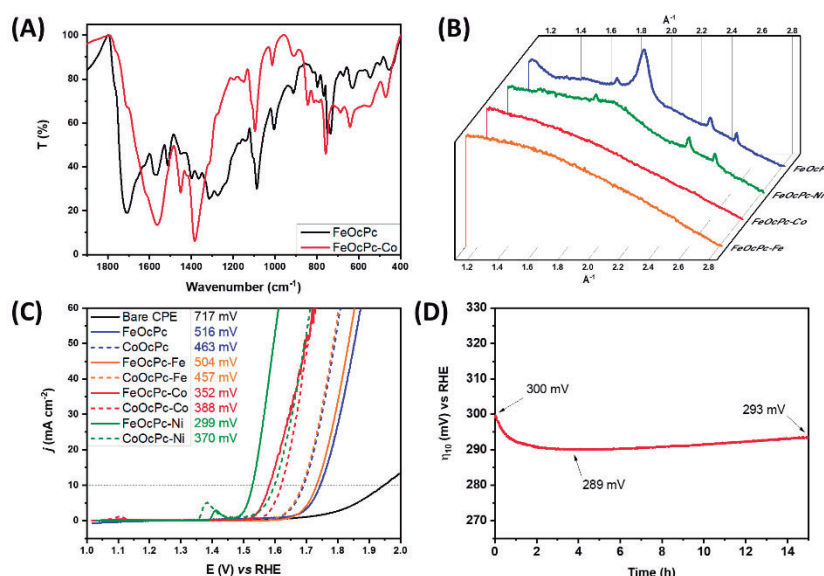


Fig 1: (A) Comparative FT-IR of FeOCPc and FeOCPc-Co CP; (B) Comparative WAXS of FeOCPc and this respective FeOCPc-M_b CPs; (C) LSV of M_aOCPc and M_aOCPc-M_b loaded on carbon past electrode (CPE); (D) 15 h chronopotentiometry at $j = 10 \text{ mA cm}^{-2}$ with FeOCPc-Ni CP.

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