

Cobalt phosphinates as precursors of cobalt phosphide electrocatalysts

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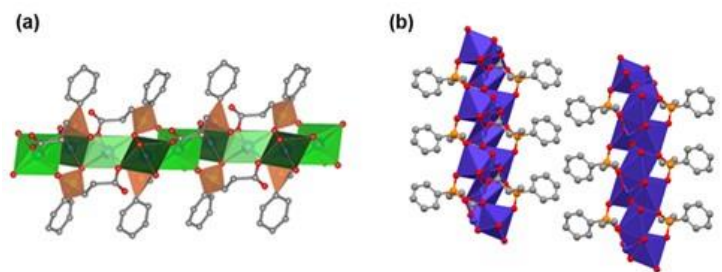
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The scarcity and high cost of Pt and Ru/Ir-based noble metal electrocatalysts forces to design alternative low-cost and efficient materials for sustainable energy storage and conversion technologies [1]. Among them, phosphorus-containing coordination polymers, such as phosphinates, have emerged as potential precursors of transition-metal phosphide (TMP) electrocatalysts [2]. The possibility of incorporating two functionalized organic moieties into the phosphinate ligands makes metal phosphinates highly attractive precursors to obtain core-shell carbon/TMP electrocatalysts.

In this research-work, we report the synthesis and crystal structure of two Co²⁺-phosphinates derived from the (2-carboxyethyl)(phenyl)phosphinic acid (CEPPA), Co₂[(O₂P(CH₂CH₂COO)(C₆H₅)(H₂O)]₂·2H₂O (**CoCEPPA-1D**) and Co₃[O₂P(CH₂CH₂COO)(C₆H₅)₂(OH)]₂ (**CoCEPPA-2D**), synthesized by microwave-assisted method [3]. These solids were used as precursor of cobalt phosphides (Co₂P/CoP) by thermal reduction under 5%H₂-Ar atmosphere at different temperatures and their electrocatalytic performances were investigated toward Oxygen Evolution Reaction (OER), Oxygen Reduction Reaction (ORR) and Hydrogen Evolution Reaction (HER). The relationship between Co/P molar ratios and/or the Co²⁺ coordination environment in the precursor structures and the electrocatalytic activity of the prepared cobalt phosphides will be discussed.



(a) 1D arrangement of **CoCEPPA-1D**, with the chains running along the *c*-axis. (b) Layered structure of **CoCEPPA-2D** viewed along *b* axis

Referencias

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