Researchers use 2D bimetallic MOFs to create Se-containing electrocatalysts for overall water splitting

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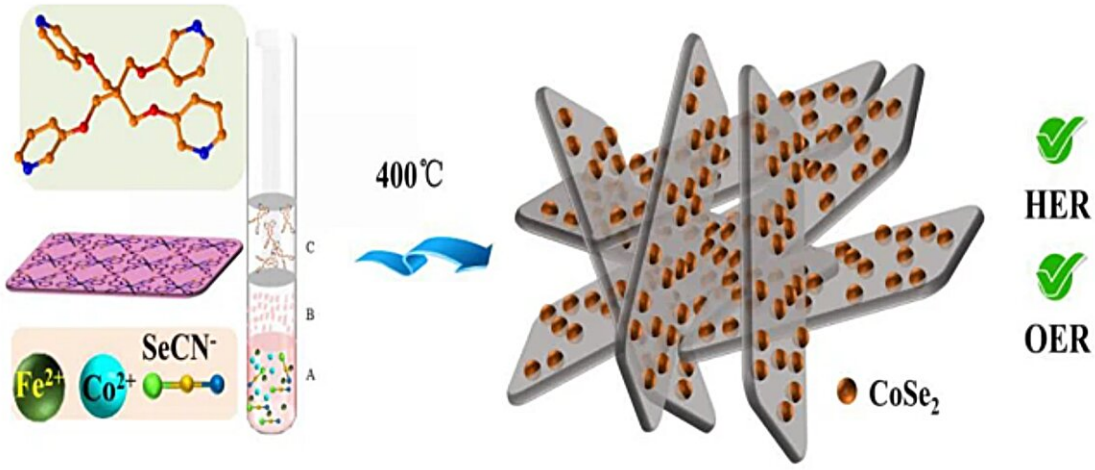

By utilizing the 2D-MOF as self-sacrificial template selenium-containing materials had been produced via simple method, which exhibits the efficient activity for overall water splitting. Credit: Higher Education Press

Transition metal selenides have been considered to be a good choice for electrocatalytic water splitting. In addition, Metal-organic frameworks (MOFs) have been used to make catalysts with good electrocatalytic capabilities. Traditionally, the MOF-derived selenides are produced via the self-sacrificing MOF template methods. However, this strategy is high-energy consuming, and it is difficult to precisely control the

structure and component homogeneity of the product during pyrolysis.

A research group including Wang-ting Lu, Fan Yu, and Yun Zheng from Jianghan University and Fuzhou University used two-dimensional (2D) layered MOFs as self-sacrificial templates to create high-efficiency Selenium (Se)-containing electrocatalysts for overall water splitting. The study is published in the journal *Frontiers in Energy*.

They adopted two strategies to introduce Se element into the Co–Fe MOF, one being the etching of as-prepared MOF by SeO_2 solution and the other, the replacing of SCN^- with $SeCN^-$ as the construction unit. The electrochemical activity of Se-containing electrocatalysts for catalyzing the hydrogen evolution reaction (HER) and oxygen evolution reaction (OER) is evaluated and further discussed.

It is found that both two Se introducing approaches can obviously improve the HER performance during overall water splitting. The high electrochemical performance may have resulted from the unique 2D hierarchical porous structure and strong synergistic effect between different components in the material.

This work reveals that the rational design of layered MOFs with S- or Se-containing linkers as water splitting catalysts is a feasible option for the development of economical and low-energy-consuming electrocatalysts. In addition, it provides an innovative approach for the synthesis of MOF-based metallic selenides.

More information: Zhao-ting Shang et al, Two-dimensional bimetallic selenium-containing metal-organic frameworks and their calcinated derivatives as electrocatalysts for overall water splitting, *Frontiers in Energy* (2024). DOI: 10.1007/s11708-024-0924-x

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