MOF-Derived $CoSe_2$ Microspheres with Hollow Interiors as High-Performance Electrocatalysts for Enhanced Oxygen Evolution Reaction

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Electrocatalytic water splitting has been recognized to be one of the most promising routes to acquire hydrogen. However, the high-efficiency water splitting is limited by the sluggish kinetics of anodic oxygen evolution reaction (OER). Metal-organic frameworks (MOFs) have been extensively utilized as the precursors to synthesize high-performance electrocatalysts. Herein, a facile template-engaged strategy is adopted to fabricate hollow microspheres derived from Co-MOF. After thermally induced selenylation process under argon atmosphere, Co-MOF is successfully converted into $CoSe_2$ microspheres at different temperatures (**Figure 1a**). The optimized $CoSe_2$-450 microspheres display excellent OER electrocatalytic performance in 1.0 M KOH aqueous solution, exhibiting 10 mA cm^{-2} at η = 330 mV with small Tafel slope of 79 mV dec^{-1}, even superior to the commercial IrO_2 catalyst (**Figure 1b** and **1c**). Moreover, $CoSe_2$-450 shows excellent durability without obvious decay after 1000 cyclic voltammetry cycles. This is owing to the hollow interior of $CoSe_2$ microspheres and well-distributed active sites, which can effectively offer a space for fast mass transport and electron transfer. Our works not only provide a facile method of constructing electrocatalysts derived from hollow MOFs, but also enrich the noble metal-free electrocatalyst species for producing sustainable energy.[1]

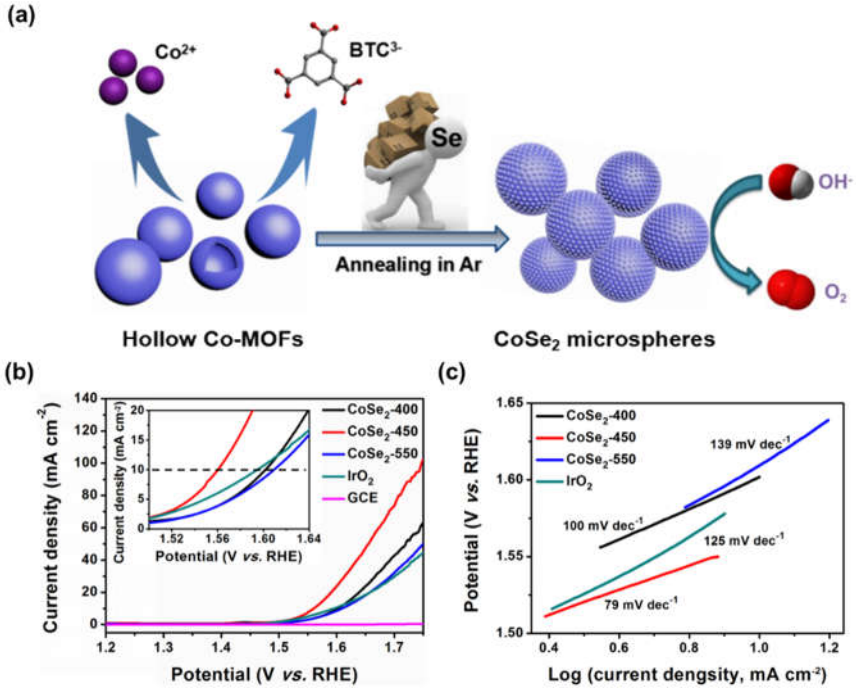

Figure 1. (a) Schematic illustration of the synthetic strategy of the $CoSe_2$ microspheres. (b) Polarization curves of $CoSe_2$-400, $CoSe_2$-450, $CoSe_2$-550, IrO_2 and GCE in 1.0 M KOH solution. (c) Tafel plots of $CoSe_2$-400, $CoSe_2$-450, $CoSe_2$-550 and IrO_2.

References:

[1] X. B. Liu, Y. C. Liu and L. Z. Fan, J. Mater. Chem. A, 2017, 5, 15310-15314.