Supplementary Material for

**Two-Dimensional Metal-Organic Framework Nanosheets as Bifunctional Catalyst for Electrochemical and Photoelectrochemical Water Oxidation**

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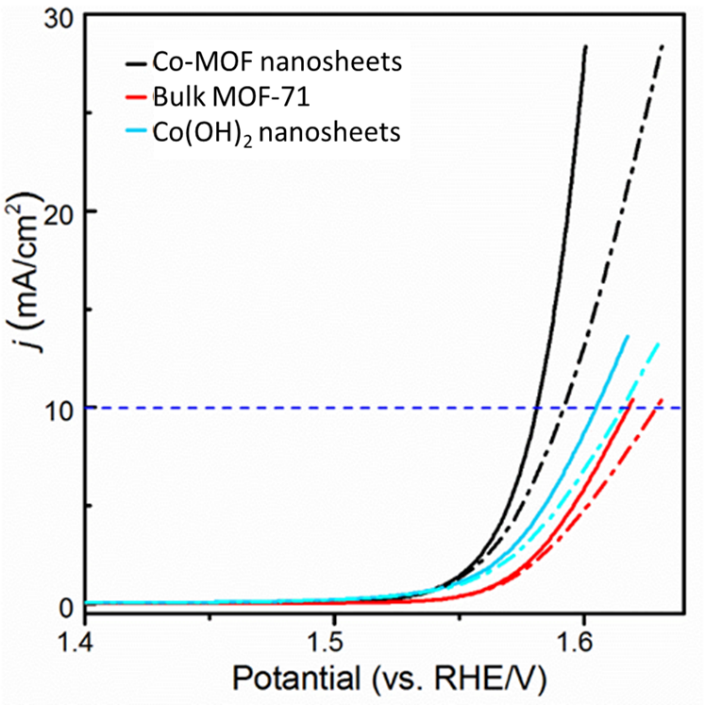
**Figure S1 (A, B)** TEM images of Co-MOF nanosheets, and **(C)** digital photograph of the Tyndall effect for Co-MOF nanosheets colloid suspension in isopropanol.

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**Figure S2** TEM images of bulk MOF-71.

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**Figure S3** FTIR spectrum of terephthalic acid powder.



**Figure S4** Electrochemical measurements of Co-MOF nanosheets, bulk MOF-71 and Co(OH)2 nanosheets, with (solid line) and without (dashed line) iR-correction.

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**Figure S5** TEM images of the prepared Co(OH)2 nanosheets.

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**Figure S6** XRD of the prepared Co(OH)2 nanosheets.

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**Figure S7** FTIR spectrum of the as-synthesized Co(OH)2 nanosheets.

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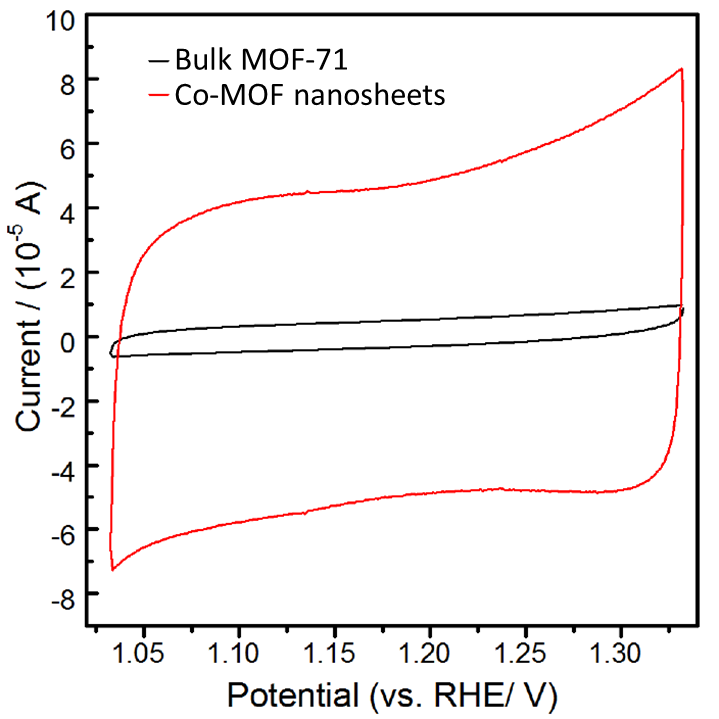
**Figure S8** Electrochemical measurements of the Co-MOF nanosheets: iR-corrected (Red) and uncorrected (Black) LSV plots.

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**Figure S9** Electrochemical measurements of the bulk MOF-71: iR-corrected (Red) and uncorrected (Black) LSV plots.

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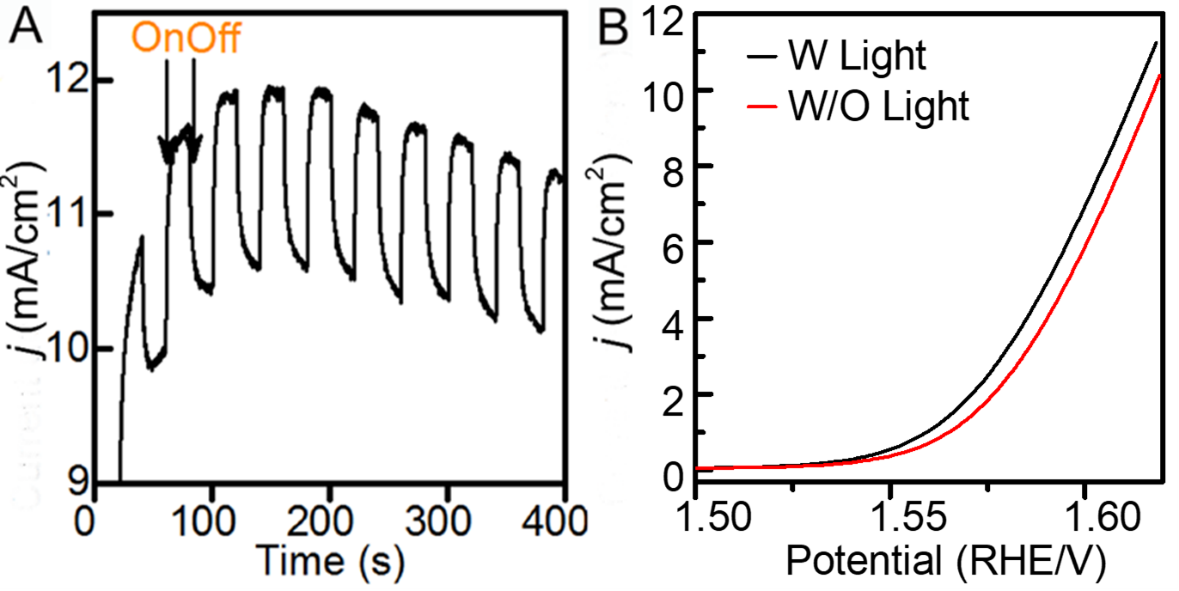
**Figure S10** Electrochemical measurements of the Co(OH)2 nanosheets: iR-corrected (Red) and uncorrected (Black) LSV plots.

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**Figure S11** Cyclic voltammetry (CV) measurements of Co-MOF nanosheets (Red) and bulk MOF-71 (Black).

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**Figure S12** Electrochemical measurements of the Co-MOF nanosheets:iR-correctedLSVplotswith and without light illumination.

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**Figure S13** Electrochemical measurements of the bulk MOF-71: **(A)** potentiostatic current response at E= 1.532 V and **(B)** iR-corrected LSVplotswith and without light illumination.



**Figure S14** Characterization of bulk MOF-71, UV-Vis absorption **(A)**, Mott-Schottky plot **(B)**, and Energy band alignment **(C)**.

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**Figure S15** Durability testof the Co-MOF nanosheets at 352 mV overpotential: current density and current density retention as function of time.

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**Figure S16** Electrochemical measurements of the Co-MOF nanosheets: Nyquist plot before and after durability test at 352 mV overpotential.

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**Figure S17** Characterizations of the tested Co-MOF nanosheets: **(A, B)** TEM of the Co-MOF nanosheets after at 302 mV overpotential for 8,000 seconds, and **(C, D)** TEM of the Co-MOF nanosheets after at 352 mV overpotential for 8,000 seconds.

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**Figure S18** Durability testof the Co-MOF nanosheets at 302 mV overpotential: current density and current density retention as function of time.

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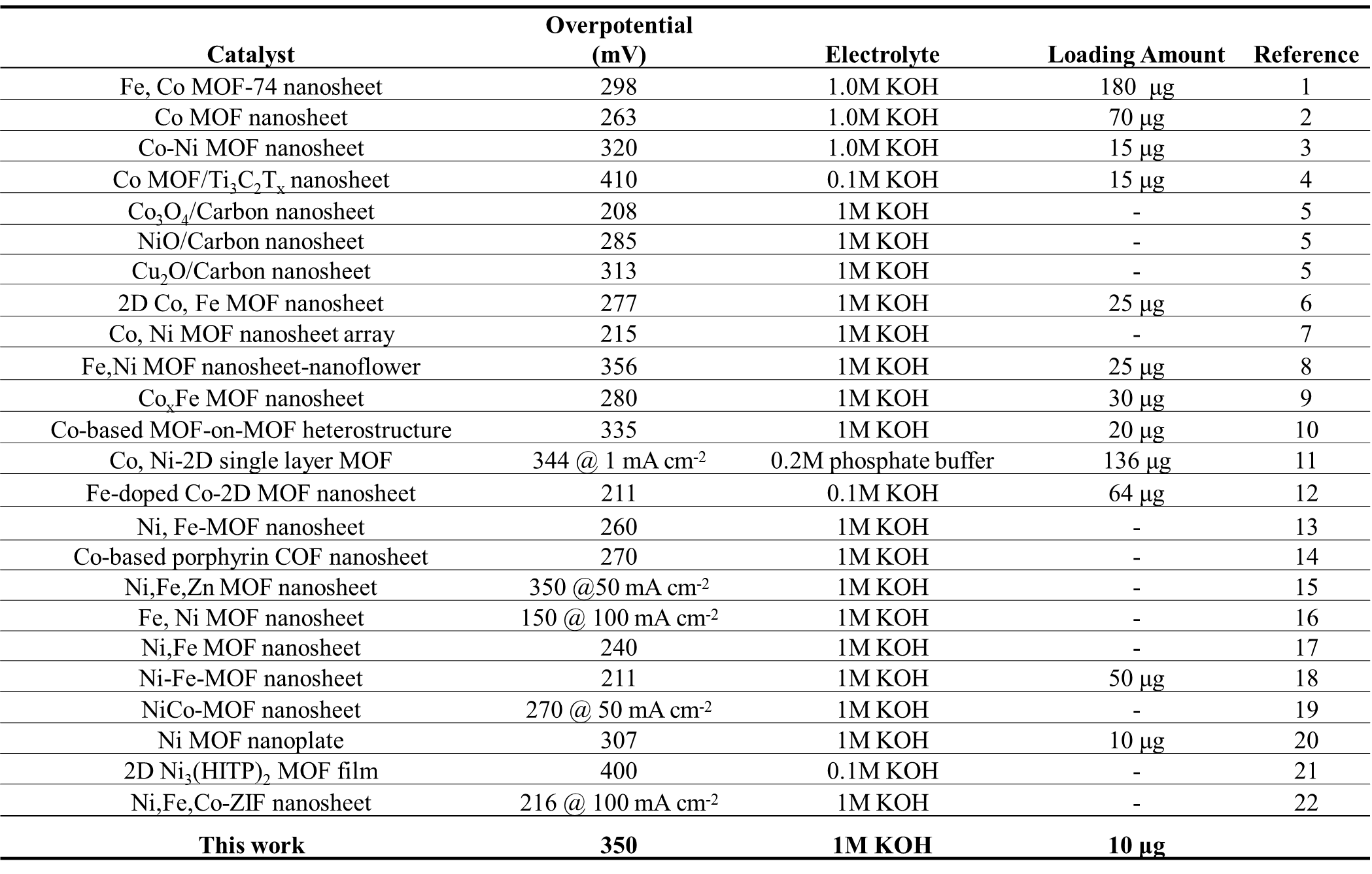
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**Figure S19** Electrochemical measurements of the Co-MOF nanosheets: **(A)** iR-corrected LSV plots and **(B)** Nyquist plots before and after durability test at overpotential 302 mV.



**Figure S20** Electrochemical measurements of the Co-MOF nanosheeets after stability test:potentiostatic current response at E= 1.532 V with and without light illumination.

**Table S1** Summary of OER electrocatalytic activity from recently reported 2D MOF nanosheets and MOF-derived materials.



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