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We are pleased to inform you that the following paper has been officially accepted for publication in *Chemical Synthesis*:

Manuscript ID: CS-2024-123
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Title: Oxygen coverage effect promotes oxygen evolution reaction
Authors: Haoyang Lin; Pengfei Liu; Huagui Yang
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Chemical Synthesis

Research Highlight

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Oxygen coverage effect promotes oxygen evolution reaction

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Green hydrogen production powered by water electrolysis stands as a promising technology for renewable energy transition and storage. However, oxygen evolution reaction (OER) with sluggish multi-electron-transferred process has limited the overall efficiency of water splitting. For iridium-based benchmark materials, understanding the intrinsic water oxidation kinetics and realizing accurate activity descriptors are key factors to help design better electrocatalysts for practical application of water electrolysis.

Recently reported in *Nature Catalysis*, through clever analysis of the absorption spectra in *operando* time-resolved ultraviolet-visible (UV-vis) spectroscopy, Liang *et al.* have quantified the active site density and oxygen binding strengths on different iridium oxides, unveiling the effect of adsorbate-adsorbate interactions on O–O bond formation[1]. Previously, for rational design of OER catalysts, oxygen adsorption energy (ΔG_{*O}) was first introduced by Rossmeisl and Nørskov *et al.* to describe the OER activity[2,3], and the standard free energy change $\Delta G^{\circ}_{*O} - \Delta G^{\circ}_{*OH}$ was universally applied as the activity descriptor with a volcano-type relationship[4-6]. In this work, besides the conventional binding energetics of $\Delta G^{\circ}_{*O} - \Delta G^{\circ}_{*OH}$, an additional oxygen coverage effect showed how the interactions between adsorbates can control the OER kinetics [Figure 1A]. A clever modification of the conventional activity descriptor was made, as shown in the improved three-dimensional volcano plot [Figure 1B]. Accordingly, the previous descriptor ΔG°_{*O} -