STRUCTURE-ACTIVITY RELATIONSHIP IN COBALT POLYPYRIDYL WATER REDUCING CATALYSTS – THE QUEST FOR REDUCED OVERPOTENTIALS

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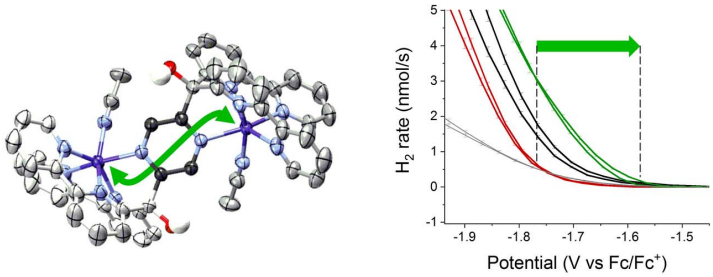
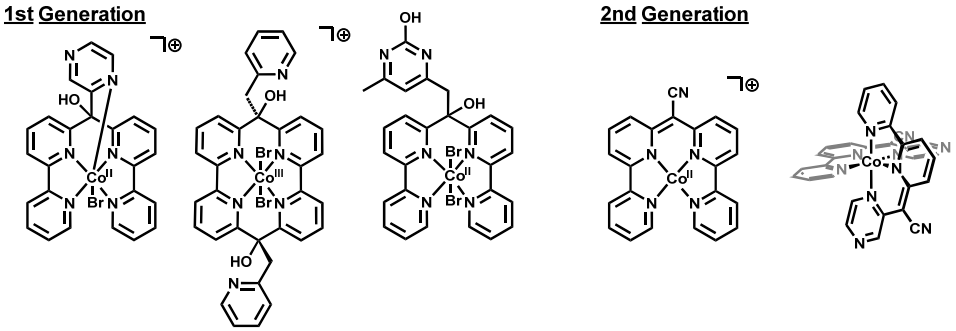
In photocatalytic water reduction, cobalt polypyridyl catalysts are appreciated for their stabilities.[1] Their performances are limited by relatively high overpotentials, making them less energetically efficient.[2] Exploring ways to shift the catalytic onset potential anodically is therefore of great interest and the key focus of our research. Potential paths towards more efficient catalysts are dinuclear complexes, facilitating the intramolecular cooperation of the metal centers. These interactions open up new mechanistic pathways and eventually allow the production of dihydrogen at less cathodic potentials.[3]



Electronic Co-Co interaction leads to reduced onset potential.

The assumption has always been that modifications in the coordination sphere of the catalyst impact the catalytic performance. Consequently, our group has built a large library of Co(II) and Co(III) catalysts with di-bipyridine binding motives. Functionalizations were carried out at the bridging carbon. We will present new results in electrochemical analysis such as CV, LSV and chronoamperomentry, which suggest that modifications at this site do not influence overpotential significantly. Consequentially, we now focus on the broadening of our ligand scope and the introduction of electron-poor moieties like pyrazine in the first coordination sphere of the catalysts.



[1] N. Queyriaux, R. T. Jane, J. Massin, V. Artero, M. Chavarot-Kerlidou, *Coord. Chem. Rev.* **2015**, *304–305*, 3–19.

[2] S. Schnidrig, C. Bachmann, P. Müller, N. Weder, B. Spingler, E. Joliat-Wick, M. Mosberger, J. Windisch, R. Alberto, B. Probst, *ChemSusChem* **2017**, *10*, 4570–4580.

[3] N. Weder, N. S. Grundmann, B. Probst, O. Blacque, R. Ketkaew, F. Creazzo, S. Luber, R. Alberto, *ChemSusChem* **2022**, *15*, DOI 10.1002/cssc.202201049.