



Dr. Orestes Rivada-Wheelaghan

Orestes (born 1985 in Seville, Spain), obtained his BSc in Chemistry at the University of Oviedo and received his MSc and PhD degree in inorganic chemistry at the University of Seville in Spain, under the supervision of Dr. Salvador Conejero. After two years working as a post-doctoral researcher with Prof. David Milstein at the Weizmann Institute of Science (Israel), developing iron-based green homogeneous catalysis. Orestes moved to the Okinawa Institute of Science and Technology (Japan) as a JSPS Fellow where he designed and developed multimetallic complexes to study meta-metal cooperation. Between 2019 and 2022, Orestes worked as a Junior Make Our Planet Great Again Laureate at the Laboratoire d'Electrochimie Moleculaire (Université Paris Cité) in collaboration with the renowned group in molecular electrochemistry and electrocatalysis REACTE, led by Prof. M. Robert. This position allowed him to build an electrochemical/organometallic lab from scratch and start his own team while learning the theoretical and experimental techniques used in molecular electrochemistry. From March 2022, Orestes has established his research team at the Instituto de Investigaciones Químicas (IIQ) at Universidad de Sevilla (Spain). His interest spans from organometallic chemistry to molecular electrocatalysis, including different modes of cooperative molecular activation and its use in energy storage application.

Molecular Tools in Electrochemical Carbon Dioxide Reduction.

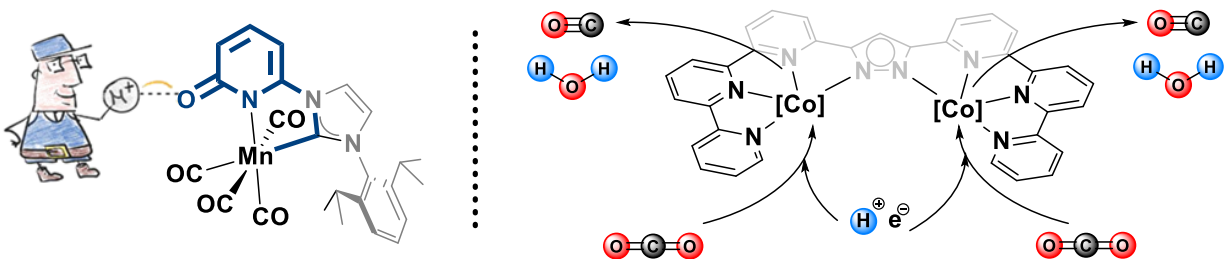
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Molecular electrocatalysts have received a renewed interest due to their capabilities towards sustainable and energy-efficient redox chemical transformations,¹ in particular, those involved in new strategies towards energy storage application.^{1a, 2} In this presentation, different new approaches towards Electrochemical Carbon Dioxide Reduction Reaction (eCO₂RR) towards carbon-based fuels transformation will be shown.³ First, the correlation of remote interactions between a molecular Mn^I-complex bearing a bioinspired ligand and different alkali cations with redox potential tuning, including its impact towards eCO₂RR is shown.^{3a} Next, the formation and characterization of a dinuclear cobalt complex that electrocatalytically reduces carbon dioxide to carbon monoxide in the presence of Brønsted acids will be discussed. Chemical, electrochemical and spectro-electrochemical studies indicate a paired redox behavior of the cobalt centers. Electrocatalytic studies revealed up to 94 % selectivity towards CO formation when 1.47 M trifluoroethanol were present, at -1.35 V vs Saturated Calomel Electrode in DMF (0.39 V overpotential).^{3b}



References

- (1) a) N. W. Kinzel, C. Werlé, W. Leitner, *Angew. Chem. Int. Ed.* **2021**, *60*, 11628–11686; b) N. Wolff, O. Rivada - Wheelaghan, D. Tocqueville, *ChemElectroChem* **2021**, *8*, 4019–4027.
- (2) a) T. R. Cook, D. K. Dogutan, S. Y. Reece, Y. Surendranath, T. S. Teets, D. G. Nocera, *Chem. Rev.* **2010**, *110*, 6474–6502.
- (3) a) A. Srinivasan, J. Campos, N. Giraud, M. Robert, O. Rivada–Wheelaghan, *Dalton Trans.* **2020**, *49*, 16623–16626; b) A. Bohn, J. J. Moreno, P. Thuéry, M. Robert, O. Rivada-Wheelaghan, **2022** 10.1002/chem.202202361.