

UniSysCat - Colloquium

Dr. Maxie Rößler

Imperial College London, Department of Chemistry and Centre for Pulse EPR Spectroscopy

Start Time: Wednesday, July 19, 2023 05:15 pm

End Time: Wednesday, July 19, 2023 06:30 pm

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or via Zoom

Mechanistic insights into bio- and electrocatalytic reactions from EPR spectroscopy.

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Unpaired electrons play an important role in numerous redox-driven catalytic processes. Controlling their location and exploiting the interactions with their environment can provide key mechanistic information into these catalytic reactions. In this talk I will discuss how we are exploiting and developing EPR-based techniques in conjunction with biochemistry, electrochemistry and materials chemistry to gain mechanistic insights into metalloenzymes¹ and electrocatalysts.

I will discuss some insights that pulse EPR has brought to understanding how complex membrane proteins, respiratory complex I and its homologue in photosynthesis,² function. I will further show ongoing work that considers the importance of the membrane.³

I will then introduce film-electrochemical EPR spectroscopy (FE-EPR)⁴ as a new tool to investigate surface-bound molecular catalysts. With *in situ* and *operando* FE-EPR we can monitor the evolution of radicals during catalysis in real time, providing a novel way to benchmark such electrocatalysts. Our current work is focussed on extending FE-EPR to metalloenzymes.

1. K. H. Richardson, M. Seif-Eddine, A. Sills and M. M. Roessler, *Methods Enzymol*, 2022, **666**, 233–296.

2. K. H. Richardson, J. J. Wright, M. Šimėnas, J. Thiemann, A. M. Esteves, G. McGuire, W. K. Myers, J. J. L. Morton, M. Hippler, M. M. Nowaczyk, G. T. Hanke and M. M. Roessler, *Nature Communications* 2021 12:1, 2021, **12**, 1–8.
3. J. Eisermann, J. J. Wright, J. D. E. T. Wilton-Ely, J. Hirst and M. M. Roessler, *RSC Chem Biol*, 2023, DOI:10.1039/D2CB00158F.
4. K. Abdiaziz, E. Salvadori, K. P. Sokol, E. Reisner and M. M. Roessler, *Chemical Communications*, 2019, **55**, 8840–8843.
5. M. Seif-Eddine, K. Abdiaziz, S. Cobb, M. Bajada, E. Reisner and M. M. Roessler, *under review*.

Prof. Dr. Petra Wendler

Organizer