

SEMINAR SERIES

HIGHLIGHTS IN ENERGY RESEARCH

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Structure and electrolyte sensitivity in CO₂ electroreduction

Prof. Beatriz ROLDAN CUENYA

*Department of Interface Science, Fritz-Haber-Institute of the Max Planck Society (FHI),
Berlin, Germany*

Host : Prof. Raffaella Buonsanti

The utilization of fossil fuels as the main energy source gives rise to serious environmental issues, including global warming caused by the continuously increasing level of atmospheric CO₂. The electrochemical conversion of CO₂ (CO₂RR) to chemicals and fuels driven by electricity derived from renewable energy has been recently recognized as a promising strategy towards sustainable energy.

In this talk I will provide examples of recent advances in the development of highly active nanostructured single crystal, thin film and nanoparticle (NP) electrocatalysts (Cu, Ag, Zn, and Cu-M with M = Co, Zn) and how their structure (crystal orientation, atomic arrangement, size, shape, defects), oxidation state and composition influence their selectivity in CO₂RR. Additionally, the determining role of the electrolyte in the reaction activity and selectivity will be illustrated by adding cations and anions (Cs⁺, Li⁺, Na⁺, K⁺, I⁻, Br⁻, Cl⁻) to aqueous electrolytes. Finally, the importance of *in situ* and *operando* characterization methods (e.g. EC-AFM, XAS, XPS) to gain in depth understanding on the structure- and electrolyte-sensitivity of real CO₂RR catalysts under working conditions will be demonstrated. Our results are expected to open up new routes for the reutilization of CO₂ through its direct selective conversion into higher value products.

Bio: Beatriz Roldan Cuenya

Beatriz is currently the director of the Interface Science Department at the FHI in Berlin (Germany). She began her academic career by completing her MSc in Physics in Spain in 1998 and a PhD in Physics in Germany in 2001. Her postdoctoral research took her to the Department of Chemical Engineering at the University of California Santa Barbara (USA). In 2004 she joined the Department of Physics at the University of Central Florida (UCF) as Assistant Professor becoming a full professor in 2012. In 2013, Beatriz became a chair professor of Solid State Physics at Ruhr-University Bochum (Germany). She then moved to the FHI in 2017.

Beatriz is the author of more than 120 peer-reviewed publications and 3 book chapters. She is Associate editor of ACS Catalysis and serves in the editorial board of the Journal of Catalysis, the Surface Science journal and in the Advisory Committee of the Office of Basic Energy Sciences of the US Department of Energy.

