ICFO



INSIGHT SEMINAR: Probing the dynamics of CO2 electrolysis

WARD VAN DER STAM

January 30, 2025
12:00 to 13:00
Elements Room

ABSTRACT:
The electrocatalytic reduction of CO2 (eCO2RR) into valuable base chemicals and fuels is a very complex reaction that depends on the intimate relation between catalyst structure and external reaction conditions. Despite considerable progress over the past few years, it is evident that the precise identification of the active sites of the electrocatalyst under operation remains a challenge, which hinders the rational design and industrial application of advanced electrocatalysts for eCO2RR. For this purpose, in situ characterization techniques are required that probe the dynamic catalyst structure, from bulk to surface, with improved time and space resolution.
In this presentation, I will discuss how we deploy in situ time-resolved Raman spectroscopy (TR-SERS), in situ fluorescence and advanced in situ synchrotron-based X-ray scattering and

spectroscopy techniques to investigate the electrocatalytic activation of CO2 and the dynamic chemical structure of the electrode surface at the electrode-electrolyte interface.

BIO:

Dr. Ward van der Stam is an assistant professor at Utrecht University, where his main focus lies on in situ characterization of electrocatalysts under reaction conditions. The research line combines (colloidal) nanoparticle synthesis strategies, electrochemistry and in situ spectroscopy (e.g. Raman and fluorescence spectroscopy) and X-ray techniques (e.g. X-ray diffraction, scattering and absorption) to access and understand novel reaction pathways in the electrocatalytic conversion of CO2 into value-added chemicals and fuels. Furthermore, he likes to share his passion for sustainability research and what chemistry can do to mitigate CO2 emissions with the next generation of scientists through knowledge dissemination events and teaching.

Hosted by: Prof. Dr. F. Pelayo Garcia de Arquer