

UniSysCat - Colloquium

Dr. Paul Donaldson

Central Laser Facility, STFC Rutherford-Appleton Laboratory

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

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

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or via Zoom

Steering ultrafast 2D-IR spectroscopy towards applications in heterogeneous catalysis

Dr. Paul Donaldson

Central Laser Facility, STFC Rutherford-Appleton Laboratory

In this talk, UKRI Fellow Paul Donaldson will introduce his, and his group's research into developing and applying time-resolved infrared (IR) spectroscopy techniques such as 2D-IR-Raman, IR-Vis SFG, laser induced temperature jump and pH jump spectroscopy. The particular focus of the talk will be on the group's latest work applying ultrafast two-dimensional (2D)-IR techniques to the characterisation of solid acid zeolite catalysts. In dealing with congested spectra, 2D-IR spectra can be vastly more informative than conventional '1D' spectra, and report on ultrafast molecular dynamics, vibrational couplings and energy relaxation. 2D-IR spectroscopy is however still very much a technique in development, and the opaque and optically scattering nature of many materials relevant to catalysis and energy science mean that they have not been widely studied so far with 2D-IR spectroscopy. At the Central Laser Facility ULTRA, Paul and collaborators have developed 2D-IR techniques that enable 2D-IR studies of heterogeneous catalysts, fuel cell membranes and battery electrode materials. Zeolites gives stunning 2D-IR spectra, which as the focus of this talk will be seen to embody many of the aspects of 2D-IR spectroscopy that make it useful.

Prof. Dr. Henrike Müller-Werkmeister

Organizer