EDITH COWAN UNIVERSITY

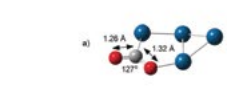
School of **Science**

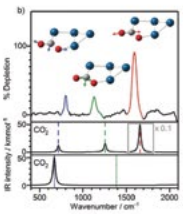
Spectroscopy and Surface Science Research Facility

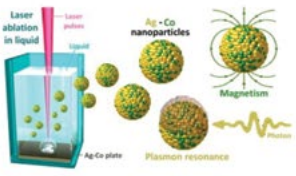
From gas phase interactions to solid state applications.

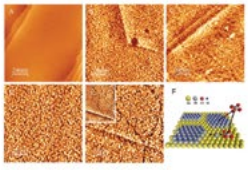
Gas Phase Fundamental Molecular Activation	Solution Phase Metal NP Synthesis and Catalysis	Solid state Metal RF Sputtering	Electrochemical Analysis
PES, (IR/E)PD, CID ECU, UWA	Laser ablation UWA, Curtin	XRD, STM, GC, H-cell ECU	H-cell, Potentiostat Curtin, UWA, ECU

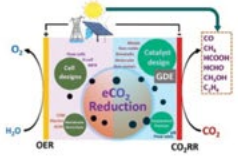
- Increasing Cluster/Particle Size
- Increasing Cell Development



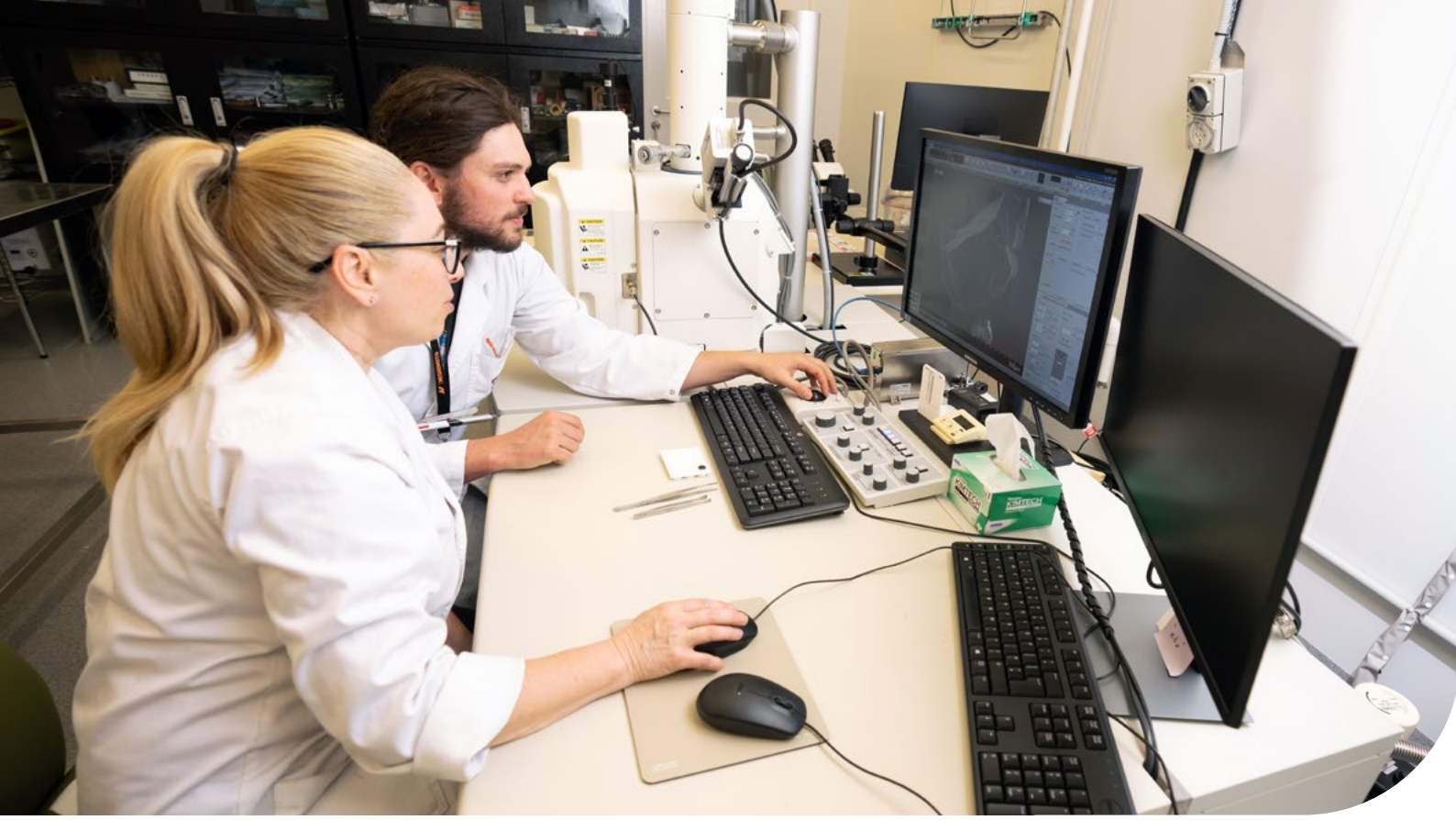








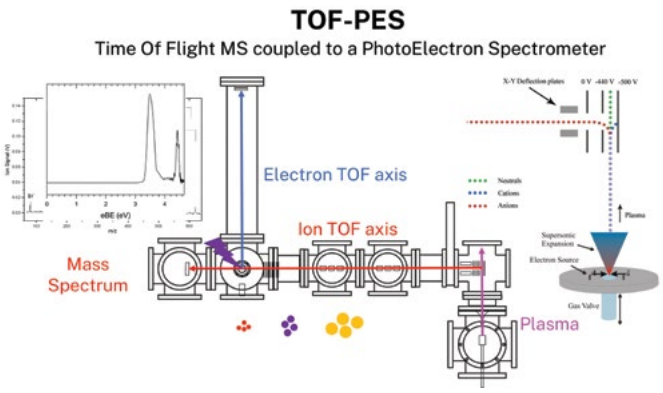
• Binding & activation to small clusters • Structure-energy relationship • Reaction mechanisms	• Synthetic control • Reactivity in solution • Solvent interactions	• Surface topography • Deposition of NPs to surface • Substrate interactions	• Roll of potential bias • Conversion efficiency • Scalability



Facility equipment

Spectroscopy

- Anion Photoelectron Spectrometer - Elucidate details on intermolecular interactions between anions, radicals, and molecules, and probe for reactive species in the atmosphere, via spectroscopy
- Matrix Infrared Spectrometer - trap and investigate species in an argon matrix, and probe via infrared spectroscopy
- Time Resolved Nanosecond Fluorescence Spectroscopy - investigate energy relaxation pathways.
- Nd:YAG pumped Dye Laser 205 – 710 nm, 5 ns pulse width, 0.04 cm-1 linewidth, static wavelengths (1064, 532, 355, and 266 nm for ablation, and other experiments)
- Six dedicated workstations running Gaussian 09 and 16, CFOUR, Orca, GAMESS, and NWCHem, Spartan



Surface Science

- XRD - material characterisation of the atomic crystal structure, size and phase identification
- RF Magnetron Sputtering Systems - production of thin films on various substrates for a variety of applications, including the production of novel catalysts for electrochemical reduction of carbon dioxide gas (over 80 different sputtering targets)
- E-Beam Evaporative Systems - production of thin films
- SEM - morphological and elemental surface information
- Electrochemical cells – H-cell for carbon dioxide reduction

ECU research team L-R: Mr Kurt Macri, Dr Duncan Wild and Dr Magdalena Wajrak.