

## Lesley Yellowlees Professor of Inorganic Electrochemistry

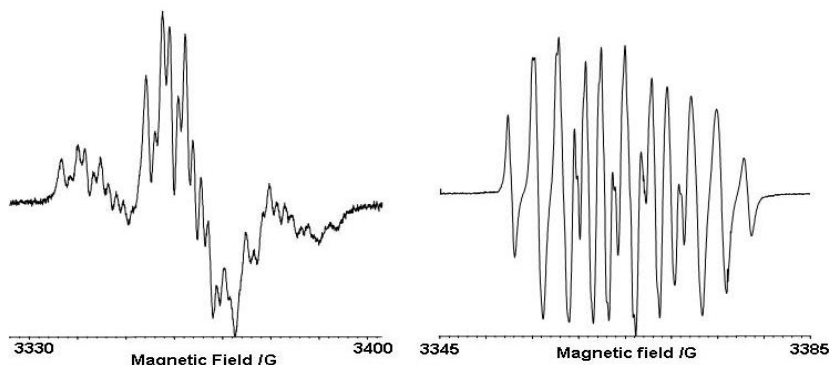


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Research Interests: Inorganic Electrochemistry, Spectroelectrochemistry, Electron transfer reactions, EPR Spectroscopy

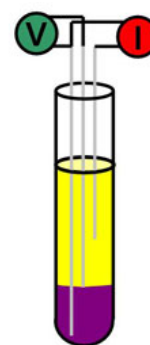
Electron transfer reactions are central to many diverse areas of chemistry such as solar energy conversion, catalytic processes, synthetic procedures, chemical biology pathways. We are interested in the redox properties of compounds many of which contain a transition metal. These properties may be influenced by solvent, electrolyte or temperature. In addition, changing a substituent on a ligand or the metal centre may result in wholesale changes to the electrochemical properties which permit redox tuning of materials.

Electron transfer may be reversible, in which case we can probe the site of electron transfer by uv/vis/nir, ir or epr spectroscopy, or irreversible where we study the kinetics and mechanism of new product formation. For example, *in situ* epr spectroelectrochemical study of reduced 4-NO<sub>2</sub>-2,2'-bpy and Pt(4-NO<sub>2</sub>-2,2'-bpy)Cl<sub>2</sub> revealed that the unpaired electron coupled more strongly to the NO<sub>2</sub> nitrogen in the free pro-ligand but to the pyridine ring nitrogen in the coordinated compound.



**EPR spectra of [Pt(4-NO<sub>2</sub>-bpy)Cl<sub>2</sub>]<sup>1-</sup> (left) and [4-NO<sub>2</sub>-bpy]<sup>1-</sup> (right) generated *in situ* at 233 K in 0.1 M [TBA][BF<sub>4</sub>]/DMF.**

We have recently developed a new system to carry out *in-situ* W- and Q-band EPR spectroscopy. The set-up involves using three PTFE coated wires with the PTFE stripped off at the tips. This allows us to record reproducible spectra of compounds which have been oxidised/reduced in cells as small as a capillary tube. The initial results on the in-house X-band spectrometer are very encouraging and we will soon be testing the system on Q- and W-band spectrometers. This project will utilise the facilities held at the [University of Manchester](http://www.manchester.ac.uk).



### SELECTED RECENT PUBLICATIONS

1. Yellowlees, Lesley and Murray, Paul *EPR Spectroelectrochemistry in Spectroelectrochemistry*, Kaim, Wolfgang and Klein, Axel (Eds), R.S.C publishing (2008)
2. Alessio, Enzo; Daff, Simon; Elliot, Marie; Iengo, Elisabetta; Jack, Lorna A.; Macnamara, Kenneth G.; Pratt, John M.; Yellowlees, Lesley J. Spectroelectrochemical techniques. *Trends in Molecular Electrochemistry* (2004), 339-381.
3. Adams, Christopher J.; Bowen, Lucy E.; Humphrey, Mark G.; Morrall, Joseph P. L.; Samoc, Marek; Yellowlees, Lesley J. Ruthenium bipyridyl compounds with two terminal alkynyl ligands. *Dalton Transactions* (2004), (24), 4130-4138.