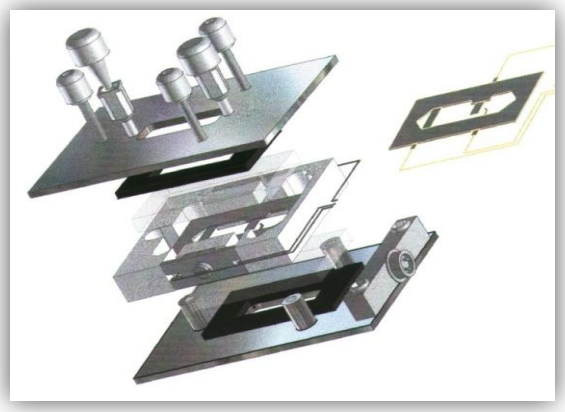
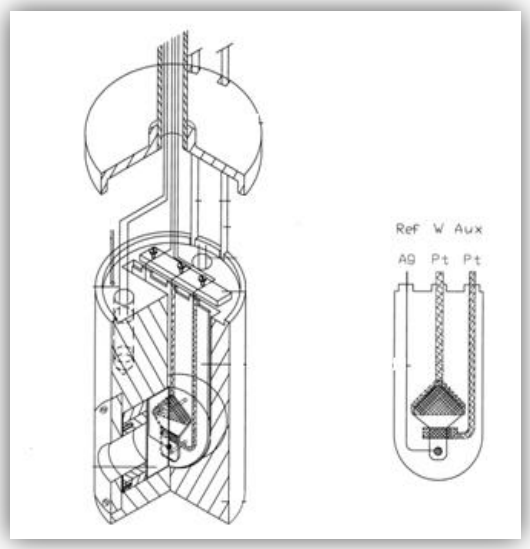
University of Reading

Optically Transparent Thin Layer Electrochemical (OTTLE) Cells

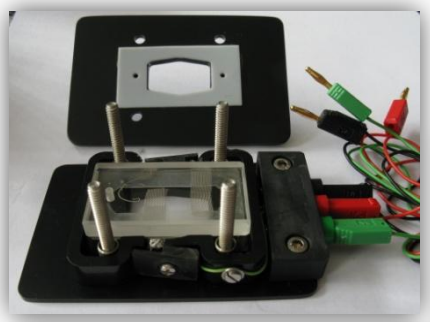


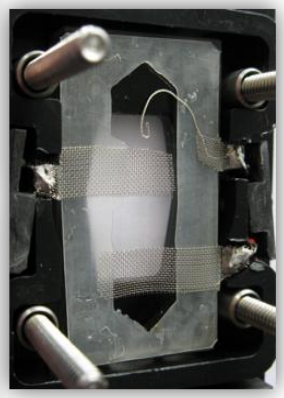
In situ monitoring of spectroscopic changes accompanying electrochemical processes has become increasingly popular and widespread in different fields of chemical research. Based on 20 years of practical experience and development, the University of Reading is now able to offer the community of research chemists in academic and industrial institutions reliable and high-level air-tight optically transparent thin-layer electrochemical (OTTLE) cells for UV-Vis-NIR-IR-FIR and (resonance) Raman spectroelectrochemistry at variable temperatures.

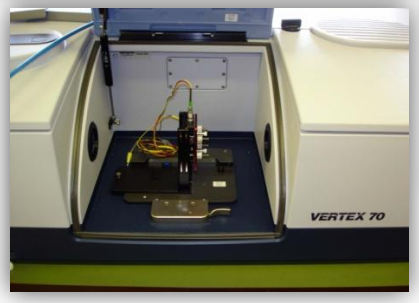


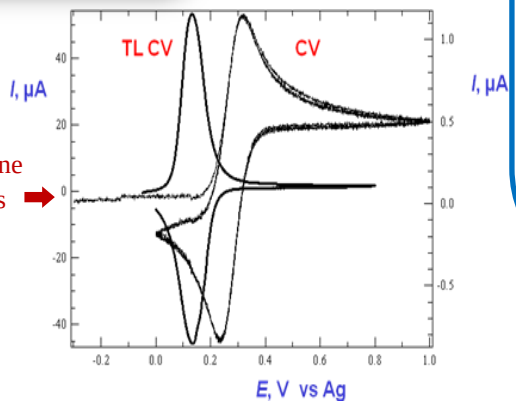
Room Temperature (RT) OTTLE Cell

The first version of the RT OTTLE cell was developed and published in early 1990's (*J. Electroanal. Chem. Interfacial. Electrochem.* **1991**, *317*, 3887). The present design features a number of improvements. Several customisable options are available, including modification for laser, 2D IR, VCD, ECL or epifluorescence microscopy measurements. Currently, the cell has been employed in more than 75 research laboratories worldwide and cited in about 400 publications, including the recently issued book *Spectroelectrochemistry* (RSC, UK, 2009, A. Klein and W. Kaim Eds).









ferrocene in dichloromethane
TL-CV: scan rate at 2 mV/s

Main Features:

- ✓ Quick to assemble, easy cleaning and maintenance
- ✓ Wide choice of window materials
- ✓ No leaking and completely air-tight: suitable for air- and moisture-sensitive compounds and volatile solvents
- ✓ Outstanding thin-layer voltammetric behaviour, negligible diffusion in the thin solution layer (optical path less than 0.2 mm) and high stability in time
- ✓ Rapid electrolysis: suitable for time-resolved measurements and rapid FTIR spectroscopy scan
- ✓ Low sample volumes required (0.1-0.2 mL)
- ✓ Low level of electronic noise
- ✓ Ready to use in all types of commercially available UV-Vis-NIR-IR spectrophotometers
- ✓ Also available for Raman spectroscopic measurement and laser experiments demanding zero light scattering

Low Temperature (LT) OTTLE Cell

LT Spectroelectrochemistry not only helps to study unstable electrogenerated products at room temperature, but it also serves to investigate temperature-dependent properties of redox-active compounds. The successful prototype of the unique LT OTTLE cell covering the whole UV-Vis-NIR-IR region was described in *Applied Spectroscopy* **1994**, *48*, 1522. Since then it has since been cited in more than 50 publications. A significantly improved smaller commercial version of the LT OTTLE cell is now available (*Collect. Czech. Chem. Commun*. **2003**, *68*, 1687). To date this cell has been employed in seven different laboratories in the UK, Germany, Italy, India and Australia.

Main Features:

In addition to the features of the RT OTTLE cell, our LT OTTLE cell offers some unique advantages for temperature dependent measurements.

- ✓ Temperature range of 295-175 K, using a flexible cryostatted cell holder.
- ✓ Efficient and accurate temperature elevation and reverse cooling within 1 K by using local electronic temperature control
- ✓ Electrolysis can be completed rapidly even close to low temperature limits of electrolytes

Temperature Control

Inner OTTLE Cell

FT-IR spectrometer

UV-Vis-NIR diode array spectrophotometer