



In converting base-pair recognition events into a signal, electrochemical methods based on long-range electron transfer are highly suitable. Learn more in the paper by Wong and Gooding (p. 280).

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Foreword

Electrochemistry Special Issue

Richard John

Aust. J. Chem. **2005**, 58, 235–236.

Future textbooks on electrochemistry will undoubtedly feature chapters on the diverse and interdisciplinary topics of electrochemistry plus nanotechnology, biochemistry, microbiology, genetics, new materials, or molecular biology, as collected in this special issue.

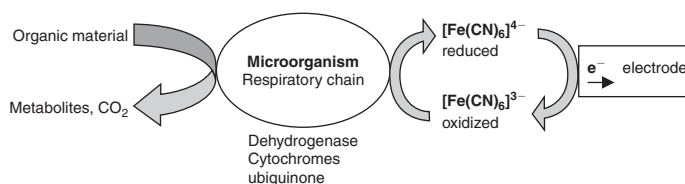
Review

Ferricyanide-Mediated Microbial Reactions for Environmental Monitoring

Kristy Morris, Huijun Zhao,
Richard John

Aust. J. Chem. **2005**, 58, 237–245.

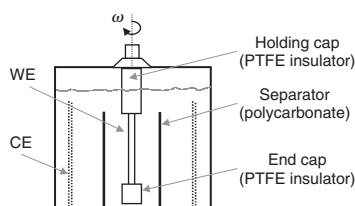
Bacteria can substitute $[\text{Fe}(\text{CN})_6]^{3-}$ for oxygen in their respiratory processes. This ability thus allows the electrochemist to monitor environmental processes, such as biological oxygen demand, with new, rapid biosensors.



The Rotating Cylinder Electrode (RCE) and its Application to the Electrodeposition of Metals

Chee Tong John Low, Carlos Ponce de Leon, Frank C. Walsh

Aust. J. Chem. **2005**, 58, 246–262.



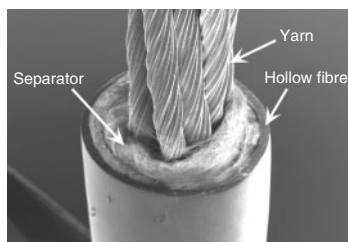
The theoretical basis of RCE technology has progressed significantly over the past decade; now RCEs find application in electrodeposition studies of single metals, alloys, and composite, multilayered, or nanostructured electrodeposits. The rotating cylinder Hull cell (one particular configuration is shown), the heart of which is an RCE, allows the above-mentioned studies to be conducted at a range of current densities in a single experiment.

Current Chemistry

Electrochemical Actuator Devices Based on Polyaniline Yarns and Ionic Liquid Electrolytes

Wen Lu, Ian D. Norris,
Benjamin R. Mattes

Aust. J. Chem. **2005**, 58, 263–269.



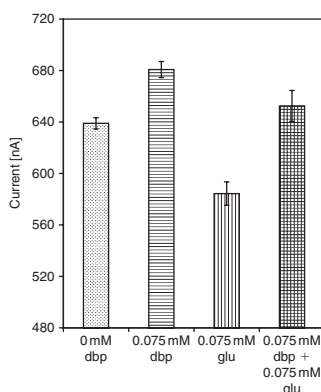
Electrochemical actuators, capable of generating stresses far in excess of that of skeletal muscle, have been prepared from polyaniline yarns and ionic liquid electrolytes within a fibre sheath, as shown. A critical parameter to the forces generated is the degree of twisting in the inner yarn.

Full Papers

Electrochemical Detection of Yeast Responses to Catabolizable Molecules

Keith H. R. Baronian, Saroja Gurazada,
Ancy Thomas

Aust. J. Chem. **2005**, 58, 270–274.

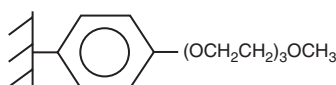


A new electrochemical detection system, employing steady-state voltammetry, easily detects catabolism in wild-type cells responding to glucose, as well as preconditioned and genetically modified cells. The differences in responses of dibutyl phthalate-grown *A. adenivorans* cells to dibutyl phthalate (dbp), glucose (glu), and an equimolar mix of dbp and glu, could be determined.

Fluorescence Microscopy Study of Protein Adsorption at Modified Glassy Carbon Surfaces

Alison J. Downard, Sandra L. Jackson,
Emelyn S. Q. Tan

Aust. J. Chem. **2005**, 58, 275–279.

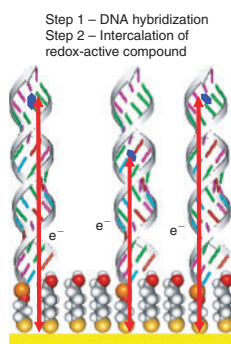


Thin films were deposited onto glassy carbon by electrochemically-assisted reduction of aryl diazonium salts and oxidation of primary amines. Mechanisms are described for why certain films decrease, and others enhance, adsorption of proteins onto the surface. Fluorescence microscopy is shown to be an effective method for identifying changes in protein adsorption following film deposition.

Electrochemical Transduction of DNA Hybridization by Long-Range Electron Transfer

Elicia L. S. Wong, J. Justin Gooding

Aust. J. Chem. **2005**, 58, 280–287.



The careful design and synthesis of an electrochemical sensor to detect the title process is reported. Gold surfaces modified by a self-assembled monolayer of thiolated ss-DNA and a diluent compound were used with a redox-active intercalator with a move towards fabricating commercially viable sensors with excellent selectivity for single-base mismatch detection. Factors governing increased sensitivity and reduced assay times were highlighted.

Redox Coupling to Microbial Respiration: an Evaluation of Secondary Mediators as Binary Mixtures with Ferricyanide

Neil Pasco, Joanne Hay, Amy Scott,
Judith Webber

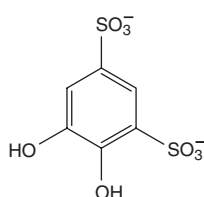
Aust. J. Chem. **2005**, 58, 288–293.

Small, synthetic redox chemicals, such as potassium hexacyanoferrate(III), can facilitate the 'shuttling' of electrons produced within the cell during respiration to an electrode and have been used in biotechnological applications in biosensors, bioelectrochemistry, and fuel cells. Here the authors supplement a secondary neutral mediator, capable of freely diffusing across the coupling membrane, in order to assess the advantage that can be credited to its presence.

The Mediated Electrodeposition of Polypyrrole on Aluminium Alloy

Kirill L. Levine, Dennis E. Tallman,
Gordon P. Bierwagen

Aust. J. Chem. **2005**, 58, 294–301.

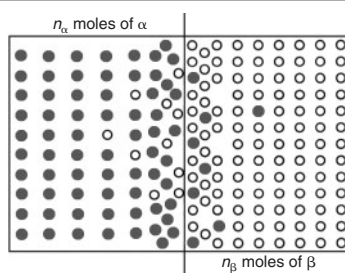


Conjugated polymers such as polypyrrole can act as corrosion inhibitors. Their poor solubility precludes simple surface casting and the positive potential required limits direct electrodeposition (due to metal corrosion and/or polymer overoxidation). Certain mediators circumvent the latter problem by reducing the electrodeposition potential and by simultaneously acting as a surfactant.

The Thermodynamics of Solid–Solid Interfaces in Systems of Fixed Mass

Stephen Fletcher

Aust. J. Chem. **2005**, 58, 302–305.



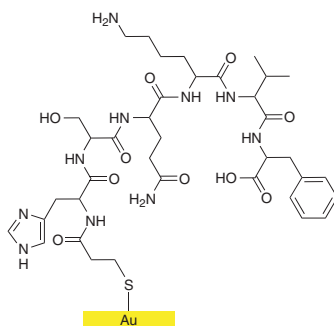
Described here is an approach to solid–solid interfaces that circumvents the textbook ‘fixed volume’ thermodynamic methods first developed by Gibbs in the 1870s. This approach is of particular interest as it allows the temperature and pressure dependences of interfacial excess free energies to be measured using electrochemical techniques.

Focus

Electrochemical Detection of Heavy Metal Ions Using Amino Acids and Oligopeptides as Complexing Ligands

Edith Chow

Aust. J. Chem. **2005**, 57, 306.



Using amino acids and oligopeptides as the core component for heavy metal biosensors potentially provides an estimate of the bioavailable metal instead of simple total metal concentrations.