

# AUSTRALIAN JOURNAL OF CHEMISTRY

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## RESEARCH FRONT: Enzyme Electrochemistry

### Essay

#### Enzyme Electrochemistry

*H. Allen O. Hill*

*Aust. J. Chem.* **2006**, *59*, 231–232.

The first generation of enzyme-based sensors relied on enzyme–electrode interaction, the second employed a mediator, and the third redox enzymes. We now look forward to a fourth generation of enzyme electrodes based on artificially designed proteins with well-defined electron transfer pathways.

### Review

#### Enzyme Electrochemistry — Biocatalysis on an Electrode

*Paul V. Bernhardt*

*Aust. J. Chem.* **2006**, *59*, 233–256.

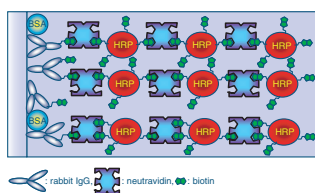
Fundamental research into electrochemically driven enzyme catalysis has led to some remarkable practical applications. Covered in this review are the fundamentals of enzyme electrochemistry and kinetics through to current and future biotechnological applications.

### Rapid Communication

#### Avidin–Biotin Assembling of Horseradish Peroxidase Multi-Monomolecular Layers on Electrodes

*Benoît Limoges, Jean-Michel Savéant,  
Dounia Yazidi*

*Aust. J. Chem.* **2006**, *59*, 257–259.



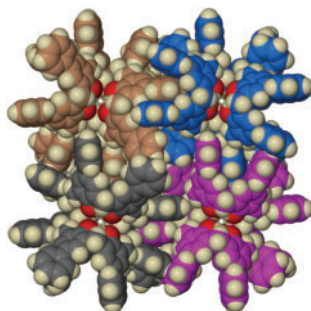
A step-by-step avidin–biotin procedure has been shown to be effective in immobilizing up to 16 successive monomolecular layers of horseradish peroxidase on an electrode without loss of the enzyme's activity. As compared to monomolecular layer coatings, improvement of the catalytic sensitivity by a factor of about ten may thus be achieved.

### Rapid Communication

#### Direct Synthesis of Deep Cavity *p*-Phenylcalix[4]arene in Poly(Ethylene Glycol), and its Self-Association in the Solid State

*Mohamed Makha, Colin L. Raston,  
Alexandre N. Sobolev*

*Aust. J. Chem.* **2006**, *59*, 260–262.



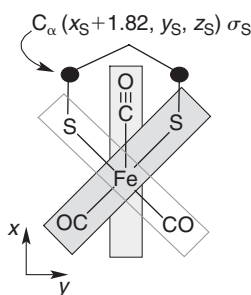
A solventless approach to the preparation of the title calixarene achieved higher yields with simpler workup than that with the use of solvents. The crystallized material is free of solvent inclusions, but an interesting association of phenyl groups into neighbouring molecules creates a columnar array, as shown.

## Full Papers

**Integration of EXAFS, Spectroscopic, and DFT Techniques for Elucidation of the Structure of Reactive Diiron Compounds**

Mark I. Bondin, Stacey J. Borg,  
Mun Hon Cheah, Garry Foran,  
Stephen P. Best

*Aust. J. Chem.* **2006**, *59*, 263–272.



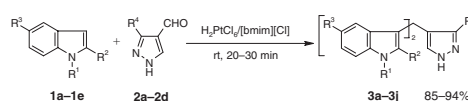
A triple-pronged approach using X-ray and vibrational spectroscopy and DFT calculations has enabled reliable determination of the structures of reactive reduced diiron compounds related to the diiron subsite of the [FeFe]-hydrogenase H-cluster.

**A New Protocol to Synthesize Di(indolyl)pyrazolyl Methanes Using H<sub>2</sub>PtCl<sub>6</sub> as a Catalyst in Ionic Liquid: Synthesis of Novel 3-[1*H*-indol-3-yl(3-phenyl-1*H*-pyrazol-4-yl)methyl]-1*H*-indoles**

Rajendran Murugan, Boreddy S. R. Reddy

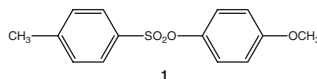
*Aust. J. Chem.* **2006**, *59*, 273–276.

The title compounds and their derivatives were synthesized by the electrophilic substitution of indole with pyrazolyl aldehydes catalyzed by H<sub>2</sub>PtCl<sub>6</sub> in ionic liquid. This procedure has operational simplicity, fast and cleaner reaction profiles, and high yield.

**Ether Aryl Sulfonic Acid Esters with Improved Antimalarial/Anticancer Activities**

Lynn M. Betts, Nga Chiu Tam,  
S. M. Humayun Kabir,  
Richard F. Langer, Ian Crandall

*Aust. J. Chem.* **2006**, *59*, 277–282.

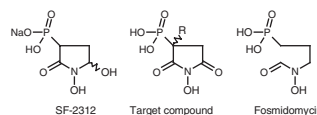


In focussing on the synthesis and testing of antimalarial/anticancer agents related to **1**, the authors identify factors important in their design in order to obtain inexpensive and simple-to-prepare materials. Factors crucial to impart biological activity, aqueous solubility, and low toxicity are summarized.

**Synthesis of 1-Hydroxypyrrolidin-2,5-dione Derivatives of the Phosphonic-Hydroxamic Acid Antibiotic SF-2312**

Wamuyu Owotoki, Detlef Geffken,  
Thomas Kurz

*Aust. J. Chem.* **2006**, *59*, 283–288.



Compounds containing the title acid functionalities often offer broad antimicrobial activity. SF-2312, an analogue of fosmidomycin, was thus derivatized to seek enhanced activity.

## Focus

**Suicide Inactivation in Adenosylcobalamin-Dependent Enzymes**

Gregory M. Sandala

*Aust. J. Chem.* **2006**, *59*, 289.

Although the reactivity of organic radicals are generally considered detrimental in biological systems, adenosylcobalamin-dependent enzymes harness radical activity to accomplish difficult rearrangements. Interestingly, their use of radicals means these enzymes can also be irreversibly deactivated. Useful mechanistic insights can be gained through analysis of deactivation processes.