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ISSN 1359-7345 CODEN CHCOFS (38) 3945-4040 (2006)



### Cover

See Chi-Ming Che *et al.*,  
page 3972.

Electronically active one-dimensional nanostructures—the skyscrapers at the nanoscale—can be self-assembled from a hybrid binuclear cyclometalated platinum(II) complex. Image reproduced by permission of Wei Lu, V. A. L. Roy and Chi-Ming Che from *Chem. Commun.*, 2006, 3972.

## CHEMICAL TECHNOLOGY

T37

Chemical Technology highlights the latest applications and technological aspects of research across the chemical sciences.

## Chemical Technology

October 2006/Volume 3/Issue 10

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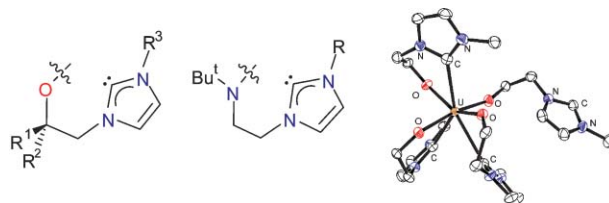
## FEATURE ARTICLE

3959

### F-block N-heterocyclic carbene complexes

Polly L. Arnold\* and Stephen T. Liddle

The incorporation of an N-tethered anionic group (alkoxide or amido) into N-heterocyclic carbenes (NHCs), allows the synthesis of a range of f-block NHC adducts. The tethering group also allows the lability of the NHC group, and its subsequent reactivity, to be studied.



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3972

### Self-assembled nanostructures with tridentate cyclometalated platinum(II) complexes

Wei Lu, V. A. L. Roy and Chi-Ming Che\*

Self-assembly of positively charged and charge-neutral tridentate cyclometalated platinum(II) complexes leads to nanowires and the drop-cast film containing these nanowires behaves as a n-type semiconductor.

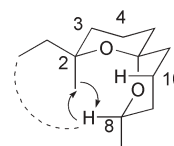


3975

### A diverse suite of spiroacetals, including a novel branched representative, is released by female *Bactrocera tryoni* (Queensland fruit fly)

Yvonne K. Booth, Brett D. Schwartz, Mary T. Fletcher, Lynette K. Lambert, William Kitching and James J. De Voss\*

The structure of a novel, branch-chained spiroacetal, one of a number released by *Bactrocera tryoni* (Queensland fruit fly), is confirmed by a mixture of total synthesis, NMR and GCMS.



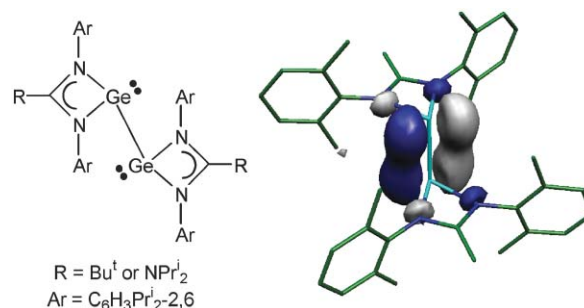
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3978

### Synthetic, structural and theoretical studies of amidinate and guanidinate stabilised germanium(I) dimers

Shaun P. Green, Cameron Jones,\* Peter C. Junk, Kai-Alexander Lippert and Andreas Stasch

The first amido-substituted germanium(I) dimers have been prepared and structurally characterised; theoretical studies suggest their LUMOs exhibit significant Ge-Ge  $\pi$ -bonding character (see picture).

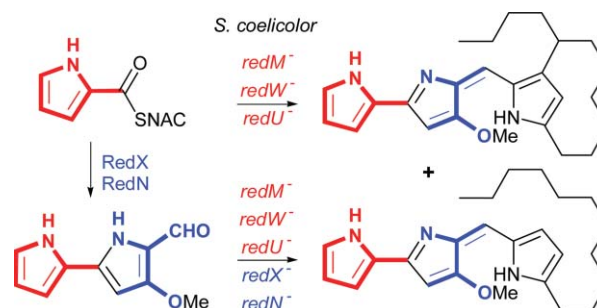


3981

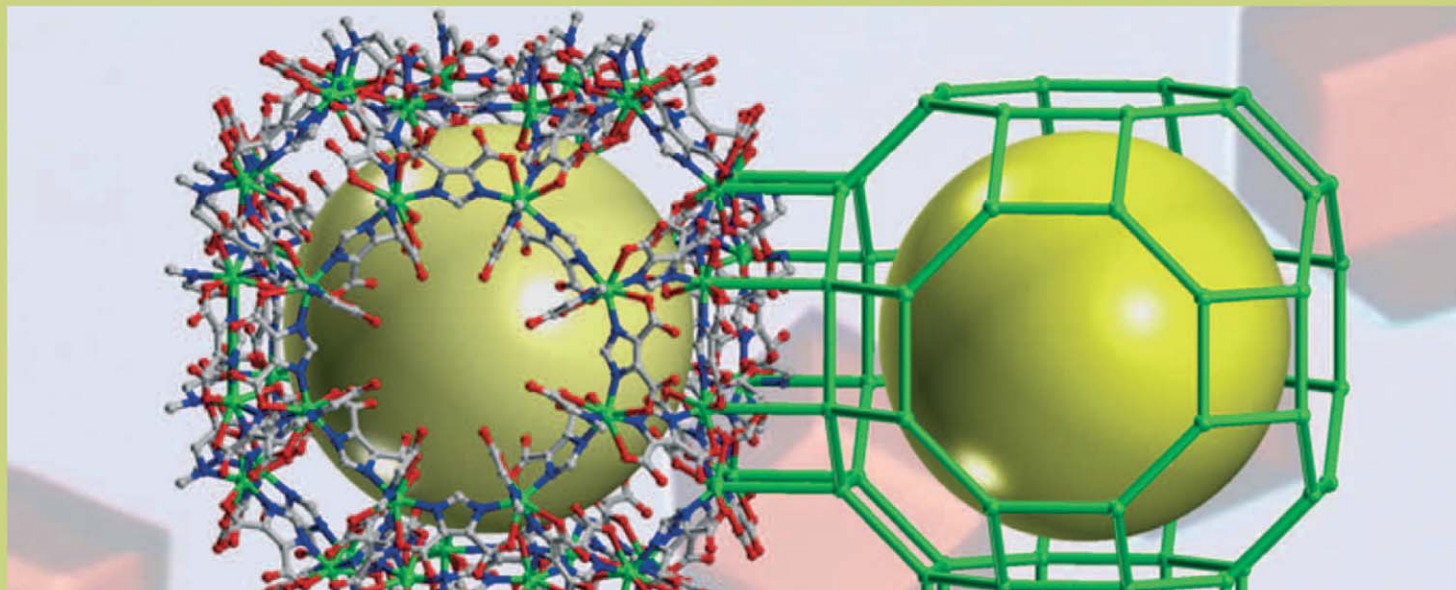
### Elucidation of the *Streptomyces coelicolor* pathway to 4-methoxy-2,2'-bipyrrrole-5-carboxaldehyde, an intermediate in prodiginine biosynthesis

Anna E. Stanley, Laura J. Walton, Malek Kourdi Zerikly, Christophe Corre and Gregory L. Challis\*

The biosynthetic pathway to 4-methoxy-2,2'-bipyrrrole-5-carboxaldehyde, a key intermediate in the biosynthesis of prodiginine antibiotics in *Streptomyces coelicolor*, has been elucidated using a combination of gene replacements and feeding experiments.







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## Professor T. Don Tilley

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Don Tilley is Professor of Chemistry at the University of California, Berkeley. His research involves synthetic, structural and reactivity studies in organometallic systems. Metal-mediated routes to new polymers, and molecular approaches to the designed construction of advanced solid state materials and heterogeneous catalysts are also being developed.

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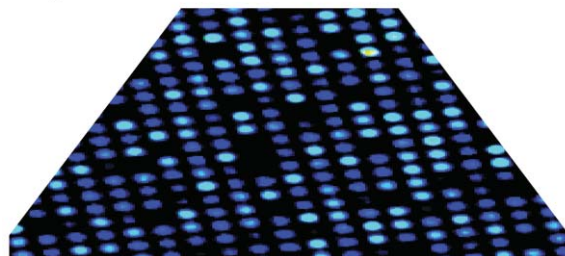
3984

### Dual colour, microarray-based, analysis of 10 000 protease substrates

Juan J. Díaz-Mochón, Laurent Bialy and Mark Bradley\*

A 10 000 member PNA-encoded library of FRET peptides was synthesised for the analysis of proteases. A dual fluorophore system and DNA microarrays were used to read out substrate specificities.

## 10,000 Protease Substrates

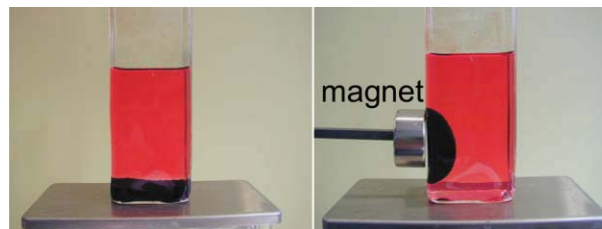


3987

### Scalable synthesis of activated carbon with superparamagnetic properties

Manfred Schwickardi, Stefan Olejnik, Elena-Lorena Salabas, Wolfgang Schmidt and Ferdi Schüth\*

Deposition and carbon-coating of iron nanoparticles in activated carbon result in superparamagnetic materials being remarkably resistant towards acid leaching of the magnetic nanoparticles. The preparation method is suitable for both lab scale and large scale production.

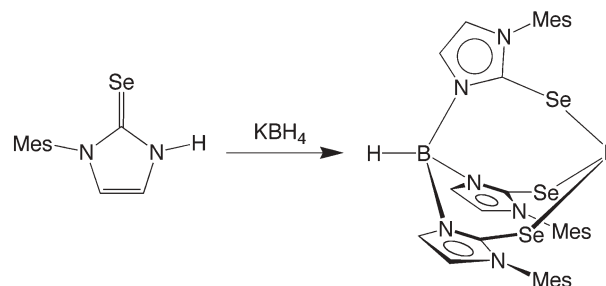


3990

### Synthesis and structural characterization of tris(2-seleno-1-mesitylimidazolyl) hydroborato complexes: A new type of strongly electron donating tripodal selenium ligand

Mao Minoura, Victoria K. Landry, Jonathan G. Melnick, Keliang Pang, Luciano Marchiò and Gerard Parkin\*

A new tripodal ligand that features three selenium donors, namely the tris(2-seleno-1-mesitylimidazolyl)hydroborato ligand, has been constructed *via* the reaction of  $\text{KBH}_4$  with 1-mesitylimidazole-2-selone.

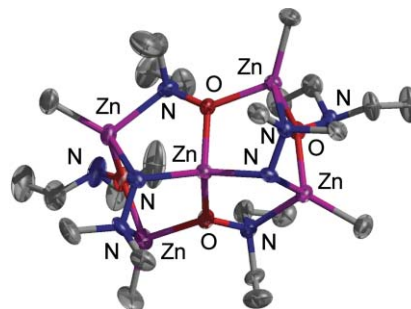


3993

### First mixed hydrazide/hydroxylamide metal aggregates

Surajit Jana, Raphael J. F. Berger, Roland Fröhlich and Norbert W. Mitzel\*

The first mixed hydrazide/hydroxylamide organometallic zinc clusters  $[\text{Zn}(\text{MeZn})_4(\text{HNNMe}_2)_2(\text{ONeEt}_2)_4]$  and  $\{\text{Zn}(\text{EtZn})_4[\text{HNN}(\text{CH}_2)_5]_2(\text{ONeEt}_2)_4\}$  were synthesised *via* one-pot procedures from zinc alkyls, substituted hydrazines and *N,N*-diethylhydroxylamine as the only metal containing products. The results demonstrate the different binding properties of the closely related hydrazide and hydroxylamide ligands.



3996

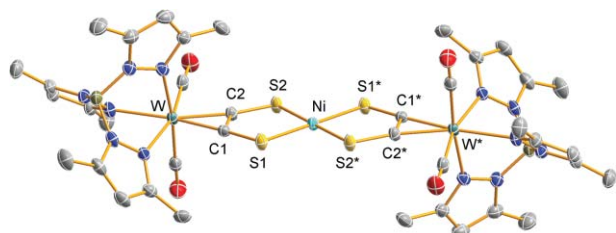


### Silica-supported tantalum clusters: catalyst for alkane conversion

Sailendra Nemana and Bruce C. Gates\*

Clusters on the surface of silica were synthesized; their formation proceeds analogously to cluster formation in solution, as elucidated by Cotton. The material catalyzes the disproportionation of alkanes.

3999

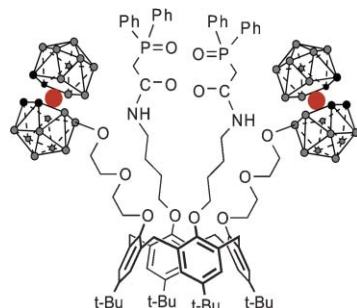


### Acetylenedithiolate: alkyne complex formation renders it a dithiolate chelate ligand

Wolfram W. Seidel,\* Markus Schaffrath and Tania Pape

The alkyne complex of acetylenedithiolate ( $\text{C}_2\text{S}_2$ )<sup>2-</sup> with  $[\text{Tp}'\text{W}(\text{CO})_2]^+$  has been established as a novel dithiolene type ligand in homoleptic group 10 metal complexes.

4001

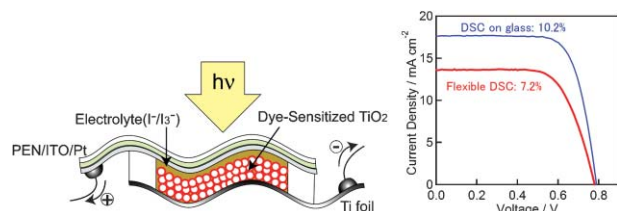


### Synergistic effect of ligating and ionic functions, prearranged on a calix[4]arene

Libor Mikulášek, Bohumír Grüner,\* Crenguta Danila, Volker Böhmer, Josef Čáslavský and Pavel Selucký

The covalent attachment of two CMPO-functions and two anionic Cosan groups to the narrow rim of *tert*-butylcalix[4]arene leads to a dramatic increase of the extraction efficiency for the *cone* isomer.

4004



### High-efficiency (7.2%) flexible dye-sensitized solar cells with Ti-metal substrate for nanocrystalline-TiO<sub>2</sub> photoanode

Seigo Ito,\* Ngoc-Le Cevy Ha, Guido Rothenberger, Paul Liska, Pascal Comte, Shaik M. Zakeeruddin, Péter Péchy, Mohammad Khaja Nazeeruddin and Michael Grätzel\*

High-efficiency flexible dye-sensitized solar cells were fabricated with optimization of the nanocrystalline-TiO<sub>2</sub> thickness on Ti-metal foil.

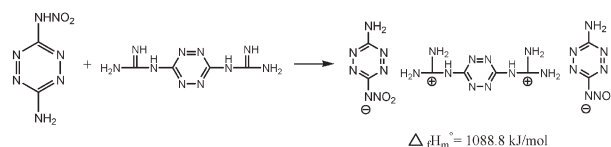


4007

### 3-Amino-6-nitroamino-tetrazine (ANAT)-based energetic salts

Haixiang Gao, Ruihu Wang, Brendan Twamley, Michael A. Hiskey and Jean'ne M. Shreeve\*

The synthesis and properties of several new high-nitrogen materials with 3-amino-6-nitroamino-tetrazine (ANAT) as the anion are reported and a combination of theoretical and empirical calculations shows that all the salts have high molar enthalpies of formation.

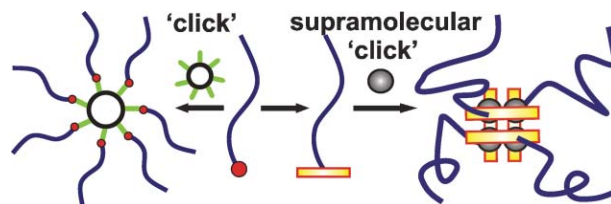


4010

### Synthesis of star-shaped poly( $\epsilon$ -caprolactone) via 'click' chemistry and 'supramolecular click' chemistry

Richard Hoogenboom, Brian C. Moore and Ulrich S. Schubert\*

The synthesis of star-shaped polymers via 'click' chemistry and 'supramolecular click' chemistry is demonstrated. The concept of 'supramolecular click' chemistry is discussed and introduced to the field of polymer science.

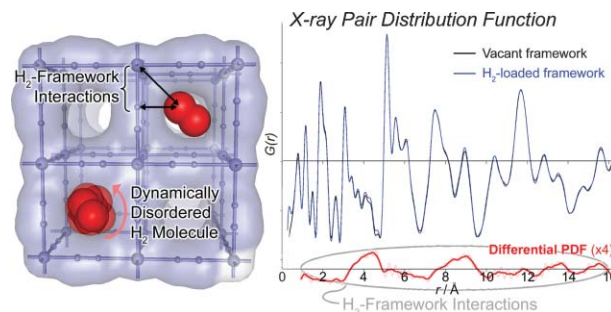


4013

### Direct observation of adsorbed H<sub>2</sub>-framework interactions in the Prussian Blue analogue Mn<sup>II</sup><sub>3</sub>[Co<sup>III</sup>(CN)<sub>6</sub>]<sub>2</sub>: The relative importance of accessible coordination sites and van der Waals interactions

Karena W. Chapman,\* Peter J. Chupas,\* Evan R. Maxey and James W. Richardson

Selective recovery of guest-framework interactions through differential X-ray and neutron pair distribution function methods, suggests that H<sub>2</sub> is disordered about a position at the centre of the pore without binding at accessible Mn<sup>II</sup> sites.

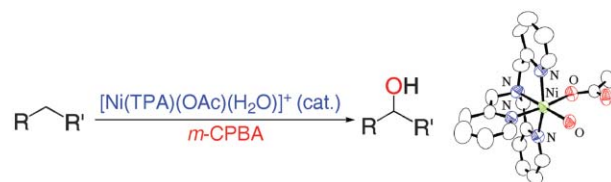


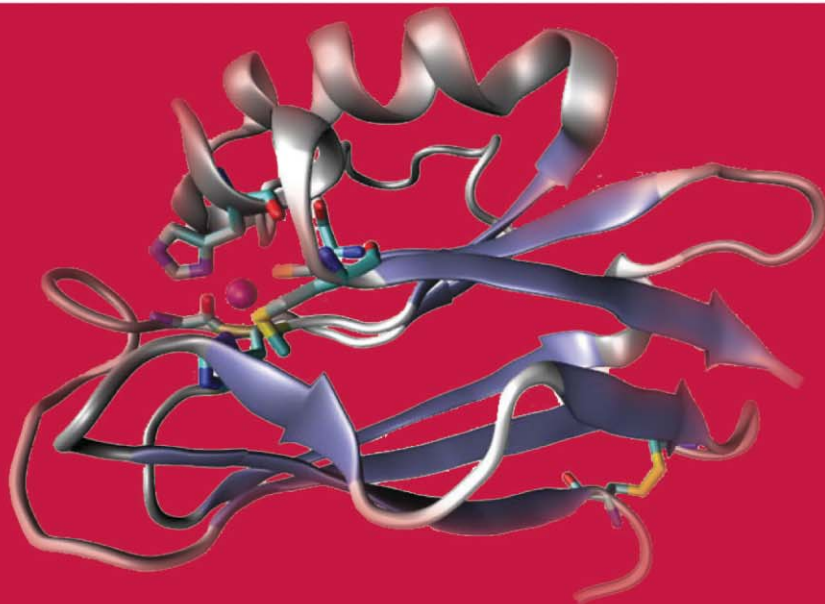
4016

### Ni<sup>II</sup>(TPA) as an efficient catalyst for alkane hydroxylation with *m*-CPBA

Takayuki Nagataki, Yoshimitsu Tachi and Shinobu Itoh\*

A simple Ni<sup>II</sup>(TPA) complex [TPA = tris(2-pyridylmethyl)amine] has been demonstrated to act as an efficient turnover catalyst for alkane hydroxylation with *m*-CPBA (*m*-chloroperbenzoic acid), in which contribution of a NiO<sup>+</sup> (nickel-oxo) type active oxygen species is suggested.





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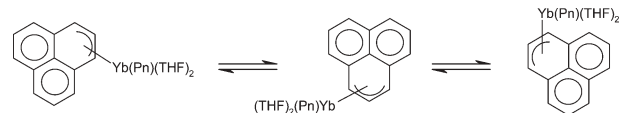


4019

### The synthesis, X-ray structure and fluxional behaviour of an ytterbium(II) phenalenide complex

David J. Berg,\* Jianlong Sun and Brendan Twamley

The first lanthanoid complexes containing  $\eta^3$ -bonded phenalenide anions undergo rapid migration of the metal centre between the three rings of the  $\pi$ -system.

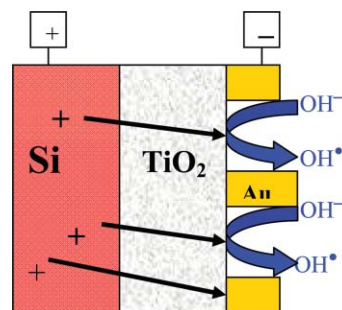


4022

### A novel electrochemical device for the disinfection of fluids by OH radicals

P. A. Christensen,\* T. A. Egerton, W. F. Lin, P. Meynet, Z.-G. Shao and N. G. Wright

Hole transfer from Si to the  $\text{TiO}_2$ /water interface by applying a negative potential to the Au grid on a Si/ $\text{TiO}_2$ /Au device, prepared by PVD, gives 'photocatalytic disinfection' without photons.

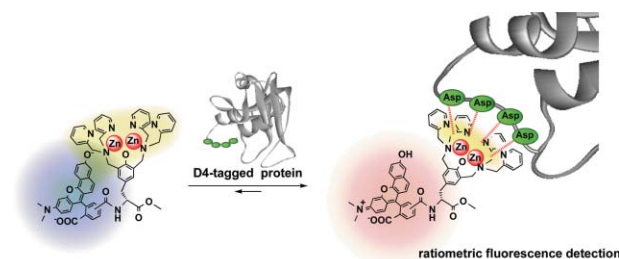


4024

### Ratiometric fluorescence detection of a tag fused protein using the dual-emission artificial molecular probe

Kei Honda, Eiji Nakata, Akio Ojida and Itaru Hamachi\*

We have successfully developed a ratiometric detection system for proteins of interest using the complementary recognition pair of the tetra-aspartate peptide tag and the SNARF-appended Zn(II)-DpaTyr probe.

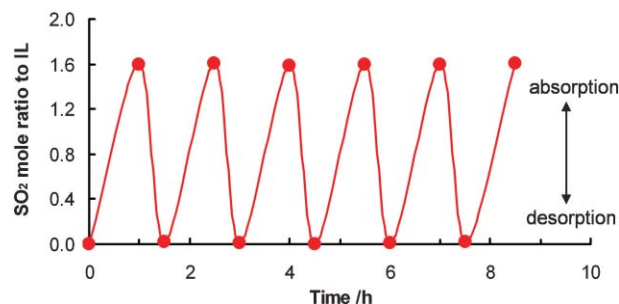


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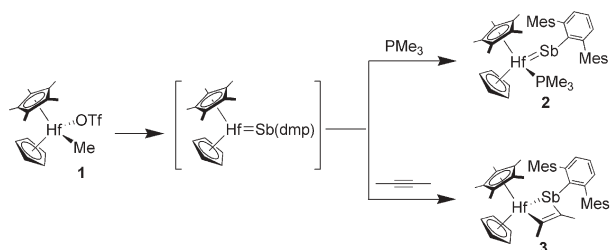
### Reversible physical absorption of $\text{SO}_2$ by ionic liquids

Jun Huang, Anders Riisager,\* Peter Wasserscheid and Rasmus Fehrmann

Ionic liquids can reversibly absorb large amounts of molecular  $\text{SO}_2$  gas under ambient conditions with the gas captured in a restricted configuration, possibly allowing  $\text{SO}_2$  to probe the internal cavity structures in ionic liquids besides being useful for  $\text{SO}_2$  removal in pollution control.



4030

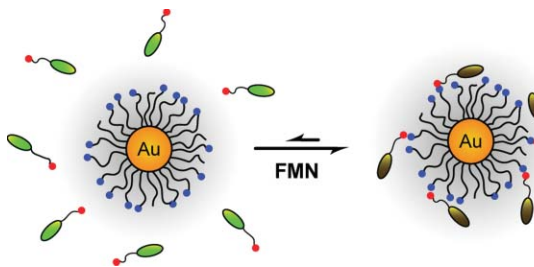


### Terminal stibinidene ligands. Generation of CpCp\*Hf=Sb(dmp) and trapping reactions with PMe<sub>3</sub> and 2-butyne

Rory Waterman and T. Don Tilley\*

Treatment of CpCp\*HfMe(OTf) (**1**) with LiSbH(dmp) followed by  $\alpha$ -abstraction then trapping with PMe<sub>3</sub> or 2-butyne gives CpCp\*Hf(PMe<sub>3</sub>)=Sb(dmp) (**2**) and CpCp\*Hf[ $\eta^2$ -Sb,C:Sb(dmp)C(Me)=C(Me)] (**3**), respectively.

4033

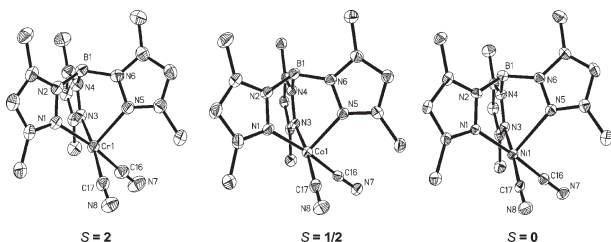


### Model systems for flavoenzyme activity: Recognition and redox modulation of flavin mononucleotide in water using nanoparticles

Ali Bayir, Brian J. Jordan, Ayush Verma, Michael A. Pollier, Graeme Cooke and Vincent M. Rotello\*

Gold nanoparticles provide high affinity hosts for flavin mononucleotide that biomimetically shift the redox potential of the flavin.

4036



### Syntheses, structures, and magnetic characterization of dicyanometalate(II) building blocks: [NEt<sub>4</sub>][(Tp\*)M<sup>II</sup>(CN)<sub>2</sub>] [M<sup>II</sup> = Cr, Co, Ni; Tp\* = hydridotris(3,5-dimethylpyrazol-1-yl)borate]

Dongfeng Li, Chad Ruschman, Sean Parkin, Rodolphe Clérac and Stephen M. Holmes\*

The syntheses, structures, spectroscopic and magnetic properties of three dicyanometalate(II) complexes, (**1**, Cr; **2**, Co; **3**, Ni) are described. Magnetic studies suggest that **1–3** exhibit  $S = 2$ ,  $1/2$ , and 0 spin ground states, respectively.

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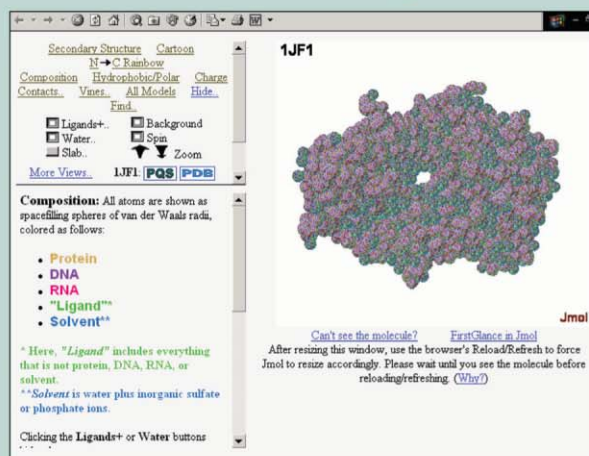
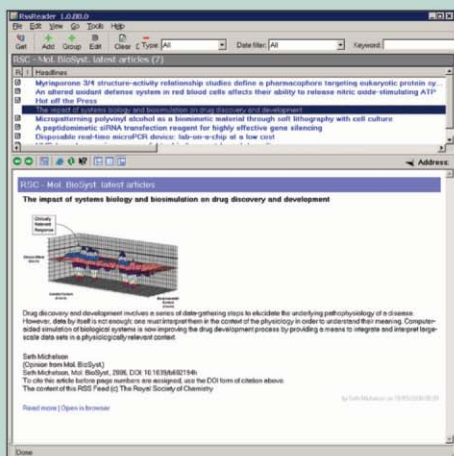
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