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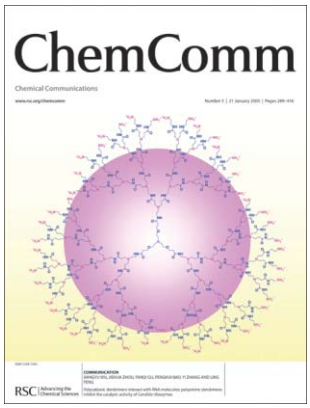
Cover
This review highlights the unique features of nanoparticles that make them particularly useful for biomacromolecular recognition, and modulation of biomacromolecule structure and function. See p. 303.



Inside cover
Polycationic dendrimers interact with RNA molecules: polyamine dendrimers inhibit the catalytic activity of *Candida* ribozymes. See p. 313.

CHEMICAL TECHNOLOGY

T1

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Chemical Technology

January 2005/Volume 2/Issue 1

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FEATURE ARTICLE

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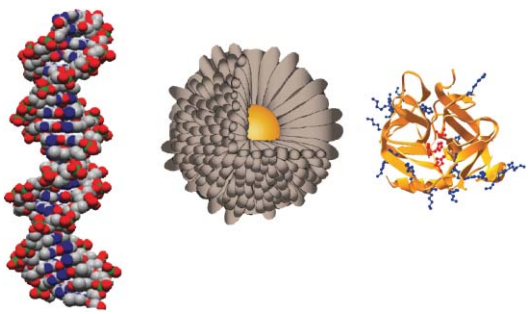
Surface recognition of biomacromolecules using nanoparticle receptors

Ayush Verma and Vincent M. Rotello*

Nanoparticles present a versatile scaffold to target biomacromolecule surfaces *via* complementary interactions. This review highlights some unique features of nanoparticles that make them particularly attractive resources for biomacromolecular recognition, and displays their use in modulation of structure and function of biomacromolecules.



Chemical Communications (print: ISSN 1359-7345; electronic: ISSN1364-548X) is published 48 times a year by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge, UK CB4 0WF. All orders accompanied by payment should be sent directly to Portland Customer Services, Commerce Way, Colchester, Essex, UK CO2 8HP. Tel +44 (0)1206 226050; E-mail sales@rscdistribution.org

2005 Annual (print + electronic) subscription price: £1595; US$2635. 2005 Annual (electronic) subscription price: £1435; US$2370. Customers in Canada will be subject to a surcharge to cover GST. Customers in the EU subscribing to the electronic version only will be charged VAT. If you take an institutional subscription to any RSC journal you are entitled to free, site-wide web access to that journal. You can arrange access via Internet Protocol (IP) address at www.rsc.org/ip. Customers should make payments by cheque in sterling payable on a UK clearing bank or in US dollars payable on a US clearing bank. Periodicals postage paid at Rahway, NJ, USA and at additional mailing offices. Airfreight and mailing in the USA by Mercury Airfreight International Ltd., 365 Blair Road, Avenel, NJ 07001, USA. US Postmaster: send address changes to Chemical Communications, c/o Mercury Airfreight International Ltd., 365 Blair Road, Avenel, NJ 07001. All despatches outside the UK by Consolidated Airfreight.
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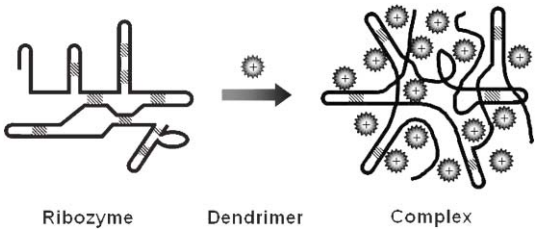

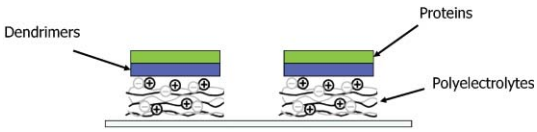

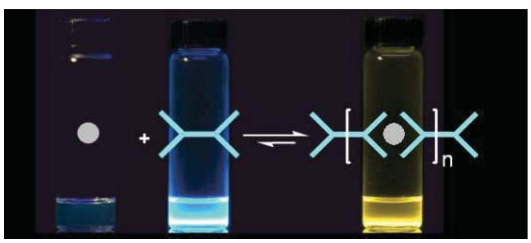

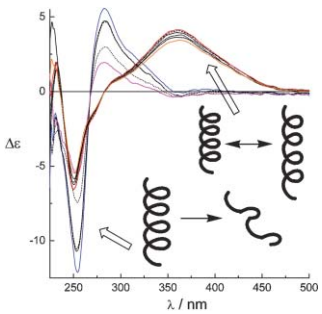

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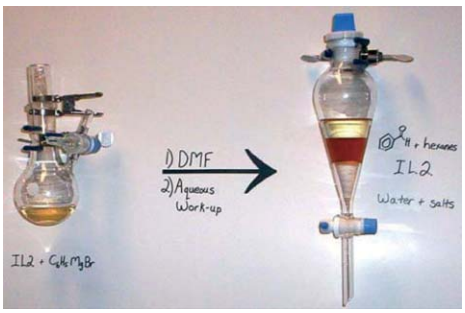

Phosphonium ionic liquids as reaction media for strong bases

Taramatee Ramnial, Daisuke D. Ino and Jason A. C. Clyburne*

Grignard reagents form stable solutions with phosphonium ionic liquids. The stability of these solutions appears to be kinetic in origin.

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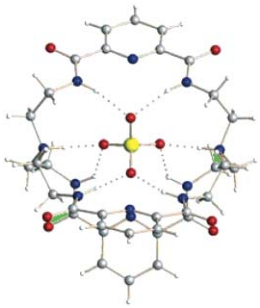

Encapsulated sulfates: insight to binding propensities

Sung Ok Kang, Md. Alamgir Hossain, Douglas Powell and Kristin Bowman-James*

Two crystal structures of sulfate inclusion complexes in an aza- and amido-cryptand indicate penta- and octa-coordination, respectively, and represent the first examples of encapsulated sulfate in synthetic cryptand receptors.

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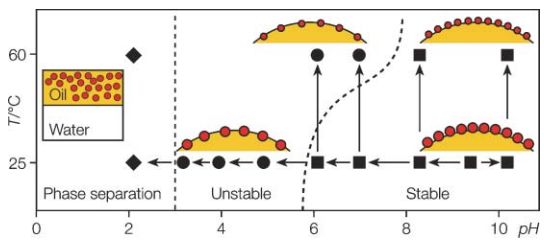

Novel emulsions stabilized by pH and temperature sensitive microgels

To Ngai, Sven Holger Behrens* and Helmut Auweter

Surfactant-free oil-in-water emulsions prepared with temperature and pH sensitive poly(*N*-isopropylacrylamide) (PNIPAM) microgel particles offer unprecedented control of emulsion stability.

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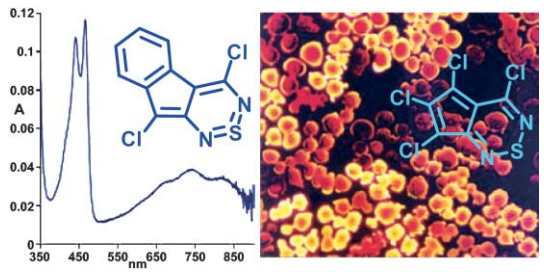
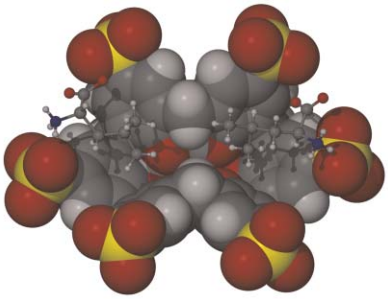
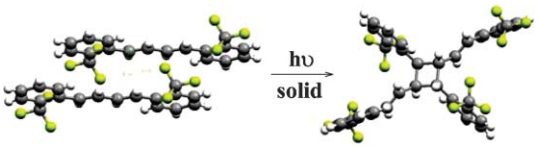


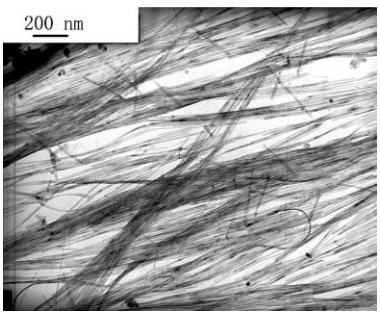
Cyclopentathiadiazines, new heterocyclic materials from cyclic enaminonitriles

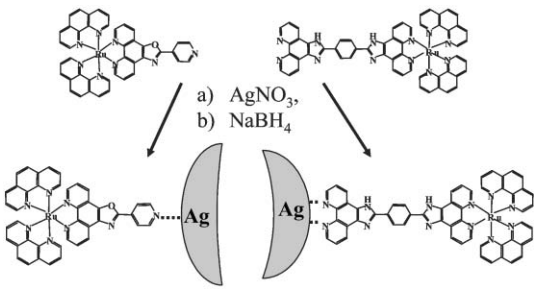
Sonia Macho, Daniel Miguel, Ana G. Neo, Teresa Rodríguez and Tomás Torroba*

Indene and cyclopentene enaminonitriles were reacted with SCl_2, $^tBu_3N$ and NCS to give the first cyclopenta[1,2,6]thiadiazines that showed unusual characteristics, one as a near-infrared dye and another as a liquid crystal.









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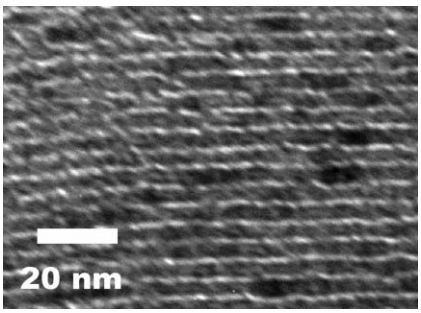

Metallic Ni nanoparticles confined in hexagonally ordered mesoporous silica material

Katsutoshi Yamamoto, Yoji Sunagawa, Hideyuki Takahashi and Atsushi Muramatsu*

Single nanometer-sized metallic Ni particles are efficiently introduced into a hexagonally ordered mesoporous silica material by using a liquid-phase reductive deposition method.

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Rapid synthesis and visible photoluminescence of ZnS nanobelts

Jiangfeng Gong, Shaoguang Yang,* Junhong Duan, Rong Zhang and Youwei Du

Belt-like ZnS was synthesized rapidly by Zn and S in the vapor phase. A blue-green photoluminescence microscopic image was observed under the excitation of ultraviolet light.

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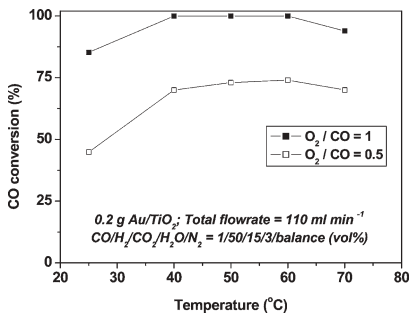

Preparation of Au/TiO_2 for catalytic preferential oxidation of CO under a hydrogen rich atmosphere at around room temperature

Wen-Yueh Yu, Chien-Pang Yang, Jiunn-Nan Lin, Chien-Nan Kuo and Ben-Zu Wan*

Au/TiO_2 prepared in a pH adjusted gold solution by a deposition–precipitation method can possess high activity and stability for selective CO oxidation in a H_2 rich stream at close to room temperature.

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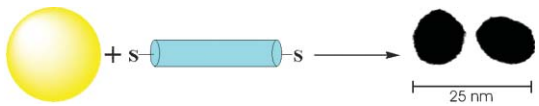

Sulfide-capped wire-like metallaynes as connectors for Au nanoparticle assemblies

Jie-Wen Ying, David R. Sobransingh, Guo-Lin Xu, Angel E. Kaifer* and Tong Ren*

New rigid-rod, conjugated Ru_2 metallaynes were used as gold nanoparticle tethers taking advantage of their terminal sulfide functional groups.

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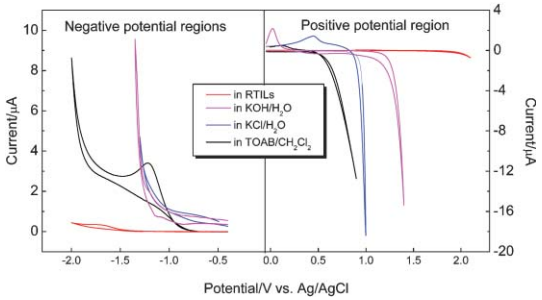
Room-temperature ionic liquids as media to enhance the electrochemical stability of self-assembled monolayers of alkanethiols on gold electrodes

Jinghong Li,* Yanfei Shen, Yuanjian Zhang and Yang Liu

The electrochemical stability of self-assembled monolayers was greatly enhanced by using room-temperature ionic liquids due to the unique properties of RTILs such as the high viscosity and large ion size.



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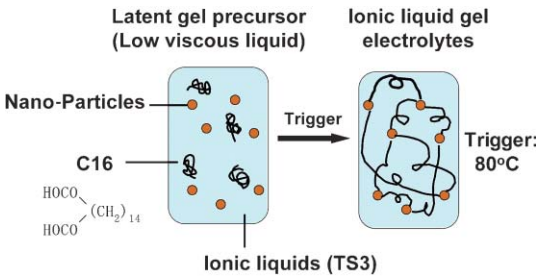
Latent gel electrolyte precursors for quasi-solid dye sensitized solar cells

Takehito Kato, Akio Okazaki and Shuzi Hayase*

Latent gel electrolyte precursors exhibit a long shelf life at room temperature and swift solidification at 80 °C.



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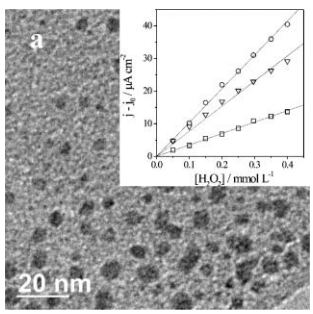
Synthesis, characterization and immobilization of Prussian blue nanoparticles. A potential tool for biosensing devices

Pablo A. Fiorito, Vinicius R. Gonçales, Eduardo A. Ponzio and Susana I. Córdoba de Torresi*

Well-organized Prussian blue (PB) particles of *ca.* 5 nm size were synthesized and immobilized in a multilayer structure, as a strategy for the potential development of an amperometric transducer for oxidase-enzyme-based biosensors.



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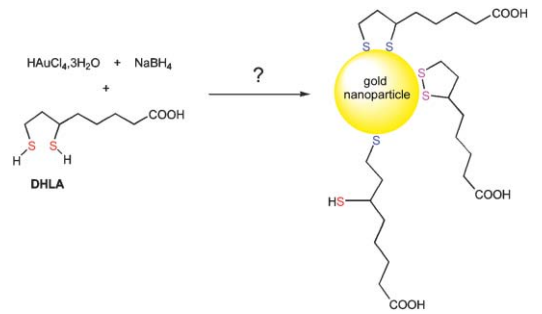
Sulfur K-edge XANES study of dihydrolipoic acid capped gold nanoparticles: dihydrolipoic acid is bound by both sulfur ends

Bruno Garcia, Murielle Salomé, Laurence Lemelle, Jean-Luc Bridot, Phillipe Gillet, Pascal Perriat, Stéphane Roux* and Olivier Tillement

Sulfur K-edge XANES spectroscopy was used to determine the grafting mode of DHLA on gold particles prepared by reducing gold salt in presence of DHLA.



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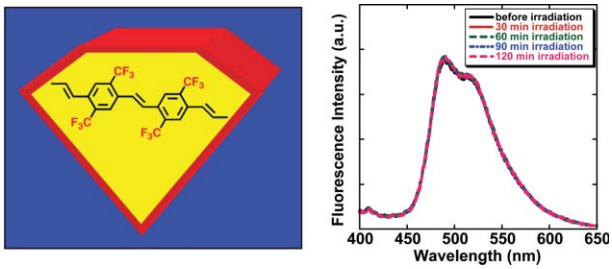

Ultra-photostable n-type PPVs

Youngmi Kim and Timothy M. Swager*

Unbleachable polymer: a perfluoroalkane substituted PPV shows remarkable resistance to photodamage.

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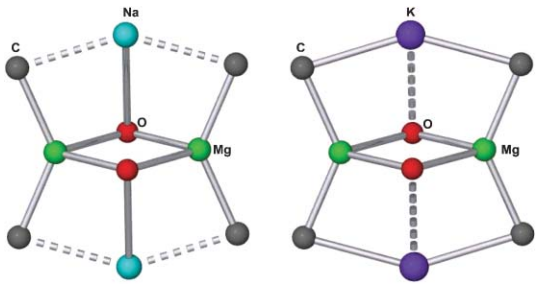

Crystallographic characterisation of binary alkali metal alkoxide–magnesium bis(alkyl) mixtures: differential binding of Na^+ and K^+ to a common dinuclear diorganomagnesiate

Nicholas D. R. Barnett, William Clegg, Alan R. Kennedy, Robert E. Mulvey* and Susan Weatherstone

Relevant to understanding the mode of action of "superbase" reagents, two crystal structures of mixed alkali metal–magnesium bis(alkyl) complexes reveal a major distinction in the way that Na^+ and K^+ bind to the organoC/O moiety.

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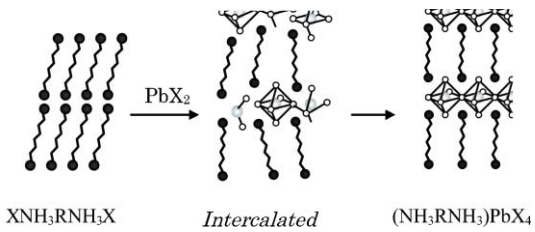

Intercalated formation of two-dimensional and multi-layered perovskites in organic thin films

Yuko Takeoka, Miyuki Fukasawa, Takashi Matsui, Kentaro Kikuchi, Masahiro Rikukawa* and Kohei Sanui

Two-dimensional layered perovskite $[NH_3(CH_2)_{12}NH_3]PbBr_4$ with a quantum confinement effect has been naturally formed by intercalating lead bromide into organic alkyldiammonium bromide frameworks.

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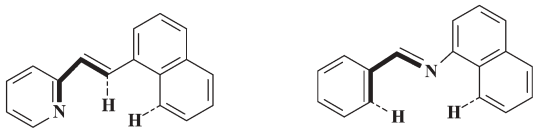

Meridional bicyclometalation with iron: a novel way of forming dianionic [C,N,C]-ligands

Hans-Friedrich Klein, Sebnem Camadanli, Robert Beck and Ulrich Flörke

Bicyclometalation of aromatic substrates containing imine anchoring groups is achieved with a dimethyliron complex at −70 °C. Azadiene systems undergo a regiospecific activation of 1,4-CH/N interchanged C–H bonds which may be aromatic or vinylic.

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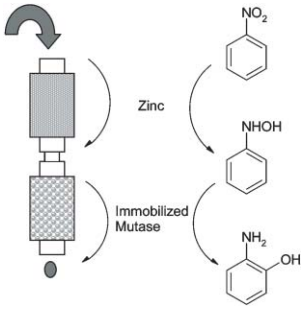
Continuous synthesis of aminophenols from nitroaromatic compounds by combination of metal and biocatalyst

Heather R. Luckarift, Lloyd J. Nadeau and Jim C. Spain*

The combined action of immobilized hydroxylaminobenzene mutase and zinc in a flow-through system catalyzes the conversion of nitroaromatic compounds to the corresponding *ortho*-aminophenols, including a novel analog of chloramphenicol.



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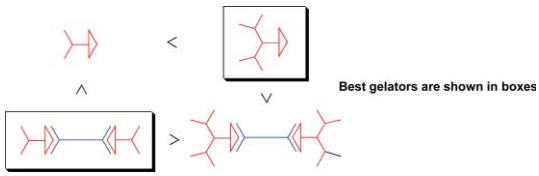
Controlling the materials properties and nanostructure of a single-component dendritic gel by adding a second component

John G. Hardy, Andrew R. Hirst, David K. Smith,* Colin Brennan and Ian Ashworth

Changing the dendritic generation of a gelator controls whether the system operates best on its own, or in combination with a second, supramolecular, complementary component.



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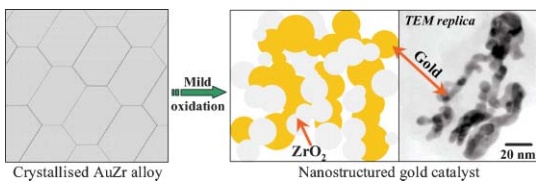
Preferential oxidation of CO in H_2 over highly loaded Au/ZrO_2 catalysts obtained by direct oxidation of bulk alloy

Marc Lomello-Tafin, Abdel Ait Chaou, Franck Morfin, Valérie Caps and Jean-Luc Rousset*

The intimate mixture of a skeletal gold structure with ZrO_2 nanoparticles obtained simply by oxidation of $Au_{0.5}Zr_{0.5}$ alloy at room temperature turns out to be an efficient catalyst for the selective oxidation of CO in the presence of hydrogen.



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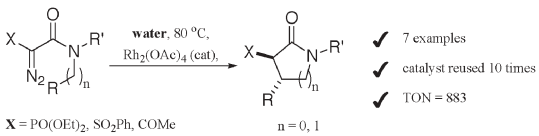
Rh(II) catalysed intramolecular C–H insertion of diazo substrates in water: a simple and efficient approach to catalyst reuse

Nuno R. Candeias, Pedro M. P. Gois and Carlos A. M. Afonso*

The $Rh_2(OAc)_4$ catalysed intramolecular C–H insertion of diazo substrates can be performed in water without competitive O–H insertion and the catalyst can be efficiently reused.



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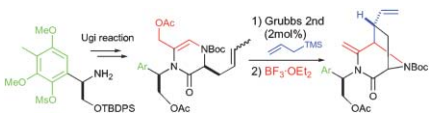

Synthetic studies on (−)-lemonomycin: stereocontrolled construction of the 3,8-diazabicyclo[3.2.1] skeleton

Kentaro Rikimaru, Kazuki Mori, Toshiyuki Kan and Tohru Fukuyama*

Stereocontrolled synthesis of the bicyclo[3.2.1]octane framework of (−)- lemonomycin (**1**) has been accomplished by using the Ugi 4-CC reaction, a cross-metathesis with allylsilane and a subsequent intramolecular Hosomi–Sakurai type reaction.

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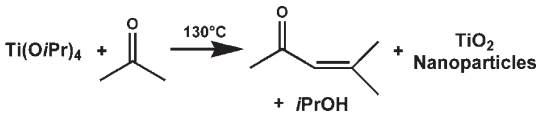

Nonaqueous synthesis of crystalline anatase nanoparticles in simple ketones and aldehydes as oxygen-supplying agents

Georg Garnweitner, Markus Antonietti and Markus Niederberger*

The reaction between titanium isopropoxide and simple ketones and aldehydes allows the preparation of crystalline anatase nanoparticles. According to the organic species present in the final reaction mixture, mainly aldol-like condensations are involved in the oxide formation.

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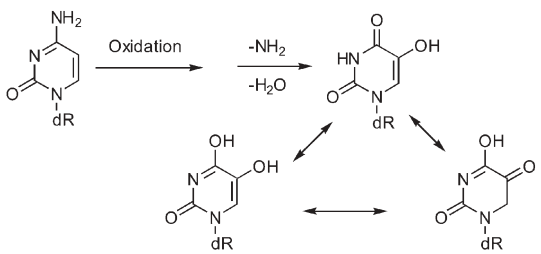

5-Hydroxyuracil can form stable base pairs with all four bases in a DNA duplex

Varatharasa Thiviyanathan, Anoma Somasunderam, David E. Volk and David G. Gorenstein*

5-Hydroxyuracil, produced by oxidative deamination of cytosines, is the major chemical precursor for transition mutations in DNA, and forms stable base pairs with all four DNA bases.

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Tetraarylethylene having two nitroxide groups: redox-switching of through-bond magnetic interaction by conformation change

Akihiro Ito, Yoshiaki Nakano, Tatsuhisa Kato and Kazuyoshi Tanaka*

Reversible redox-switching of through-bond magnetic interaction has been achieved by conformation change of the tetraarylethylene moiety upon redox input: intramolecular magnetic interaction between two nitroxide groups is dead after oxidation, whereas it was alive before.

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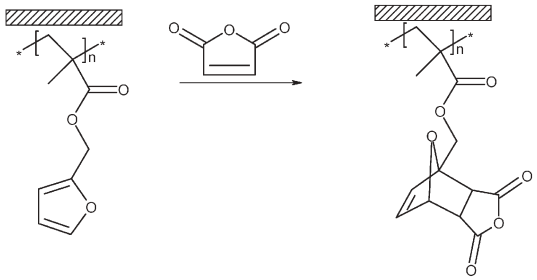
Diels–Alder chemistry at furan ring functionalized solid surfaces

Cinzia Tarducci, Jas Pal S. Badyal,* Stuart A. Brewer and Colin Willis

A substrate-independent method for Diels–Alder chemistry at solid surfaces is described for the first time.



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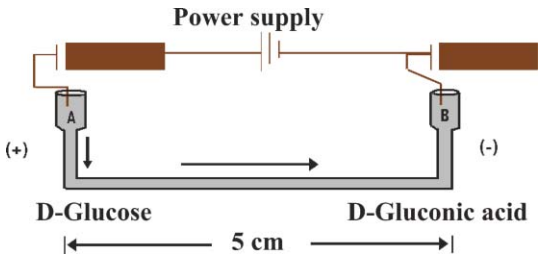
Development and application of a simple capillary-microreactor for oxidation of glucose with a porous gold catalyst

Chanbasha Basheer, Sindhu Swaminathan, Hian Kee Lee* and Suresh Valiyaveettil*

A novel low cost capillary microreactor for oxidation of glucose to gluconic acid is designed and developed. Porous gold sponge was used as the catalyst.



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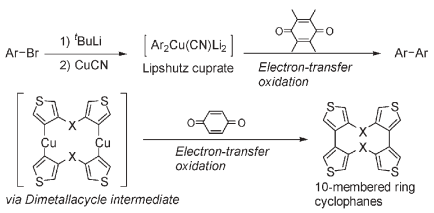
Novel electron-transfer oxidation of Lipshutz cuprates with 1,4-benzoquinones: an efficient homo-coupling reaction of aryl halides and its application to the construction of macrocyclic systems

Yoshihiro Miyake, Mo Wu, M. Jalilur Rahman and Masahiko Iyoda*

The electron transfer reaction from Lipshutz cuprates to 1,4-benzoquinones was found to proceed smoothly, affording either the corresponding homo-coupling products, in modest to excellent yields, or macrocyclic products selectively.



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