VIP *The following Communications have been judged by at least two referees to be "very important papers" and will be published online at www.angewandte.org soon:*

*A. Pal, M. Bérubé, D. G. Hall**
Design, Synthesis, and Screening of a Library of Peptidyl Bisboroxoles as Low Molecular Weight Receptors for Complex Oligosaccharides in Water: Identification of a Receptor for the Tumor Marker TF-Antigen

*P. J. Malinowski, M. Derzsi, Z. Mazej, Z. Jagličić, B. Gaweł, W. Łasocha, W. Grochala**
Anomalously Strong Antiferromagnetism in Silver(II) Sulfate

*R. C. Driesener, M. R. Challand, S. E. McGlynn, E. M. Shepard, E. S. Boyd, J. B. Broderick, J. W. Peters, P. L. Roach**
[FeFe]-Hydrogenase Cyanide Ligands Derived From S-Adenosylmethionine-Dependent Cleavage of Tyrosine

*E. Kan, H. Xiang, C. Lee, F. Wu, J. Yang, M.-H. Whangbo**
Origin of the Ferroelectricity in Perovskites with s^0 A-Site Cations: Toward Near-Room-Temperature Multiferroics

A. Ciesielski, S. Lena, S. Masiero, G. P. Spada, P. Samorì**
Dynamers at the Solid–Liquid Interface: Controlling the Reversible Assembly/Reassembly Process Between Two Highly Ordered Supramolecular Guanine Motifs

*M. Alcarazo, T. Stork, A. Anoop, W. Thiel, A. Fürstner**
Steering the Surprisingly Modular π-Acceptor Properties of N-Heterocyclic Carbenes: Implications for Gold Catalysis

H. Braunschweig, C.-W. Chiu, K. Radacki, T. Kupfer*
Synthesis and Structure of an Carbene-Stabilized π-Boryl Anion

S. Zhang, Y. Shao, G. Yin, Y. Lin**
Electrostatic Self-Assembly of Platinum-Around-Gold Nanocomposite with High Activity Towards Formic Acid Oxidation

DOI: 10.1002/anie.200907777

Frontiers of Chemistry in Paris


Figure 1. Maison de la Chimie.

On May 21, a Friday before a long weekend in most European countries, a symposium will take place at which 10 illustrious speakers including four Nobel Laureates will discuss some of the current frontiers of chemical research (see Table 1). As the symposium celebrates the 10th anniversary of *ChemBioChem* and *ChemPhysChem*, the lectures naturally focus on the interfaces of chemistry with physics, biology, and medicine. This focus should, however, be inspiring for every chemist regardless of whether his or her own research deals with synthetic organic or theoretical inorganic chemistry or any other specialised field. The symposium should be particularly attractive to PhD students and postdocs who can also present posters. While the symposium itself is only a one-day event, the posters will be available online for a three-month period.

As *ChemBioChem* and *ChemPhysChem* are published by Wiley-VCH on behalf of ChemPubSoc Europe (which comprises 14 European chemical societies including the Société Chimique de France, SFC), the symposium has been organized by all three associations (with the help of LDO, a professional organizer of scientific conferences). The venue is most fittingly the Maison de la Chimie in the heart of Paris (Figure 1). The moderate registration fee covers coffee breaks and a buffet lunch. Are you interested? Then please go to http://www.chembiophyschem.org for more information.

Table 1: Lectures.

Gerhard Ertl	Reactions at Surfaces: From Atoms to Complexity
Michel Orrit	Nano-optics: A Window on Structure and Dynamics at Molecular Scales
Marc Fontecave	From Enzymes to Nanocatalysts: The Case of Hydrogenases
Alan R. Fersht	Tumour Suppressor p53: From Structure to Drug Discovery
Michael Grätzel	Molecular Photovoltaics and Mesoscopic Solar Cells
Roger Y. Tsien	Breeding and Building Molecules for Imaging
Nicolas Winssinger	Translating Instructions into Function by Self Assembly
Luisa De Cola	Nanomaterials: Properties, Assemblies and Biomedical Applications
Ada Yonath	The Ribosome: The Remnant of an Ancient Translation Apparatus

I look forward to seeing you in Paris!

Peter Goelitz

Contents

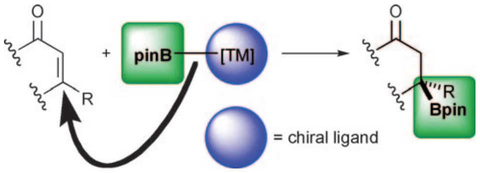
Author Profile

"In a nutshell, my research involves understanding how molecules work.
The biggest challenge facing scientists is securing sufficient renewable energy resources. …"
This and more about Martin Kaupp can be found on page 1190.

Books

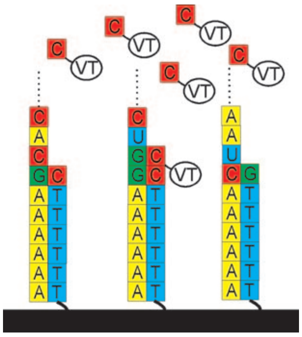
Highlights

Asymmetric Catalysis



Learn your ABCs! The asymmetric borylation in conjugate fashion has rapidly progressed in recent years if not months (see scheme, pin = pinacolato, TM = transition metal). This Highlight summarizes these breathtaking developments, including a mechanistic analysis. An outlook onto a future asymmetric organocatalysis is presented as well.

RNA Sequencing



Direct RNA sequencing (DRS) is based on the principle of single-molecule sequencing by synthesis. This next-generation sequencing technology requires only minute amounts of RNA and has the potential to make snapshots of the transcriptome of any given cell population without the need for copying to cDNA.

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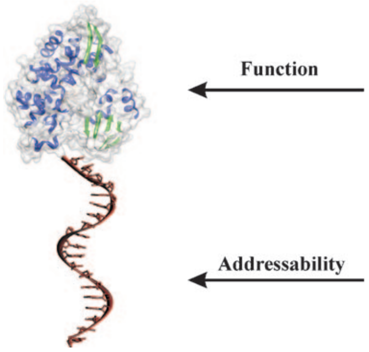
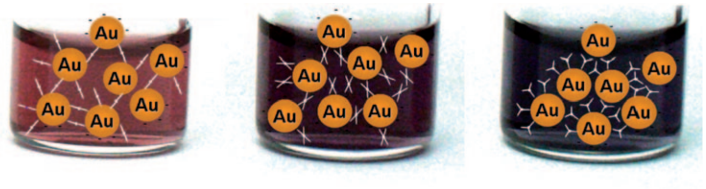
Reviews

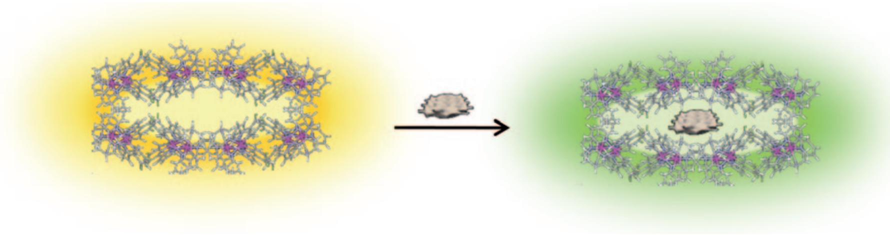


The best of both worlds: Semisynthetic conjugates of DNA oligonucleotides and proteins (see picture for an example) combine the self-assembly properties of nucleic acids with the large repertoire of protein functionality optimized by evolution. This Review surveys chemical approaches to generate DNA–protein hybrids as well as their application in biosensing, molecular nanofabrication, and materials science.

Communications



Stolen identity: The molecular geometries of a series of cross-linkers that bear between one and four pyridyl moieties are expressed in the optical properties of AuNP assemblies (see picture). TEM analysis indicates that the molecular-level structural differences of the cross-linkers are also transferred at the submicrometer level in the formation of the AuNP assemblies.



Let your light shine: A new class of noncovalently linked crystalline porous materials is based on luminescent iridium complexes. Pairs complexes possessing different emission colors and complementary charges form complex salts. The crystalline materials form 3D porous motifs, and the emission color can be tuned by inclusion of a solvent or by selective quenching of one of the components of the crystal.

Frontiers of Chemistry:
From Molecules to Systems

A One-Day Symposium

Celebrating 10 Years of

On 21st May 2010 in Paris

at the Maison de la Chimie
(near the Eiffel Tower and Les Invalides)

Speakers

Gerhard Ertl
Nobel Prize 2007

Jean-Marie Lehn
Nobel Prize 1987

Roger Y. Tsien
Nobel Prize 2008

Ada Yonath
Nobel Prize 2009

Luisa De Cola

Alan R. Fersht

Marc Fontecave

Michael Grätzel

Michel Orrit

Nicolas Winssinger

Scientific committee

E. Amouyal, M. Che,
F. C. De Schryver,
A. R. Fersht, P. Gölitz,
J. T. Hynes, J.-M. Lehn

Posters

will be displayed also online from 1st April

www.chembiophyschem.org

Topics

catalysis, biochemical imaging, chemical biology, bionanotechnology, proteomics, spectroscopy, solar cells

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ChemPubSoc Europe

Société Chimique de France

Partner of the event sanofi aventis
Because health matters

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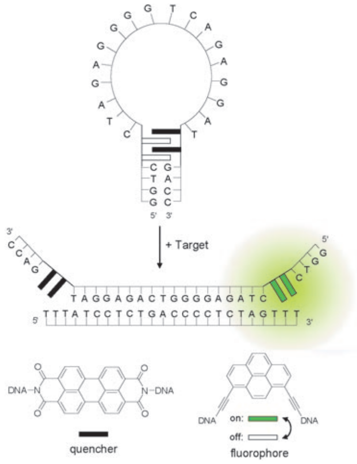
557101001

Non-nucleosidic chromophores in the stem of a molecular beacon inhibit excimer fluorescence through the formation of a donor–acceptor complex (see picture). The excellent reduction of the background fluorescence allows the detection of DNA and RNA targets in the presence of a significant excess of the probe.

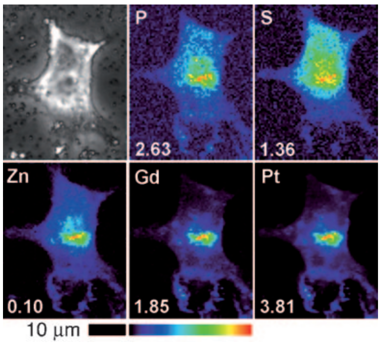


Molecular Beacons

R. Häner,* S. M. Biner, S. M. Langenegger, T. Meng, V. L. Malinovskii ____ 1227 – 1230

A Highly Sensitive, Excimer-Controlled Molecular Beacon

Hitching a ride: Treatment of A549 human lung carcinoma cells with a DNA metallointercalator complex results in the selective aggregation of the intact drug within the cell nuclei, as determined by synchrotron X-ray fluorescence (XRF) imaging (see images). This work is the first example of gadolinium delivery by a platinum complex to a tumor-cell nucleus.



Tumor Targeting

E. L. Crossley, J. B. Aitken, S. Vogt, H. H. Harris,* L. M. Rendina* ____ 1231 – 1233

Selective Aggregation of a Platinum–Gadolinium Complex Within a Tumor-Cell Nucleus

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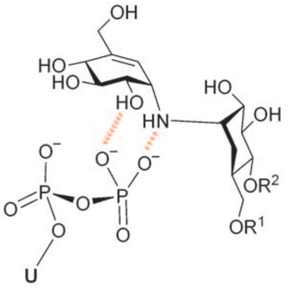

Structural “valid”-ation: The mechanism of enzyme-catalyzed glycosyl transfer with retention of anomeric configuration continues to baffle, a situation compounded by the lack of insightful 3-D structures of ternary enzyme complexes. Synthesis and multi-dimensional kinetic analysis of validoxylamine derivatives are used to access the 3-D structure of a ternary complex (see picture; U = uridyl) providing insight into the geometry and donor–acceptor interplay at the glycosyltransfer site.

Glycosyltransferase Inhibitors

J. C. Errey, S. S. Lee, R. P. Gibson, C. Martinez Fleites, C. S. Barry, P. M. J. Jung, A. C. O’Sullivan, B. G. Davis,* G. J. Davies* ____ 1234 – 1237

Mechanistic Insight into Enzymatic Glycosyl Transfer with Retention of Configuration through Analysis of Glycomimetic Inhibitors

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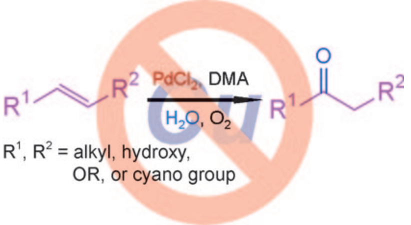


A simple catalyst system consisting of $PdCl_2$ and *N*,*N*-dimethylacetamide (DMA) as the solvent can successfully promote Wacker-type oxidation of internal olefins. This catalyst system does not require copper compounds and is tolerant of a wide range of substrates having internal olefins.

Synthetic Methods

T. Mitsudome, K. Mizumoto, T. Mizugaki, K. Jitsukawa, K. Kaneda* ____ 1238 – 1240

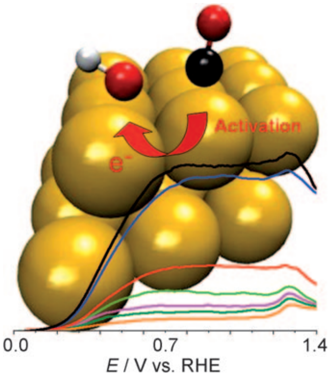
Wacker-Type Oxidation of Internal Olefins Using a $PdCl_2$/*N*,*N*-Dimethylacetamide Catalyst System under Copper-Free Reaction Conditions

Gold Electrochemistry

P. Rodríguez, A. A. Koverga,
M. T. M. Koper* ________ 1241 – 1243

Carbon Monoxide as a Promoter for its own Oxidation on a Gold Electrode

Goldeneye: A model for CO oxidation on gold electrodes in alkaline media is presented, and it assumes that CO enhances the adsorption of its own oxidant. This model explains a reaction order larger than 1, and that dissolved CO was easier to oxidize than adsorbed CO. DFT calculations confirmed that CO and OH enhanced each other's binding on the Au(111) surface. C black, O red, H gray.

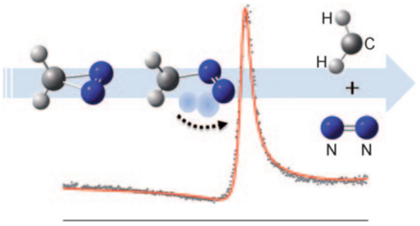


Chemical Dynamics

D.-S. Ahn, S.-Y. Kim, G.-I. Lim, S. Lee,*
Y. S. Choi,* S. K. Kim* ________ 1244 – 1247

Mode-Dependent Fano Resonances Observed in the Predissociation of Diazirine in the S_1 State

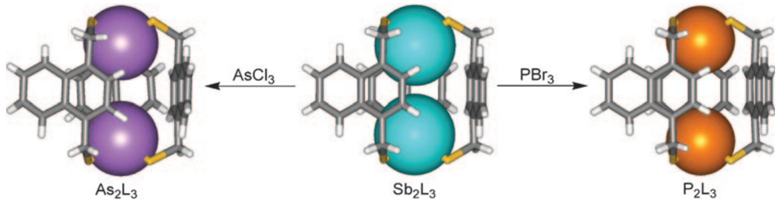
Lights, spectrometer, action: Crucial information about the detailed shape of the potential-energy surface in the vicinity of the transition state is obtained from the Fano resonances in the photodissociation cross-section of diazirine in the S_1 state. The excitation along the asymmetric C–N stretching mode accelerates the ring-opening reaction, suggesting that two C–N bonds of the excited diazirine break in a stepwise manner (see scheme).



Supramolecular Chemistry

V. M. Cangelosi, L. N. Zakharov,
D. W. Johnson* ________ 1248 – 1251

Supramolecular "Transmetalation" Leads to an Unusual Self-Assembled P_2L_3 Cryptand

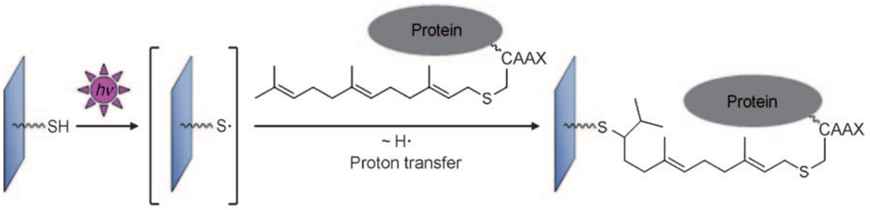


Out with the old, in with the new: Can the transmetalation of metal–organic supramolecular assemblies lead to new structure types? A series of Bi, Sb, and As-containing cryptands is reported that can be transmetalated to give a novel P_2L_3 cryptand (see scheme). The P–S bonds behave reversibly, like traditional metal–ligand bonds, suggesting a possible new motif for dynamic covalent chemistry.

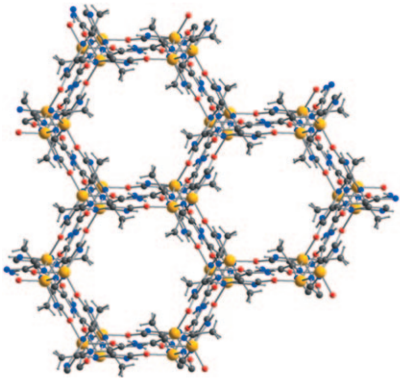
Protein Microarrays

D. Weinrich, P.-C. Lin, P. Jonkheijm,
U. T. T. Nguyen, H. Schröder,
C. M. Niemeyer, K. Alexandrov, R. Goody,
H. Waldmann* ________ 1252 – 1257

Oriented Immobilization of Farnesylated Proteins by the Thiol-Ene Reaction



Anchoring the protein: Proteins were immobilized rapidly under mild conditions by thiol-ene photocoupling between S-farnesyl groups attached to a genetically encodable "CAAX-box" tetrapeptide sequence (A is aliphatic) at the C terminus of the protein and surface-exposed thiols (see scheme). This method enables the oriented covalent immobilization of proteins directly from expression lysates without additional purification or derivatization steps.



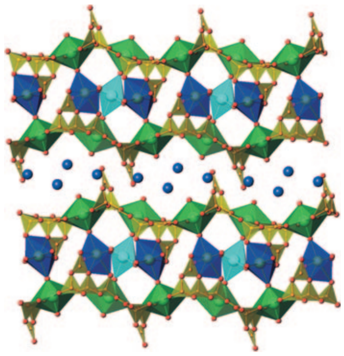
Narrow channels with polar walls are the structural and functional features responsible for the high capacity of a zinc–organic framework based on an imidazolate–amide–imidate ligand for the uptake of H_2 and CO_2 (see structure: orange Zn, blue N, red O, dark gray C, light gray H). The rigid and stable chelating ligand was synthesized in situ by partial hydrolysis of a dicyanoimidazole compound.

Metal–Organic Frameworks

F. Debatin, A. Thomas, A. Kelling, N. Hedin, Z. Bacsik, I. Senkovska, S. Kaskel, M. Junginger, H. Müller, U. Schilde, C. Jäger, A. Friedrich, H.-J. Holdt* ______ **1258 – 1262**

In Situ Synthesis of an Imidazolate-4-amide-5-imidate Ligand and Formation of a Microporous Zinc–Organic Framework with H_2-and CO_2-Storage Ability

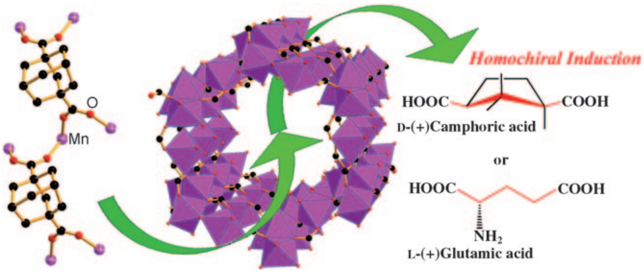
Not like the others: In contrast to uranium and plutonium borates, neptunium borates are mixed-valent and simultaneously display three coordination environments and three oxidation states (see picture; polyhedra: Np^{IV} light blue, Np^{V} dark blue, Np^{VI} green, B yellow; spheres: O red, K or Ba blue).



Actinides

S. Wang, E. V. Alekseev, J. Ling, S. Skanthakumar, L. Soderholm, W. Depmeier, T. E. Albrecht-Schmitt* ______ **1263 – 1266**

Neptunium Diverges Sharply from Uranium and Plutonium in Crystalline Borate Matrixes: Insights into the Complex Behavior of the Early Actinides Relevant to Nuclear Waste Storage

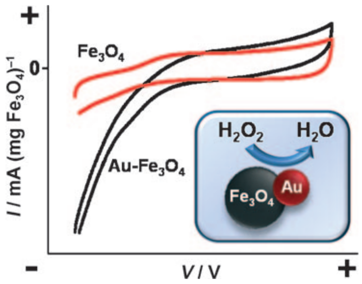


Something for nothing? A chiral induction reagent catalyzes the growth of chiral crystals and controls their bulk chirality. Time-dependent experiments show that an initial achiral phase is slowly converted into enantioenriched crystals in the presence of the chiral induction agent.

Chirality Induction

J. Zhang, S. Chen, R. A. Nieto, T. Wu, P. Feng, X. Bu* ______ **1267 – 1270**

A Tale of Three Carboxylates: Cooperative Asymmetric Crystallization of a Three-Dimensional Microporous Framework from Achiral Precursors



Dumbbell-like Au-Fe_3O_4 nanoparticles and their single-component counterparts, Au and Fe_3O_4, were compared regarding their H_2O_2 reduction capability. The Au-Fe_3O_4 nanoparticles are catalytically more active, which is attributed to polarization effects from Au to Fe_3O_4. This activity can be further tuned by the size of the nanoparticles.

Nanoparticle Properties

Y. Lee, M. A. Garcia, N. A. Frey Huls, S. Sun* ______ **1271 – 1274**

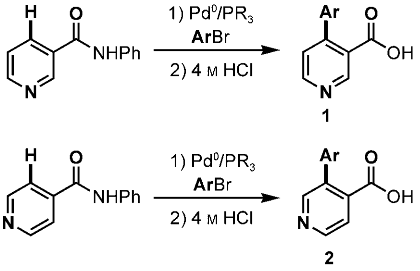
Synthetic Tuning of the Catalytic Properties of Au-Fe_3O_4 Nanoparticles

Contents

C–H Activation

M. Wasa, B. T. Worrell,
J.-Q. Yu* ______________ 1275 – 1277

Pd^0/PR$_3$-Catalyzed Arylation of Nicotinic and Isonicotinic Acid Derivatives

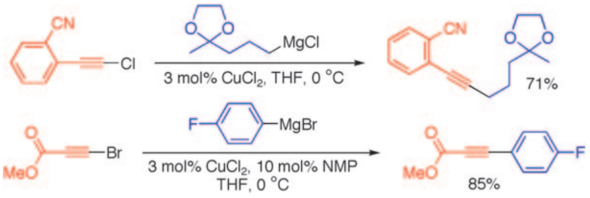


Good for your health: Intermolecular C–H functionalization of pyridine rings at the 3- and 4-positions is described using a Pd^0/PR$_3$/ArBr catalytic system. This reaction provides a powerful method for the preparation of structurally diverse nicotinic and isonicotinic acids that are of great importance in drug discovery.

Homogeneous Catalysis

G. Cahiez,* O. Gager,
J. Buendia ______________ 1278 – 1281

Copper-Catalyzed Cross-Coupling of Alkyl and Aryl Grignard Reagents with Alkynyl Halides

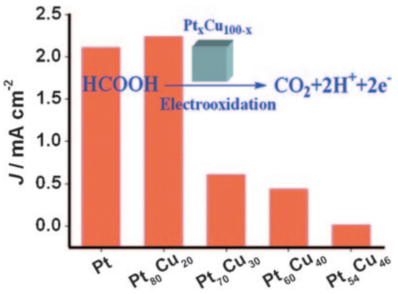


Good old copper! A new general procedure to couple aliphatic and aromatic Grignard reagents with alkynyl halides under copper catalysis is described (see scheme; NMP = *N*-methylpyrrolidinone). The reaction is chemoselective and allows preparation of a vast array of simple and functionalized internal alkynes in high yields.

Oxidation Catalysts

D. Xu, S. Bliznakov, Z. Liu, J. Fang,*
N. Dimitrov* ______________ 1282 – 1285

Composition-Dependent Electrocatalytic Activity of Pt-Cu Nanocube Catalysts for Formic Acid Oxidation

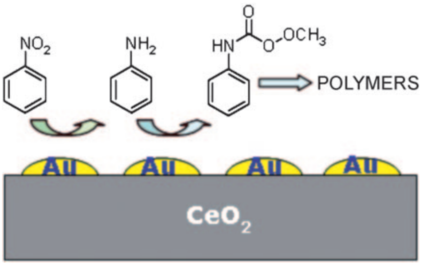


The die is cast: The electrocatalytic performance of Pt and Pt-Cu nanocubes with different compositions was investigated. Pt$_{80}$Cu$_{20}$ nanocubes were found to have high electrocatalytic activity and remarkable long-term stability for formic acid oxidation.

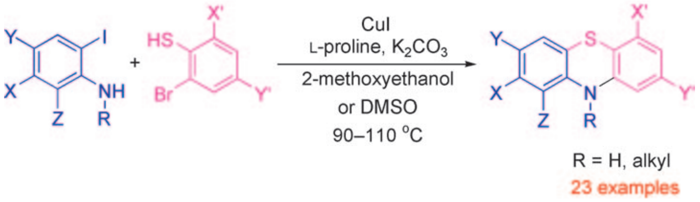
Supported Catalysts

R. Juárez, P. Concepción, A. Corma,*
V. Fornés, H. García* ______ 1286 – 1290

Gold-Catalyzed Phosgene-Free Synthesis of Polyurethane Precursors



Golden catalyst: In a two-step one-pot catalytic process gold nanoparticles supported on CeO$_2$ are able to convert nitroaromatics into aromatic carbamates, thereby providing an alternative phosgene-free route towards aromatic polyurethanes (see figure).



In the pro-line of fire: A general and efficient cascade reaction approach to substituted phenothiazines, which relies on controlled sequential CuI/L-proline-catalyzed C—S and C—N bond formations, is described. DMSO = dimethylsulfoxide.

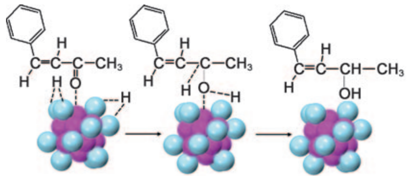
Homogeneous Catalysis

D. Ma,* Q. Geng, H. Zhang, Y. Jiang ———— **1291 – 1294**

Assembly of Substituted Phenothiazines by a Sequentially Controlled CuI/L-Proline-Catalyzed Cascade C—S and C—N Bond Formation

---

A golden opportunity: A mechanism has been proposed to account for the chemoselective hydrogenation of α,β-unsaturated ketones (or aldehydes) to unsaturated alcohols catalyzed by monodisperse $Au_{25}(SR)_{18}$ particles (see picture). Now that the structure of these nanoparticles is known, structure–activity correlations can be drawn.



Gold Nanocatalysts

Y. Zhu, H. Qian, B. A. Drake, R. Jin* ———— **1295 – 1298**

Atomically Precise $Au_{25}(SR)_{18}$ Nanoparticles as Catalysts for the Selective Hydrogenation of α,β-Unsaturated Ketones and Aldehydes

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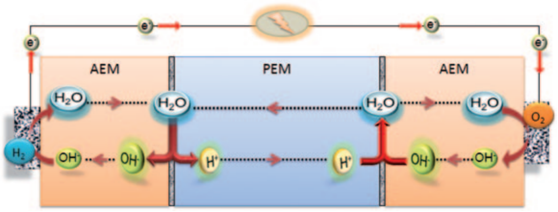


Smart management: A new hybrid fuel-cell configuration (see picture) exploits the stability and high ionic conductivity of proton-exchange materials (PEM) and electrochemical advantages of anion-exchange membrane (AEM) electrodes. Water management is significantly improved compared to traditional polymer electrolyte membrane fuel cells, allowing self-humidification of the cell.

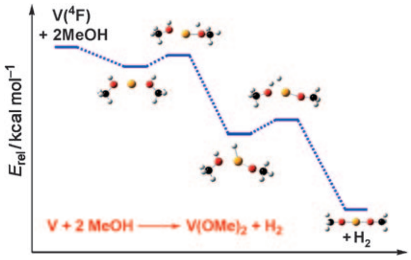
Hybrid Fuel Cell

M. Ünlü, J. Zhou, P. A. Kohl* ———— **1299 – 1301**

Hybrid Polymer Electrolyte Fuel Cells: Alkaline Electrodes with Proton Conducting Membrane

---

Implications for methanol fuel cells: In reactions of ground-state early-transition-metal atoms with methanol in an argon matrix, dihydrogen and methoxide salts $M(OMe)_2$ ($M = Sc, Ti, V, Nb$) form through spontaneous replacement reactions. This work demonstrates that hydrogen can be directly produced from the reactions of ground-state metal atoms with methanol even at cryogenic temperatures.



Matrix Isolation

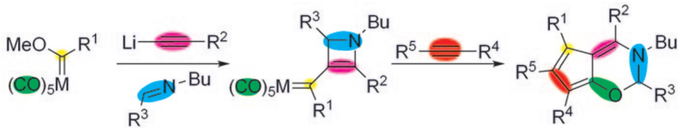
G. Wang, J. Su, Y. Gong, M. Zhou,* J. Li* ———— **1302 – 1305**

Chemistry on Single Atoms: Spontaneous Hydrogen Production from Reactions of Transition-Metal Atoms with Methanol at Cryogenic Temperatures

Synthetic Methods

J. Barluenga,* A. Gómez, J. Santamaría,
M. Tomás ______ **1306 – 1308**

Sequential Five-Component Construction of the Cyclopenta[*e*][1,3]oxazine Skeleton using Stable 2-Azetine Derivatives

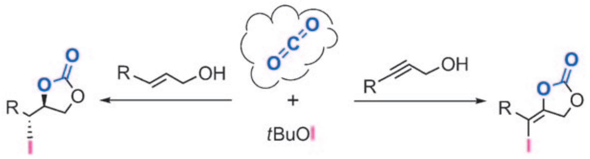


Hawaii Five-Oxazine: The sequential one-pot reaction of a methoxy-stabilized carbene with an acetylide and an imine provides stable, metal–carbene-containing 2-azetines. Subsequent mild treatment with an alkyne affords a regioselective, three-component cyclization route to fully substituted fused 1,3-oxazines.

CO_2 Fixation

S. Minakata,* I. Sasaki,
T. Ide ______ **1309 – 1311**

Atmospheric CO_2 Fixation by Unsaturated Alcohols Using *t*BuOI under Neutral Conditions

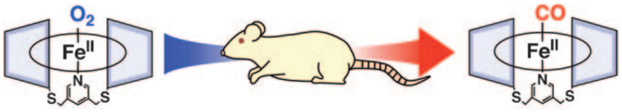


Hold on tight! Reaction of CO_2 with unsaturated alcohols and *t*BuOI to form cyclic carbonates leads to fixation of the greenhouse gas. In contrast to known CO_2 fixation methods, this process proceeds under extremely mild conditions.

In Vivo Chemistry

H. Kitagishi, S. Negi, A. Kiriyama,
A. Honbo, Y. Sugiura, A. T. Kawaguchi,
K. Kano* ______ **1312 – 1315**

A Diatomic Molecule Receptor That Removes CO in a Living Organism



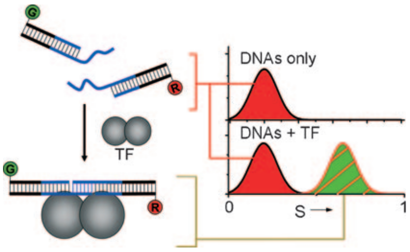
A CO stripper: The O_2-bound form of an iron(II) porphyrin cyclodextrin supramolecular complex (hemoCD) infused into a rat vein reacted with internal CO through ligand exchange, and the CO-bound hemoCD was immediately excreted in the urine (see picture). The hemoCD acting as a CO receptor made it possible to quantify endogenous CO in a living organism.

Synthetic Biology

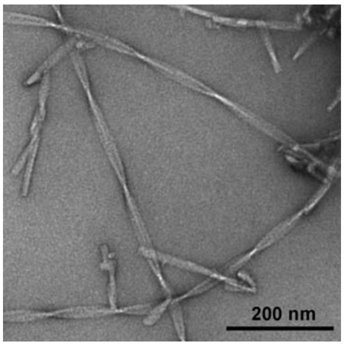
K. Lymperopoulos, R. Crawford,
J. P. Torella, M. Heilemann, L. C. Hwang,
S. J. Holden,
A. N. Kapanidis* ______ **1316 – 1320**

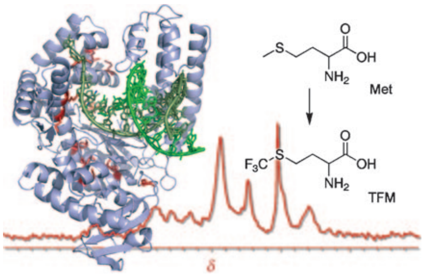
Single-Molecule DNA Biosensors for Protein and Ligand Detection

Transcription factors (TFs) control gene expression and are promising biomarkers for diseases. In a new, robust, and sensitive single-molecule fluorescence assay TFs and associated small molecules (such as nucleotides and sugars) are detected based on DNA coincidence of the two halves of the binding site (see picture; S = stoichiometry). The assay is compatible with measurements in solution, on solid supports, and even in complex biological samples.



Versatile nanomaterial: Unusually high nanoscale flexibility was displayed by amyloid fibils in electron microscopy studies (see picture). This finding is relevant for understanding amyloid pathogenicity and for potential biotechnological applications.





A multifluorinated DNA polymerase with all 14 methionine residues (Met; red in the structure) globally replaced by the non-natural amino acid trifluoromethionine (TFM) exhibits enzymatic activity and selectivity similar to the wild type. The fluorinated enzyme serves as a ^{19}F NMR probe, and despite its size of 63 kDa, individual ^{19}F resonances allow the study of enzyme dynamics during DNA synthesis by NMR spectroscopy.

Supporting information is available on www.angewandte.org (see article for access details).

A video clip is available as Supporting Information on www.angewandte.org (see article for access details).

Service

Corrigendum

In the fourth paragraph, the opening statement (“The ability of solution-phase NCs to organize into ordered arrays or superlattices was first reported in 1995 for CdSe NCs.[2]”) is incorrect. The first report was in 1989 for iron oxide particles. Reference [2] should therefore be replaced.

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[2] M. D. Bentzon, J. Van Wonterghem, S. Moerup, A. Tholen, C. J. W. Koch, *Philos. Mag. B* **1989**, *60*, 169.

All-Inorganic Nanocrystal Arrays

S. L. Brock* ______ **7484–7486**

Angew. Chem. Int. Ed. **2009**, *48*

DOI 10.1002/anie.200903989

Corrigendum

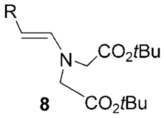
Stable Aziridinium Salts as Versatile Intermediates: Isolation and Regio- and Stereoselective Ring-Opening and Rearrangement

H. A. Song, M. Dadwal, Y. Lee, E. Mick, H.-S. Chong* ____________ **1328–1330**

Angew. Chem. Int. Ed. **2009**, *48*

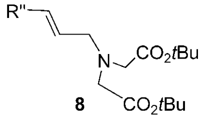
DOI 10.1002/anie.200805244

In this Communication, compounds **8** were incorrectly described as α,β-unsaturated amines. After careful examination of the NMR spectra, the authors concluded that compounds **8** are the corresponding allylic amines. This correction applies to the table of contents, Scheme 1, and Table 3 in the Communication, and to the Supporting Information. Furthermore, text passages in which **8** is referred to as a α,β-unsaturated amine have to be amended. The authors apologize for their oversight.



8

wrong structure:
α,β-unsaturated amine



8

correct structure:
allylic amine
$R = CH_2R''$

Corrigendum

A Population of Thermostable Reverse Transcriptases Evolved from *Thermus aquaticus* DNA Polymerase I by Phage Display

S. Vichier-Guerre, S. Ferris, N. Auberger, K. Mahiddine, J.-L. Jestin* __ **6133–6137**

Angew. Chem. Int. Ed. **2006**, *45*

DOI 10.1002/anie.200601217

After publication of this Communication, Dr. Fariborz Bahrami in our research group carried out a new fidelity assay. Instead of using commercially available rabbit globin mRNA (R1253, Sigma) as a template for the fidelity assay, a single clone was isolated and the corresponding DNA inserted into a pIVEX vector for in vitro transcription of the rabbit alpha globin gene into mRNA (V00875, NCBI). The high sequence diversity at positions 29, 48, and 49 of the alpha chain of rabbit globin was not observed in the new fidelity assay when using this in vitro transcribed mRNA as a template. We conclude that the sequence diversity at these positions did not result from polymerase-induced hotspot mutations during in vitro reverse transcription, but from distinct mRNA isoforms within the product R1253, which are not reported in the product specification sheet (Sigma), which have not been described at the nucleotide level (NCBI sequence database), and which were reported at the amino acid level.[1]

The estimates of the substitutions rates have therefore been revised. The natural and variant DNA polymerases have accordingly higher fidelities than previously estimated. The following two sentences replace the corresponding sentences on page 6135 (right column, penultimate paragraph) in the original publication.

"The substitution rates per base for RNA-dependent DNA polymerization of the most active variants, **5** (3.0×10^{-4}) and **14** (1.3×10^{-3}), were found to be similar or higher than that of avian myeloblastosis virus (AMV) RT (2.2×10^{-4}), which was used as a standard. Interestingly, the most abundant variant **21** (9.2×10^{-5}) had a fidelity which was about 2.5-times higher than that of AMV-RT."

The conclusions made in this Communication (last paragraph), however, remain unaltered. In particular, the observation that the catalytic efficiency of DNA polymerases can be improved by several orders of magnitude by using directed enzyme evolution by in vitro selection and phage display is unchanged.

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[1] T. Hunter, A. Munro, *Nature* **1969**, *223*, 1270–1272.