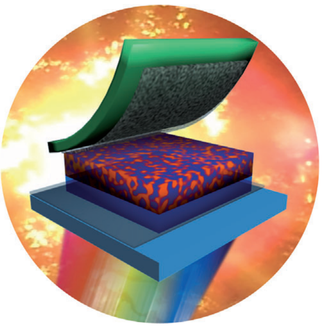
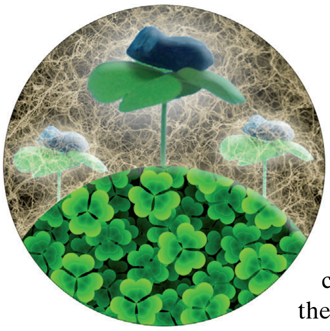
Quality through diversity ...

… has been a hallmark of *Angewandte Chemie* from the beginning, and this is no doubt also the case in the 125th year. This jubilee will be celebrated by a symposium on March 12, 2013 in Berlin, and the program is part of the current issue. The diversity of topics that appear in *Angewandte Chemie* is illustrated by the tag cloud in the cover picture. The diversity of countries from which manuscripts come is shown by the top-ten list of countries of the Communications accepted in 2012, which is represented by the size of the spheres in the cover picture. The various sections are also diverse: Reviews and Communications, Highlights and Essays, Author Profiles and News, Obituaries and occasionally Correspondences. The history of *Angewandte Chemie* is presented in this Issue by the Chairman of the Editorial Board, François Diederich, in a major Review (pp. 2714 ff.), which brings to life the development of the journal and indeed of chemistry since 1888.

Stamping Nanotechnology

In their Communication on page 2874 ff., A. J. Heeger et al. show how to insert electron-transport layers of transferable graphene oxide into bulk-heterojunction solar cells for enhanced power-conversion efficiency.





Carbon Nanomaterials

Ultralight, flexible, and fire-resistant carbon nanofiber aerogels, which can be fabricated in large scale by using bacterial cellulose as a precursor, are described by S. H. Yu and co-workers in their Communication on page 2925 ff.

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In this issue, many articles are accompanied by a special symbol:

A Speaker The articles marked with this symbol are by speakers at the Anniversary Symposium celebrating 125 years of *Angewandte Chemie*.

Editorial

"...Angewandte Chemie is probably the only scientific journal of such standing that not only comes from Germany, but even has a German title, and has established itself on the international stage ..."
Read more in the Editorial by Wolfram Koch.

"... What has so far been largely missing in bottom-up synthetic biology, however, is the power of true chemical synthesis ..."
Read more in the Editorial by Petra Schwille.

Miscellaneous

Author Profile

"If I won the lottery, I would buy a Steinway for me and a house for my Steinway.
My favorite place on earth is Paris ..."
This and more about Paul Knochel can be found on page 2646.

News


B. List


M. Christmann


E. E. Wille


R. Schlögl


F. Glorius


M. Beller


N. Maulide

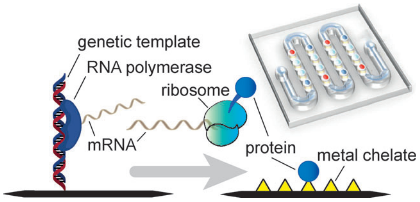
Books

Highlights

On-Chip Biosynthesis

C. Timm, C. M. Niemeyer* **2652–2654**

On-Chip Protein Biosynthesis



Spot on! Cell-free protein expression on surfaces can be implemented in biosensors and in microfluidic devices like that shown in the picture. Proteins are generated and immobilized successively on separated spots in a microfluidic reactor. This approach opens up novel opportunities for basic and applied biomedical research.

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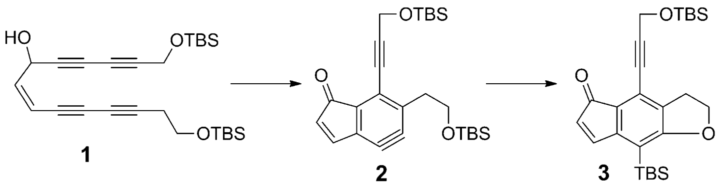
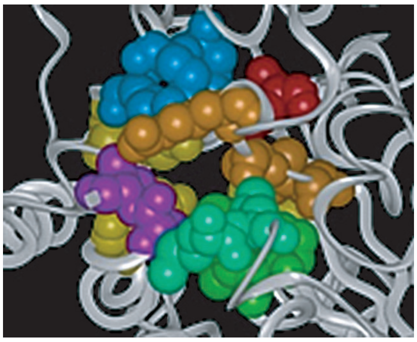
Reactive Intermediates



Fundamental aspects of chemically activated reactive intermediates can possibly be learned from the novel generation of arynes. The intramolecular [4+2] cycloaddition between a diyne and an (electronically activated) alkyne also provides a new route to generate arynes (see scheme).

Essays

Protein science



Additive or non-additive, that is the question: The increasing awareness of non-additive cooperative mutational effects in protein engineering is currently providing new theoretical and practical insights. In particular, the directed evolution of stereoselective enzymes as catalysts in organic chemistry and biotechnology profits from this intriguing development.

Unpredictability of Science

E. Keinan* ______________ 2667 – 2672

Gloomy Forecast for the Prophets of Apocalypse and Bright Forecast for Chemists

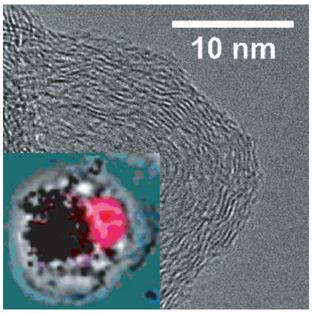
The human population, doubling every 50 years, creates global problems, including limitations on energy, raw materials, food, water, health, and air. However, the future of humankind seems bright thanks to the even faster growth of human knowledge, doubling every 18 months, and the unpredictability of science. Our global challenges are likely to be met by yet unknown technologies, mostly invented by chemists.

Exhaust Emission

B. Frank, M. E. Schuster, R. Schlögl, D. S. Su* ______________ 2673 – 2677

Emission of Highly Activated Soot Particulate—The Other Side of the Coin with Modern Diesel Engines

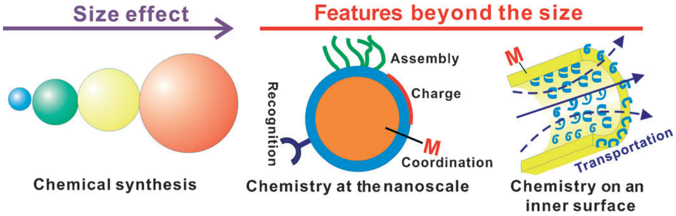
Soot toxification: The increasing chemical activity of the emitted soot particulate produced by modern diesel engines is an unwanted side effect of modification of the motors. This makes Euro IV and VI soots chemically and biologically highly active and hazardous. Taking these factors into consideration, the question arises whether the reduced net mass of diesel soot particulate emitted overcompensates for the induced micro- and nanostructure.



Nanoscience

C. Bai,* M. Liu ______________ 2678 – 2683

From Chemistry to Nanoscience: Not Just a Matter of Size



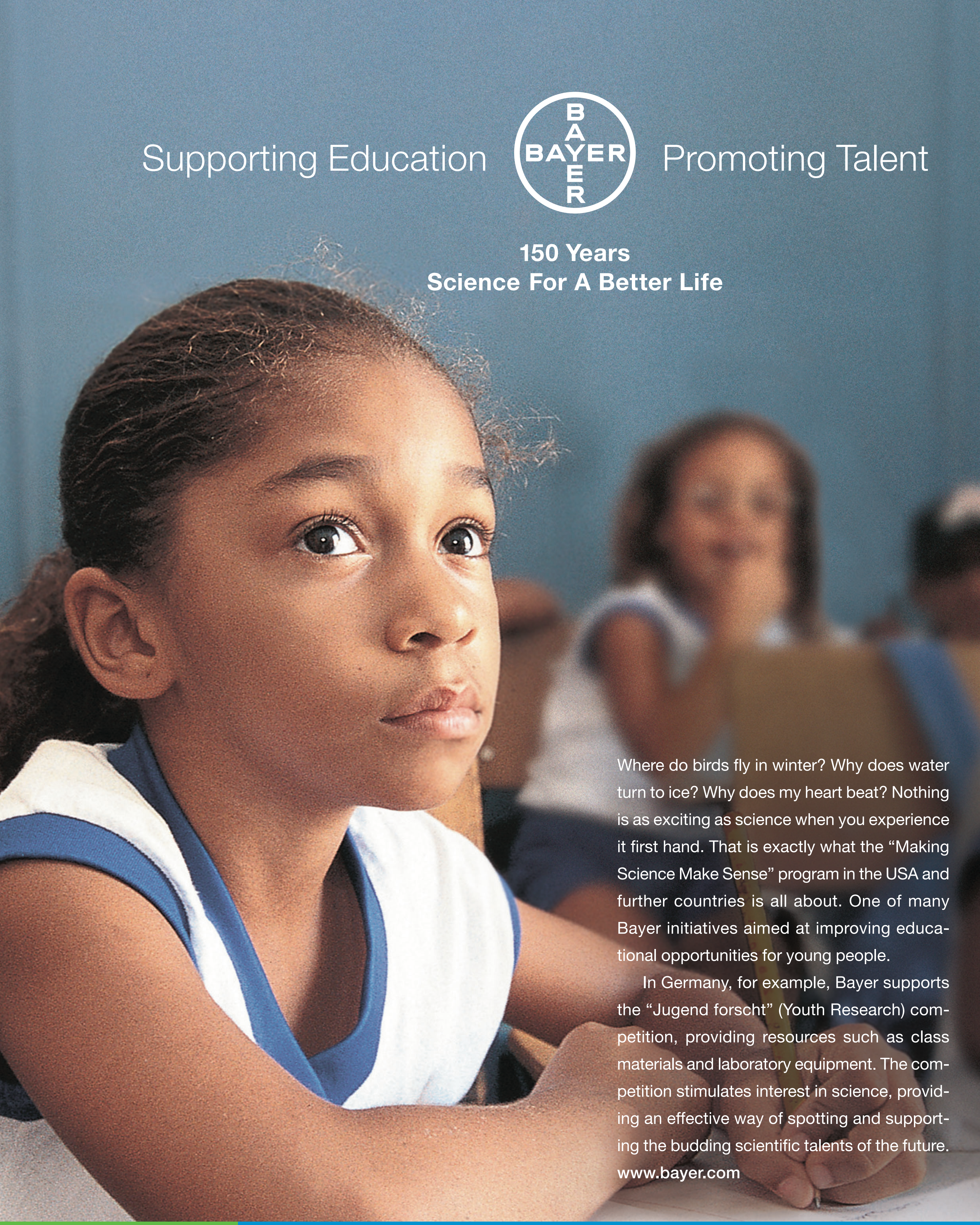
Size matters: Chemistry has contributed strongly to the rapid development of nanoscience resulting in an ever-growing amount of nanosized systems and materials. The properties of these systems do not only arise from their size, but also surface modifications and structures. Nanomaterials thus have unique properties and can contribute to the development of chemistry, including nanocatalysts and nanomedicine.

Drug Development

H. Wild,* C. Huwe, M. Lessl 2684 – 2687

“Collaborative Innovation”—Regaining the Edge in Drug Discovery

Sharers are winners: The concept of “Collaborative Innovation” has the potential to overcome the significant challenges the pharmaceutical industry faces in its effort to improve the lives of patients by fighting increasingly complex diseases. In order to succeed, it is crucial to join forces on a global level and to combine different approaches in a flexible way, requiring the right mindset of all involved parties, a combination of internal excellence and external openness, and the right organizational setup.



Supporting Education BAYER Promoting Talent

150 Years
Science For A Better Life

Where do birds fly in winter? Why does water turn to ice? Why does my heart beat? Nothing is as exciting as science when you experience it first hand. That is exactly what the "Making Science Make Sense" program in the USA and further countries is all about. One of many Bayer initiatives aimed at improving educational opportunities for young people.

In Germany, for example, Bayer supports the "Jugend forscht" (Youth Research) competition, providing resources such as class materials and laboratory equipment. The competition stimulates interest in science, providing an effective way of spotting and supporting the budding scientific talents of the future.

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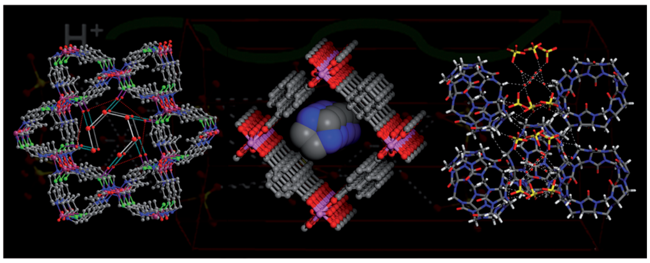
Minireviews

Proton-Conducting Materials

M. Yoon, K. Suh, S. Natarajan,*
K. Kim* ________________ **2688 – 2700**

Proton Conduction in Metal–Organic Frameworks and Related Modularly Built Porous Solids

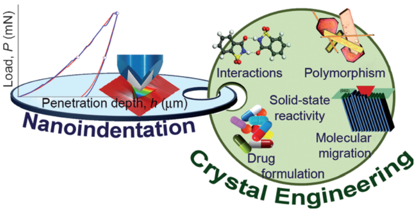


Pores and protons: Development of new types of proton-conducting materials is important in fuel-cell technology. Newly developed proton-conducting materials formed from modularly built porous solids, including coordination polymers (CPs) or metal–organic frameworks (MOFs) are discussed (see scheme).

Crystal Engineering

S. Varughese, M. S. R. N. Kiran,
U. Ramamurty,*
G. R. Desiraju* __________ **2701 – 2712**

Nanoindentation in Crystal Engineering: Quantifying Mechanical Properties of Molecular Crystals



Poking crystals: The application of nanoindentation in crystal engineering provides an important breakthrough in establishing links between microscopic structures and macroscopic properties. This Minireview highlights some of the advantages of this technique for studying the mechanical behavior of organic crystals.

Reviews

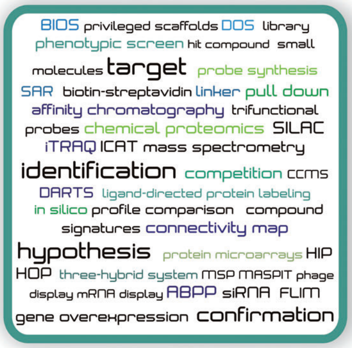
History of Chemistry

F. Diederich* ____________ **2714 – 2742**

125 Years of Chemistry in the Mirror of "Angewandte"

The development of *Angewandte Chemie* and the changes in chemical research over the first 125 years of its existence are the topic of this Review. Even from the content of its first 50 years, the journal offers numerous milestones in chemical research, and today, with its attractive layout and successful mix of articles, it covers chemical research worldwide in its full breadth.

How to solve the riddle? When phenotypic screens are performed, mostly there are missing pieces (of information) that would explain the link between a biologically active compound and the appearance of a certain phenotype. The interplay of organic synthesis, cell biology, proteomics, genetics, molecular biology, biochemistry, informatics, and biophysics is required to find the missing pieces and to assemble the whole puzzle of a compound's cellular activity.

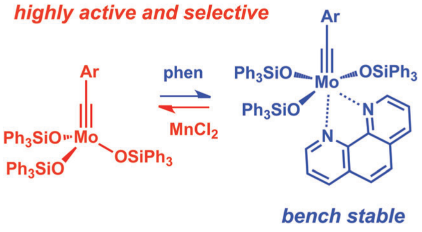


Drug Discovery

S. Ziegler,* V. Pries, C. Hedberg,*
H. Waldmann* ———— 2744 – 2792

Target Identification for Small Bioactive Molecules: Finding the Needle in the Haystack

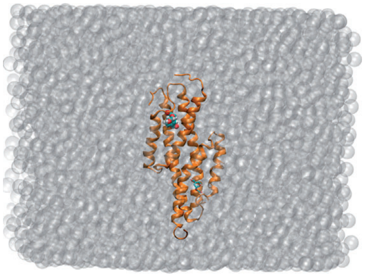
Making connections: The latest generation of alkyne metathesis catalysts holds considerable promise for synthesis, as they are exceptionally active, remarkably tolerant, and, in the form of their phenanthroline adducts, bench stable (see scheme). Numerous applications to material science and natural product synthesis illustrate the excellent performance and structural scope of this method.



Catalysis for Synthesis

A. Fürstner* ———— 2794 – 2819

Alkyne Metathesis on the Rise

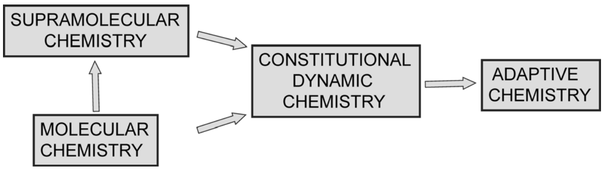


Various levels of resolution, for example, electronic, atomic, supramolecular, are combined in one model in multi-resolution simulations. The basic choices when setting up a multi-resolution model are reviewed. As an illustration the differential catalytic properties of two enzymes with similar folds are explored using multi-resolution simulation at three different levels of resolution.

Computational Chemistry

K. Meier, A. Choutko, J. Dolenc,
A. P. Eichenberger, S. Riniker,
W. F. van Gunsteren* ———— 2820 – 2834

Multi-Resolution Simulation of Biomolecular Systems: A Review of Methodological Issues



Chemistry is key for understanding the fundamental processes that underlie the evolution of matter towards states of increasing complexity through self-organization. It has developed from the molecular to the supramolecular level and has, through constitution dynamic systems, acquired the features of adaptive chemistry. Hence, chemistry opens the door towards complex matter.

Towards Complex Matter

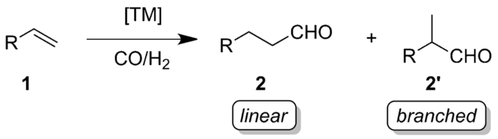
J.-M. Lehn* ———— 2836 – 2850

Perspectives in Chemistry—Steps towards Complex Matter

Homogeneous Hydroformylation

J. Pospech, I. Fleischer, R. Franke,*
S. Buchholz, M. Beller* ____ **2852 – 2872**

Alternative Metals for Homogeneous Catalyzed Hydroformylation Reactions



New possibilities: There is a growing awareness that organometallic complexes based on ruthenium, iridium, palladium, and even iron as the central metal offer new opportunities for catalytic hydroformylations (see scheme; TM = transition metal). Research from the past few decades is critically summarized in this Review.

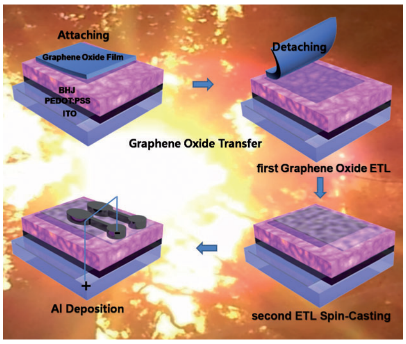
Communications

Organic Electronics

D. H. Wang, J. K. Kim, J. H. Seo, I. Park,
B. H. Hong, J. H. Park,
A. J. Heeger* ____________ **2874 – 2880**

Transferable Graphene Oxide by Stamping Nanotechnology: Electron-Transport Layer for Efficient Bulk-Heterojunction Solar Cells

Layer by layer: Electron-transport layers (ETLs) of transferable graphene oxide (GO) inserted by using a stamping nanotechnology (see picture) result in bulk-heterojunction (BHJ) solar cells with enhanced power conversion efficiency because of enhanced electron-charge transport and reduced electronic charge barrier with low series resistance. The GO ETL also increases the stability of the device in air.

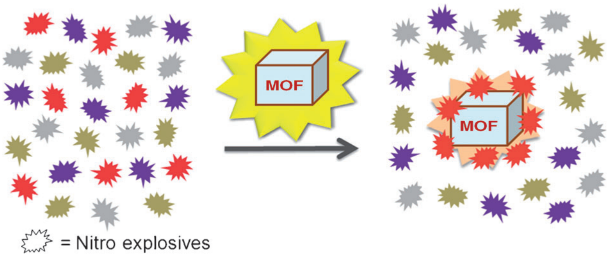


Frontispiece

Metal–Organic Frameworks

S. S. Nagarkar, B. Joarder, A. K. Chaudhari,
S. Mukherjee, S. K. Ghosh* . **2881 – 2885**

Highly Selective Detection of Nitro Explosives by a Luminescent Metal–Organic Framework

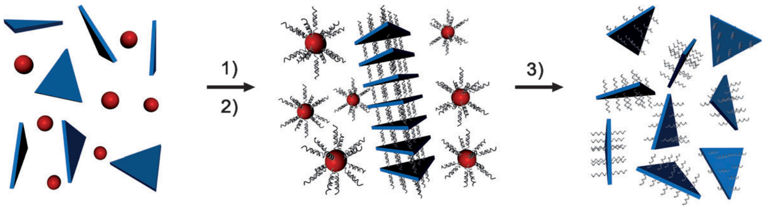


TNP can't hide from MOF: A three-dimensional fluorescent metal–organic framework (MOF), $[\mathrm{Cd(NDC)_{0.5}(PCA)}]\cdot \mathrm{G}_x$, can be used for the detection of 2,4,6-trinitrophenol (TNP). The MOF exhibits high selectivity towards TNP, even in the presence of other nitro explosives in aqueous and organic solutions, owing to electron- and energy-transfer mechanisms and electrostatic interactions.

Nanoparticle Separation

M. R. Jones, C. A. Mirkin* _ **2886 – 2891**

Bypassing the Limitations of Classical Chemical Purification with DNA-Programmable Nanoparticle Recrystallization



And then there was one: Anisotropic nanoparticle syntheses often contain impurity nanostructures. Functionalization of the products of such syntheses with DNA (see scheme (1)) allows the relative interaction strengths between particles to be tailored. The desired nanoparticle component can then be crystallized selectively (2) and separated to arrive at samples of significantly improved purity (3).

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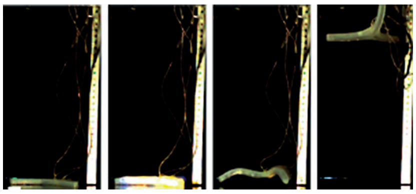
Soft Robots

R. F. Shepherd, A. A. Stokes, J. Freake, J. Barber, P. W. Snyder, A. D. Mazzeo, L. Cademartiri, S. A. Morin, G. M. Whitesides* ________ **2892 – 2896**

Using Explosions to Power a Soft Robot



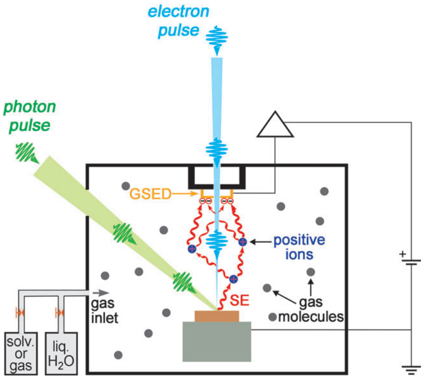
Combustion causes a soft robot to jump: Rapid actuation of a soft robot (composed of silicone elastomers) was achieved using high-temperature chemical reactions. Computer-controlled electrical sparks triggered the combustion of premixed CH_4 and O_2 gases inside the robot, which pressurized the pneumatic channels of the robot and caused it to jump (see figure). The heat from the explosions dissipated quickly and did not damage the robot even over many jumps.

Ultrafast Electron Microscopy

D.-S. Yang, O. F. Mohammed, A. H. Zewail* ____________ **2897 – 2901**

Environmental Scanning Ultrafast Electron Microscopy: Structural Dynamics of Solvation at Interfaces

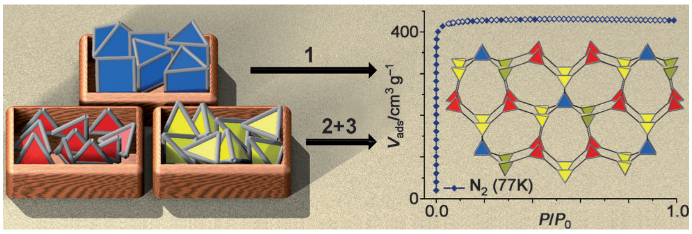
On the surface: CdSe surfaces have been used as a prototype for the investigation of the spatiotemporal characteristics of solvation by environmental scanning ultrafast electron microscopy (see picture, GSED = gaseous secondary electron detector). This study has shown that the ultrafast relaxation dynamics of polar molecules, such as water, in the adsorbate layers exhibit a striking dependence on the CdSe surface structure.



Metal–Organic Materials

A. Schoedel, A. J. Cairns, Y. Belmabkhout, L. Wojtas, M. Mohamed, Z. Zhang, D. M. Proserpio, M. Eddaoudi, M. J. Zaworotko* __________ **2902 – 2905**

The asc Trinodal Platform: Two-Step Assembly of Triangular, Tetrahedral, and Trigonal-Prismatic Molecular Building Blocks

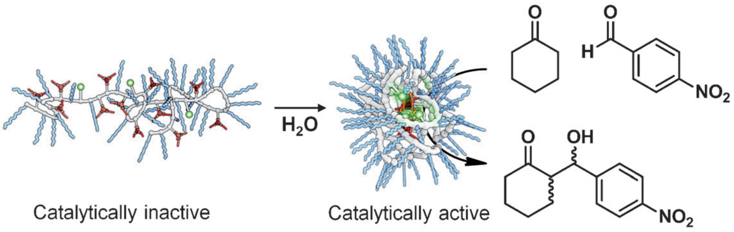


The self-assembly of triangular, tetrahedral, and trigonal-prismatic molecular building blocks affords the first example of a trinodal family of metal–organic materials. Four examples of isoreticular expanded and functionalized frameworks are detailed. Gas adsorption experiments validated the permanent porosity of the parent structure.

Supramolecular Chemistry

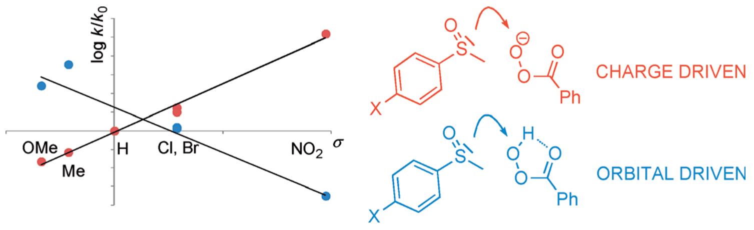
E. Huerta, P. J. M. Stals, E. W. Meijer,* A. R. A. Palmans* ________ **2906 – 2910**

Consequences of Folding a Water-Soluble Polymer Around an Organocatalyst



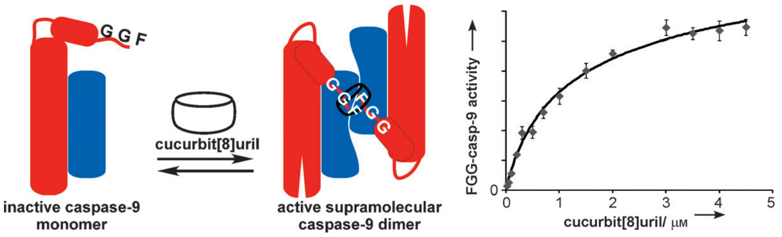
Give ’em structure: The presence of structuring elements in polymers that were functionalized with catalytic units resulted in a new class of enzyme mimics, which are only active in the folded state (see picture). The conformationally adaptive hydrophobic environment that surrounds the catalytic site allows the very efficient catalysis of an aldol reaction in water with Michaelis–Menten kinetics.

Nucleophilic Substitution



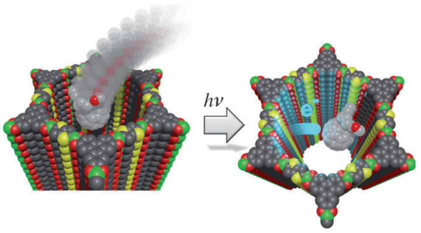
Too OT to handle? In oxygen transfer (OT) reactions the inversion of the ρ value is not representative of a change in mechanism. Substituents bonded to aromatic sulfoxides have the opposite effect on the rates of oxidation depending on whether the reaction is dominated by electrostatic or orbital-overlap effects (see picture).

Host–Guest Chemistry



At the double: Cucurbit[8]uril-mediated protein dimerization enables reversible control over strong enzyme activation of caspases. Simple addition of a short N-terminal FGG motif allows for a supramolecular-mediated 50-fold enhancement of caspase-9 catalytic activity.

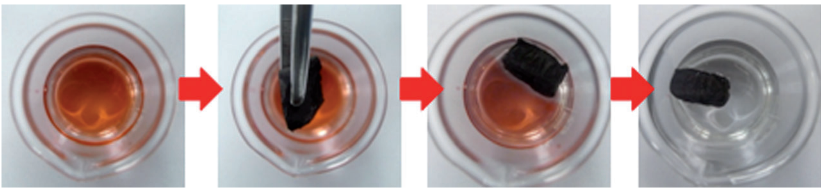
Energy Transfer



Filling a honeycomb: The thienothiophene-based covalent organic framework (COF) can be loaded with a complementary semiconductor, such as a fullerene derivative, and electronic interactions are observed (see figure). The novel periodic interpenetrated donor–acceptor system shows the spectroscopic signatures of efficient charge transfer on the nanoscale. Photovoltaic activity was demonstrated upon integrating the COF:fullerene film into a device.

Carbon Nanomaterials

Inside Back Cover



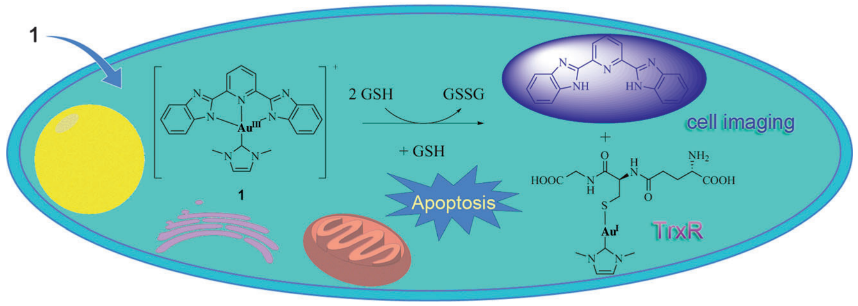
Thirsty fibers: The aerogels described in the title can be fabricated in large scale by using a low-cost biomass, bacterial cellulose, as a precursor, which can be produced at industrial level in a microbial fermentation process. The carbon nanofiber aerogels (black pieces in picture) exhibit superior absorption capacity for organic solvents (red solution) and high potential for pressure sensing.

VIP

In Vivo Gold Chemistry

T. Zou, C. T. Lum, S. S.-Y. Chui, C.-M. Che* ———— 2930 – 2933

Gold(III) Complexes Containing N-Heterocyclic Carbene Ligands: Thiol "Switch-on" Fluorescent Probes and Anti-Cancer Agents

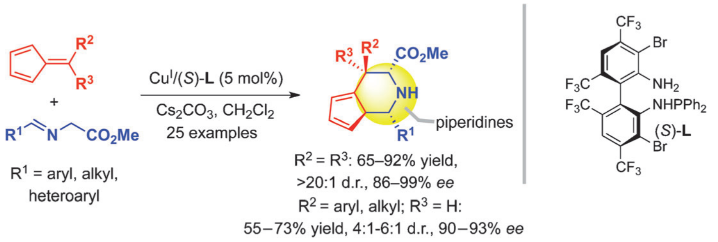


Illuminating results: Activation of non-emissive $[Au^{III}(N^\wedge N^\wedge N)(NHC)]^+$ complexes (such as **1**) through reduction by intracellular glutathione gives active Au^I–NHC complexes, which show promising anti-cancer properties, accompanied by release of the highly fluorescent ligand. The high fluorescence "switch-on" efficiency makes these Au^{III} complexes excellent probes for cellular thiol detection.

Asymmetric Catalysis

Z.-L. He, H.-L. Teng, C.-J. Wang* ———— 2934 – 2938

Fulvenes as Effective Dipolarophiles in Copper(I)-Catalyzed [6+3] Cycloaddition of Azomethine Ylides: Asymmetric Construction of Piperidine Derivatives



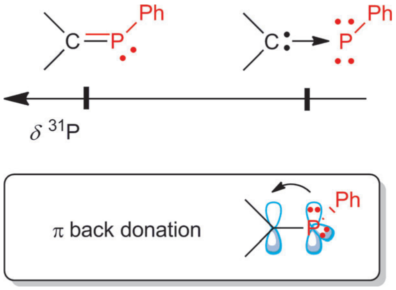
As easy as π: Fulvenes serve as 6π dipolarophiles in the title reaction in the presence of the chiral $Cu^I/(S)$-**L** complex. The present system provides a unique and straightforward access to enantioenriched, highly functionalized piperidine derivatives in good yields and excellent diastereoselectivities and enantioselectivities.

Stable Carbenes

O. Back, M. Henry-Ellinger, C. D. Martin, D. Martin, G. Bertrand* ———— 2939 – 2943

^{31}P NMR Chemical Shifts of Carbene–Phosphinidene Adducts as an Indicator of the π-Accepting Properties of Carbenes

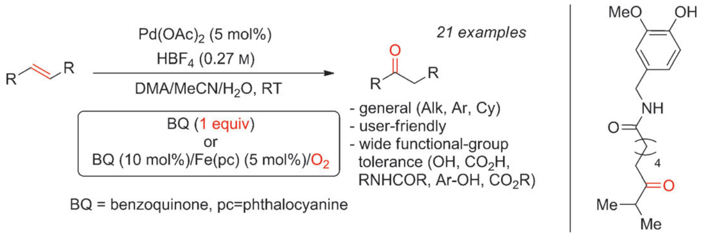
Beyond the Tolman electronic parameter: The ^{31}P NMR chemical shifts of easily synthesized carbene–phenylphosphinidene adducts allow the determination of the relative π-acceptor properties of carbenes. In combination with the Tolman electronic parameter value, the relative pure σ-donation of carbenes can also be evaluated.



Synthetic Methods

B. Morandi, Z. K. Wickens, R. H. Grubbs* ———— 2944 – 2948

Practical and General Palladium-Catalyzed Synthesis of Ketones from Internal Olefins

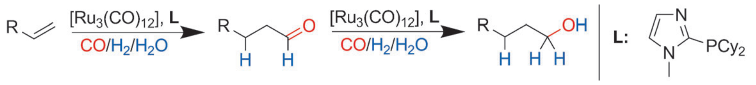


Make it simple! A convenient and general palladium-catalyzed oxidation of internal olefins to ketones is reported. The transformation occurs at room temperature and shows wide substrate scope. Applications to the oxidation of seed-oil derivatives and a bioactive natural product (see scheme) are described, as well as intriguing mechanistic features.

Carbonylation

I. Fleischer, K. M. Dyballa, R. Jennerjahn, R. Jackstell, R. Franke, A. Spannenberg, M. Beller* **2949 – 2953**

From Olefins to Alcohols: Efficient and Regioselective Ruthenium-Catalyzed Domino Hydroformylation/Reduction Sequence

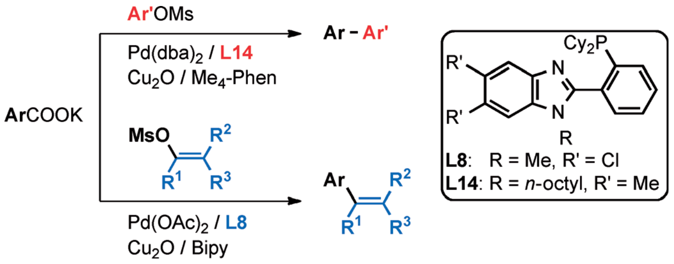


Exploring the alternatives: Ruthenium imidazoyl phosphine complexes catalyze the domino hydroformylation/reduction of alkenes to alcohols in good yields and with good selectivities (see scheme). Linear aliphatic alcohols are synthesized under reaction conditions typically used in industrial hydroformylations.

C–C Coupling

B. Song, T. Knauber, L. J. Gooßen* **2954 – 2958**

Decarboxylative Cross-Coupling of Mesylates Catalyzed by Copper/Palladium Systems with Customized Imidazolyl Phosphine Ligands

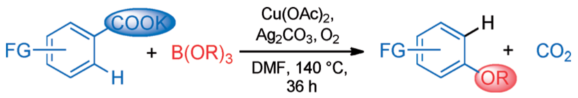


The activation of the inert C–O bonds in mesylates through the use of a new class of imidazolyl phosphines allows the decarboxylative coupling of aryl mesylates as well as polysubstituted alkenyl mesylates. Variation of the ligands leads to two complementary methods providing the corresponding biaryls and polysubstituted olefins in good yields.

C–H Activation

S. Bhadra, W. I. Dzik, L. J. Gooßen* **2959 – 2962**

Synthesis of Aryl Ethers from Benzoates through Carboxylate-Directed C–H-Activating Alkoxylation with Concomitant Protodecarboxylation



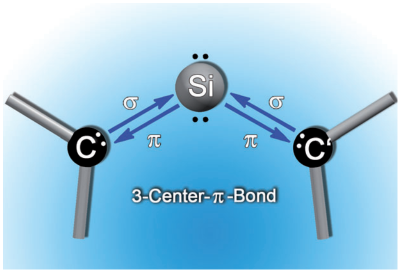
One in, one out: In the presence of a copper/silver bimetallic catalyst system, aromatic carboxylate salts undergo *ortho* C–H alkoxylation with concomitant loss of the carboxylate directing group in a protodecarboxylation step (see scheme, FG = functional group). This process provides a convenient synthetic access to the important class of aromatic ethers from widely available carboxylic acids.

Low-Valent Silicon

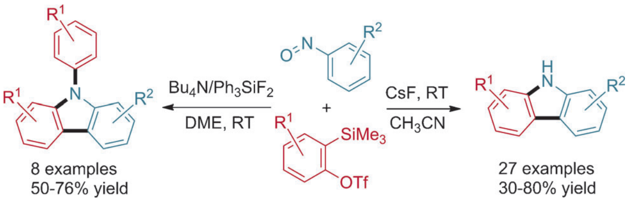
K. C. Mondal, H. W. Roesky,* M. C. Schwarzer, G. Frenking,* B. Niepötter, H. Wolf, R. Herbst-Irmer, D. Stalke* **2963 – 2967**

A Stable Singlet Biradicaloid Siladicarbene: $(L\!:)_2Si$

A trapped silicon atom: The compound $(L\!:)_2Si$ with low-valent silicon was synthesized from its dichloride biradical precursor $(L\!:)_2SiCl_2$ by reduction with KC_8. Theoretical analysis suggest that there are two donor–acceptor σ bonds $L\!:\rightarrow Si\leftarrow\!:L$. There is one σ lone-pair orbital at Si and one π orbital which features significant π-back-donation $L\!:\leftarrow Si\rightarrow\!:L$ giving short Si–C bonds.

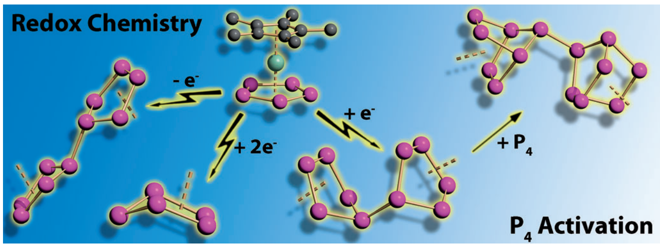


Heterocycles



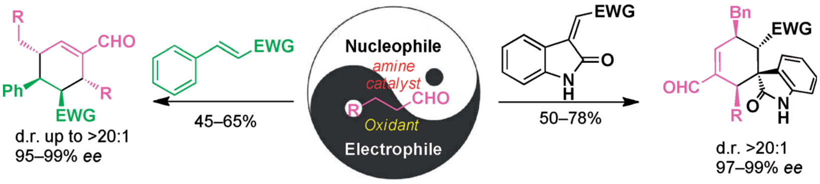
No transition metals are necessary in the reaction of in situ generated arynes with nitrosoarenes to give substituted carbazoles. Depending on the fluoride source and the solvent, either N-arylated carbazoles or NH-carbazoles are obtained (see scheme; DME = dimethoxyethane, OTf = trifluoromethanesulfonate). In these cascades a C–C and one or two C–N bonds are formed. The reactions are easy to conduct and proceed under mild conditions.

Small-Molecule Activation



Pentaphosphaferrocene redox chemistry: Unprecedented dianionic and P–P coupled and monomeric products are obtained by the reduction of pentaphosphaferrocene with KH or K metal, whereas by oxidation a P–P coupled P_{10}^{2+} ligand coordinated to two Cp*Fe units is obtained. The redox behavior clearly distinguishes pentaphosphaferrocene from its organometallic relative, ferrocene.

Asymmetric Synthesis

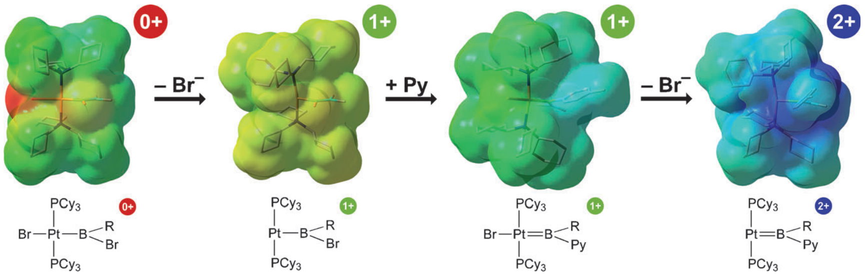


Take two: By employing two equivalents of an aldehyde in an asymmetric organocatalytic domino reaction, the nucleophilic enamine intermediate is also converted into the corresponding iminium species through oxidation with *o*-iodoxybenzoic acid. Thus, polyfunctionalized cyclohexene derivatives are formed from two simple starting materials in good yields and stereoselectivities (see scheme; Bn = benzyl, EWG = electron-withdrawing group).

Low-Coordinate Complexes

H. Braunschweig,* P. Brenner,
R. D. Dewhurst, J. O. C. Jimenez-Halla,
T. Kupfer, D. Rais,
K. Uttinger ——————— **2981 – 2984**

Maximizing Coordinative and Electronic Unsaturation: Three-Coordinate Dicationic Platinum Complexes

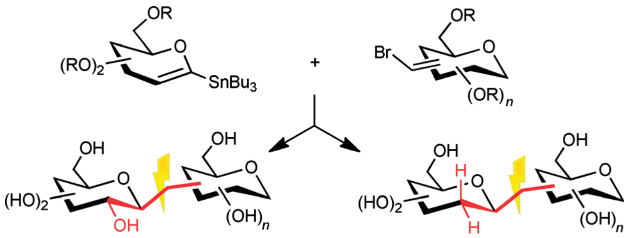


Halide abstraction from cationic base-stabilized borylene complexes led to extremely electronically and coordinatively unsaturated platinum complexes. The formally 14-electron borylene complexes show no agostic interactions with the phosphine ligands, and only small Lewis donor ligands could be added to the Pt center.

Carbohydrate Mimics

D. C. Koester, E. Kriemen,
D. B. Werz* ——————— **2985 – 2989**

Flexible Synthesis of 2-Deoxy-*C*-Glycosides and (1→2)-, (1→3)-, and (1→4)-Linked *C*-Glycosides



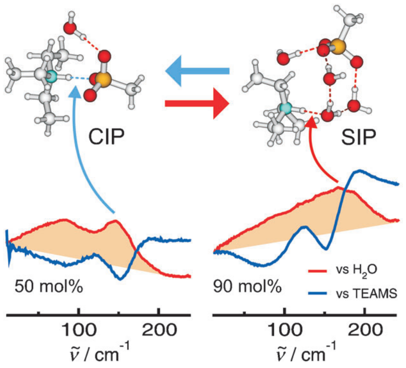
Link! Two, three, four! A rapid and flexible synthesis of native (1→*n*)-linked *C*-disaccharides (*n* = 2, 3, 4; left) is possible. The configuration of the pseudoanomeric carbon was readily established by an epoxidation/ring-opening sequence. The synthesis of (1→*n*)-linked 2-deoxy-*C*-disaccharides (right) with high diastereoselectivity follows an even shorter route.

Ion Pairs

P. Stange, K. Fumino,
R. Ludwig* ——————— **2990 – 2994**

Ion Speciation of Protic Ionic Liquids in Water: Transition from Contact to Solvent-Separated Ion Pairs

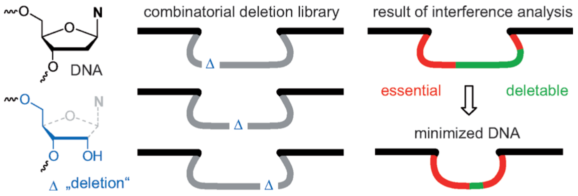
The fab four: Far-infrared difference spectra and DFT-calculated properties for mixtures of protic ionic liquids (PILs) and water clearly indicate that a minimum of four water molecules are needed to transfer contact (CIPs) into solvent-separated (SIPs) ion pairs. SIPs are favored over CIPs owing to additional H-bonds and cooperative effects. This enthalpic advantage overcompensates for the entropic penalty of separation by water.



Nucleic Acid Chemistry

B. Samanta, C. Höbartner* **2995 – 2999**

Combinatorial Nucleoside-Deletion-Scanning Mutagenesis of Functional DNA



Compact and informative: Individual nucleosides are statistically mutated by replacement with a non-nucleosidic spacer unit Δ that encodes the "deletion" in a single DNA library. This efficient mutagenesis approach enables minimization of functional DNA, identifying essential nucleotides, as demonstrated for two nucleic-acid ligating deoxyribozymes.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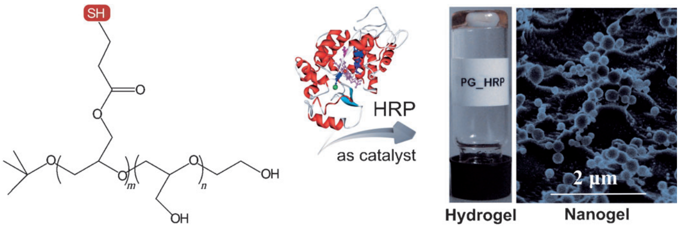
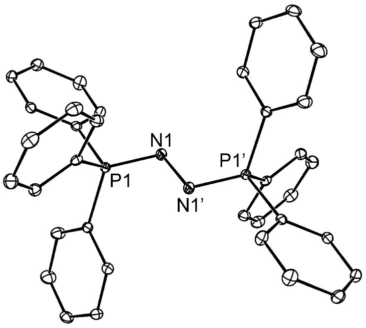
Hydrogels



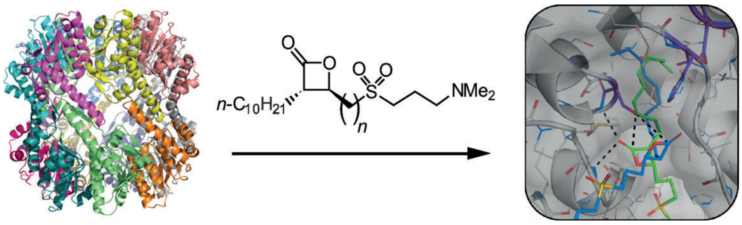
Horseradish peroxidase (HRP) can be used for the enzymatic cross-linking of thiol-functionalized polymers under mild conditions to form hydrogels and nanogels without the need for added H_2O_2. Cells can be embedded in the hydrogels and proteins can be entrapped and released from the nanogels. These gels are fully degradable under mild and cytocompatible reductive conditions.

Dinitrogen Species

Making Ns meet: Triphenylphosphinazine $N_2(PPh_3)_2$ is a donor–acceptor complex between nitrogen in the highly excited $^1\Gamma_g$ state and two anti-periplanar coordinated phosphine ligands (see structure). Although the dissociation into $N_2 + 2\,PPh_3$ is calculated to be exergonic by 75 kcal mol^{-1}, the compound is kinetically very stable as a result of the very large Lewis acidity of N_2 in the excited $^1\Gamma_g$ state.

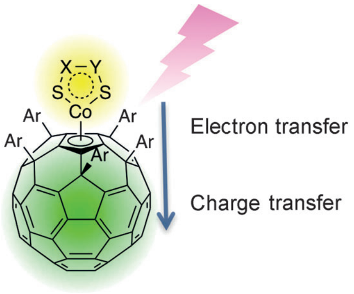


Enzyme Inhibitors



Catch me if you can: The ClpP protease mediates protein homeostasis and can be efficiently inhibited by β-lactones. A combination of molecular docking, mutagenesis, activity-based protein profiling, and kinetics studies now reveals the mechanism of ClpP inhibition. A hydrophobic pocket next to the active site allows binding of long aliphatic and aromatic residues. The preferred stereoisomer binds into the oxyanion hole.

C–H Activation



Unprecedented reactivity of a metastable cobalt trisulfide complex has been observed, and several direct C–S bond formation reactions by C–H functionalization were developed. These reactions produced a series of photofunctional motifs of sulfur-rich cobalt complexes (see picture). The measured photophysical properties of these complexes suggest promising molecular designs for photocurrent generating materials.

And Finally

What could be simpler than C_2, a diatomic molecule that has the second strongest homonuclear bond? This molecule turns out to be a microcosm of the bonding issues that bother chemists, as is shown in this trialogue. Join the three authors in their lively debate, light a candle, as Faraday did, and see the excited states of C_2!

Chemical Bonding

S. Shaik,* H. S. Rzepa,*
R. Hoffmann* ———— **3020 – 3033**

One Molecule, Two Atoms, Three Views, Four Bonds?