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:

Author Profile

"If I were not a scientist, I would be an architect or a designer.
My favorite subject at school was art because art provides essentially unlimited possibilities based on one's imagination …"
This and more about Takuzo Aida can be found on page 7380.

Obituary

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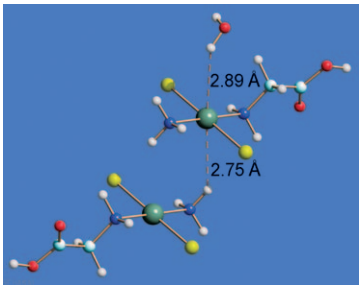
Reviews

Secrets revealed: The Nobel Prize for Medicine 2009 was awarded for the solution to one of the greatest mysteries of biology: how are chromosomes copied upon cell division and protected from degradation? The answer can be found at the ends of the chromosomes—the telomeres—and in the enzyme that forms them—telomerase. The laureates describe the events leading to the discovery first-hand.

Communications



An alternative to classical? In square-planar d^8 complexes the metal ion can interact with axial H_2O molecules either as a Lewis acid or as a Lewis base. Ab initio calculations predicted that uncharged Pt^{II} complexes form a hydrogen-bond-like interaction with H_2O, in which Pt^{II} acts as a Lewis base. Such a nonclassical O–H···Pt hydrogen bond has now been identified in crystals of *trans*-$[PtCl_2(NH_3)(N\text{-glycine})]\cdot H_2O$ by neutron diffraction.

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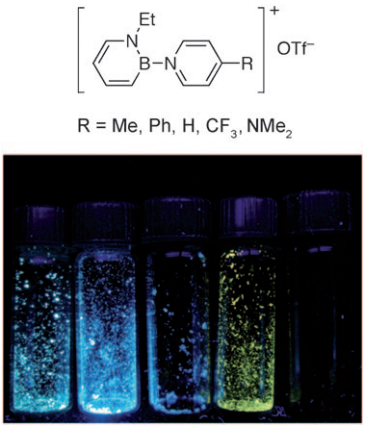
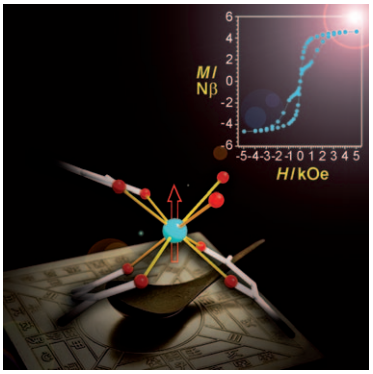
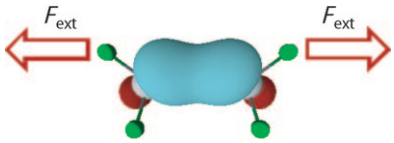


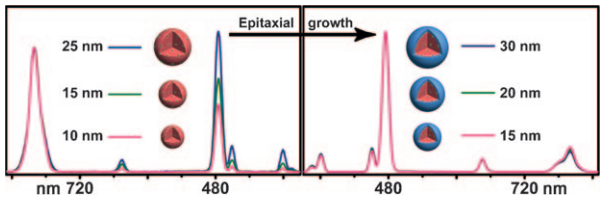
Positively brilliant: The first examples of 1,2-azaborine cations have been prepared and their structure and optoelectronic properties characterized (see picture). 1,2-Azaborine cations exhibit solid-state fluorescence that is distinct from their neutral all-carbon analogues, and the 1,2-azaborine moiety is a critical component for the optoelectronic properties. There is a potential for the utility of these complexes in materials applications.

No dates for Dy^{3+}: With a single-ion magnet containing dysprosium, magnetic-site dilution leads to a hysteresis loop that can be detected at 0.5 and 2 K. On cooling below 8 K, the relaxation mechanism of the undiluted complex changes from a thermally activated process to quantum tunneling. The quantum tunneling can be suppressed by applying a direct-current field and by magnetic site dilution.





Stress test: Quantum chemical methods were used to study how subjecting molecules to mechanical stresses (see picture; F_{ext} is an external force) can overcome the Woodward–Hoffmann (WH) rules. The results show that applied stresses do not alter the electronic structure (as is the case for irradiation) but rather render the WH rules secondary to mechanochemical factors that favor progression to the products.



A series of Yb/Tm co-doped $NaGdF_4$ nanoparticles without or with a thin surface protection layer provide direct evidence of a surface quenching effect on size-dependent upconversion luminescence (see picture). The coating preserves the optical integrity of the nanoparticles (right-hand spectrum) and minimizes emission loss induced by surface quenching.

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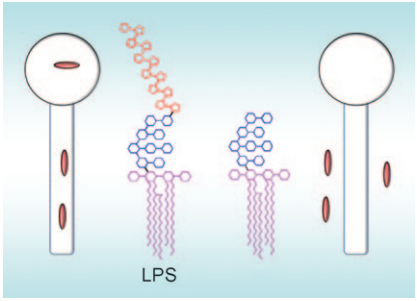
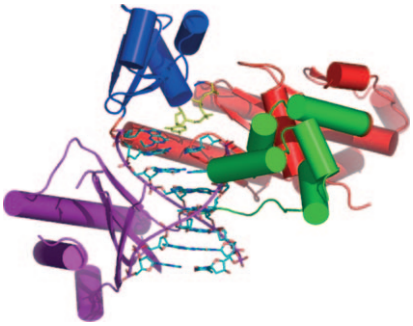
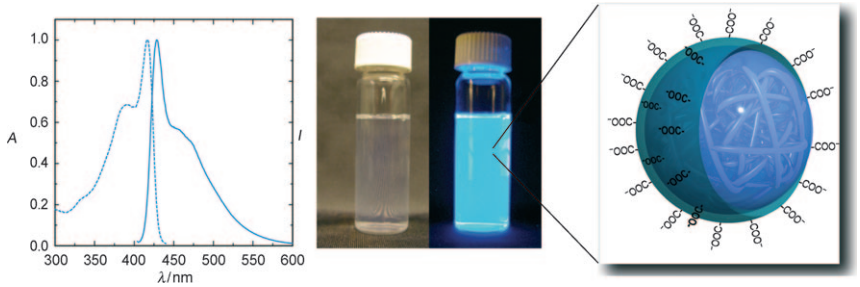
Dress code for living in a fungus: Analysis of the carbohydrate coating of the toxin-producing endobacterium of the phytopathogenic fungus *Rhizopus microsporus* revealed an unprecedented lipopolysaccharide (LPS) structure, which is important for infection and colonization of the fungal host. A mutant lacking the unusual [→2)-β-D-galactofuranose-(1→]$_n$ O antigen (red in the schematic illustration) was incapable of forming a stable symbiosis with the fungus.





Picking a pucker! Fixed-conformation North (N)- and South (S)-methanocarba-2′-deoxyadenosine-triphosphate (MC-dATP) have different effects in DNA strand extension catalyzed by HIV-1 RT and three human Y-family DNA polymerases (pols). All of the polymerases tested preferred the N-oriented furanose geometry, though pol η could insert both pucker mimics. The growth of malignant breast cancer cells overexpressing pol ι was more severely inhibited by N-MC-dATP than that of nonmalignant breast cells.



It's just a phase: A highly fluorinated compound with a rigid three-dimensional architecture was synthesized as a monomer for poly(*p*-phenyleneethynylene)s (PPEs). Fluorous biphase reactions were applied for the synthesis of a PPE that is soluble only in fluorous solvents. A fluorous solution of the polymer could be processed into aqueous emulsions that display high fluorescence quantum yields (see picture).

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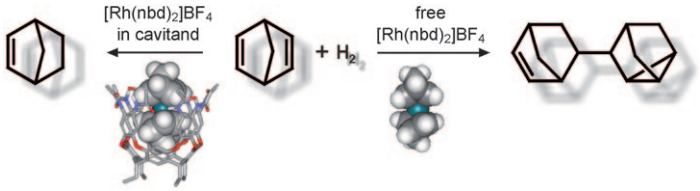
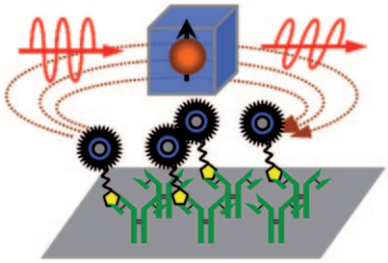
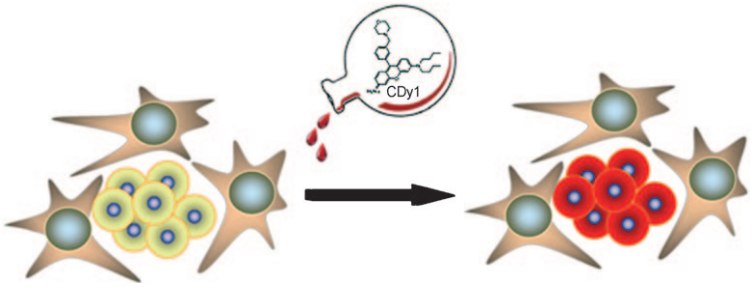


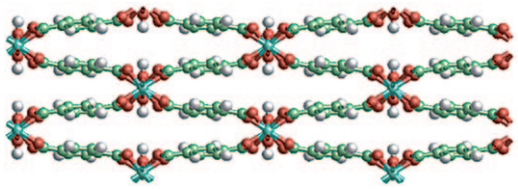
It's a wrap! The inclusion of $[Rh(nbd)_2]BF_4$ (nbd = norbornadiene) in a deep-cavity cavitand produces a catalytically active species that promotes the hydrogenation of norbornadiene to norbornene (see picture). The structure of the cavitand acts as a second-sphere ligand and modifies the stability, selectivity, and reactivity observed for the free organometallic complex in solution.



Quantitative molecular imaging: Labeled magnetic nanoparticles serve as molecular probes that bind to specific antibody molecules. The magnetic field of the bound particles is detected using scanning magnetic imaging with an optical atomic magnetometer based on the magnetooptical property of alkali metals. The magnetization, and thus the number of the antibody-bound magnetic nanoparticles, and the corresponding two-dimensional spatial information are obtained simultaneously.

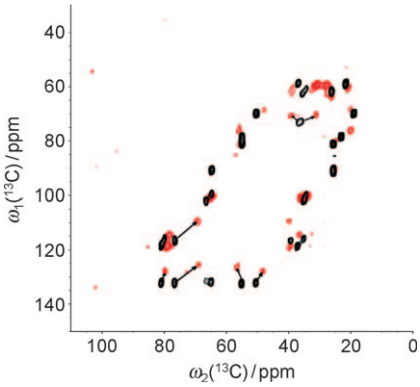


The cell-by date: The fluorescent compound CDy1 selectively stains embryonic stem cells (see scheme). CDy1 was used to identify fibroblasts undergoing reprogramming to induced pluripotent stem cells prior to the expression of green fluorescent protein under the control of the Oct4 promoter.



Breathtaking MOFs: DFT calculations reveal that the exceptional, thermally induced density change of the metal–organic framework MIL53(Al) is controlled by a competition between short- and long-range interactions and entropic factors. As shown in the picture (C green, Al cyan, O red, H white), dispersive interactions between the phenyl rings are responsible for stabilizing a narrow-pore form at low temperature. At 325–375 K, vibrational entropy causes the structure to expand markedly, permitting large volumes of light gases to be adsorbed.

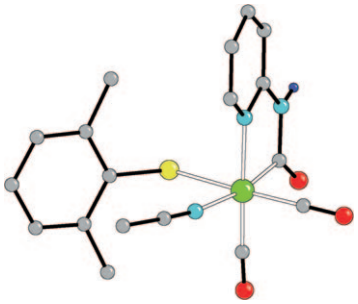
Metal–Organic Frameworks



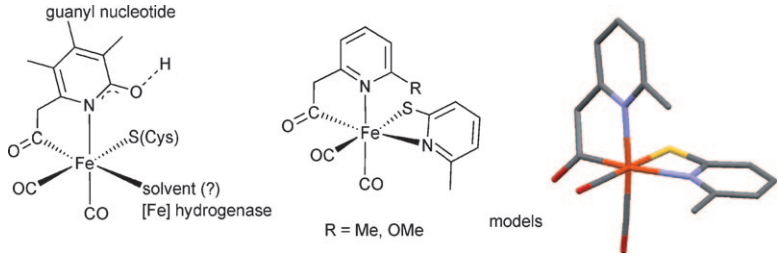
Solid evidence: Induction of the polymerization of αβ-tubulin dimers into microtubules by epothilones, such as patupilone, by an as yet unknown mechanism leads to the apoptosis of cancer cells. Solid-state NMR spectroscopy of patupilone bound to microtubules has now enabled the identification of atomic positions of the drug that undergo clear chemical-shift changes upon binding (see correlation spectra of free (black) and complexed patupilone (red)).

Drug Binding

Natural model: The synthesis of a close structural analogue of the active site of [Fe]-hydrogenase is described (see structure; C gray, H dark blue, Fe green, N light blue, O red, S yellow). Nature most probably constructs the five membered ferracyclic ring to poise the 2-hydroxy pyridine substituent in a position to assist the heterolytic cleavage of dihydrogen, and the accessibility of the analogue should now provide opportunities for probing this.



Enzyme Mimics



Where is my iron? The synthesis, structure, and reactivity of small-molecule models of [Fe]-hydrogenase are described. These models feature the intriguing acylmethylpyridinyl ligands found exclusively in the enzyme.

Enzyme Models

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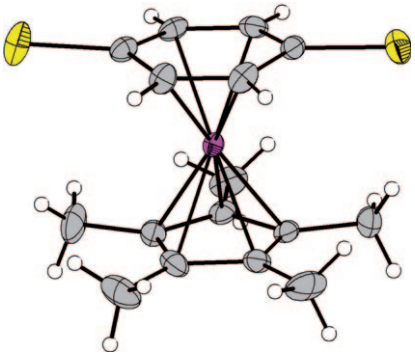
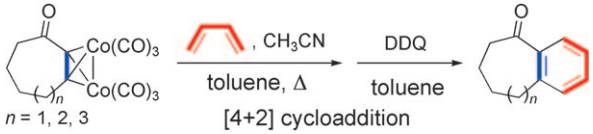


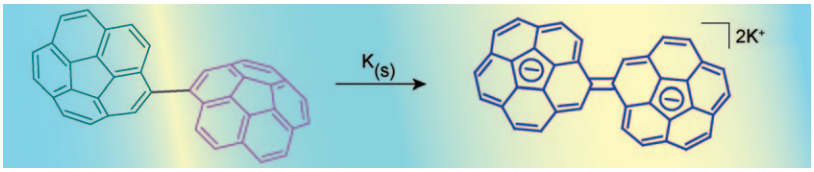
Caught in the act: The first stable η^4-diseleno-*p*-benzoquinone complex, [Cp*Ir(η^4-$C_6H_4Se_2$)], has been isolated. The X-ray structure (see picture; Ir magenta, Se yellow) confirms the coordination of the elusive diselenobenzoquinone intermediate. The anticancer activity of this complex was compared to related oxygen and sulfur analogues; only the diseleno complex was cytotoxic, having a comparable activity to cisplatin.

Quinone Complexes



A general protocol for the title transformation has been achieved and is applicable to a wide range of acyclic 1,3-dienes and cyclic alkyne—$\{Co_2(CO)_6\}$ complexes leading to various types of benzannulated medium-sized cyclic compounds after oxidative work up (see scheme; DDQ = 2,3-dichloro-5,6-dicyano-1,4-benzoquinone). Interestingly, the [4+2] cycloaddition proceeded preferentially over the Pauson–Khand reaction.

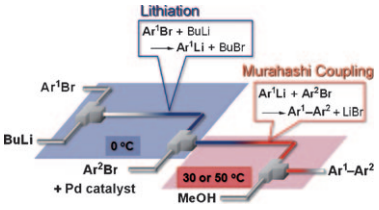
Cycloaddition Reactions



Super bowl: Bicorannulenyl, a large biaryl composed of two corannulene bowls, effectively becomes an overcrowded ethylene upon reduction to form a dianion (see picture). DFT calculations and NMR spectroscopic experiments reveal the double-bond character of the connection between the two bowls. Three stable diastereomers that interconvert through bowl inversions and central bond rotations were shown to exist.

Buckybowls

Going with the flow: The use of palladium catalysts bearing a carbene ligand resulted in a faster Murahashi coupling, and enabled its integration with the Br–Li exchange of ArBr with BuLi in a microreactor (see picture). This system allows the cross-coupling of two different aryl bromides within a minute without necessitating low temperatures (−78°C).



Microreactors

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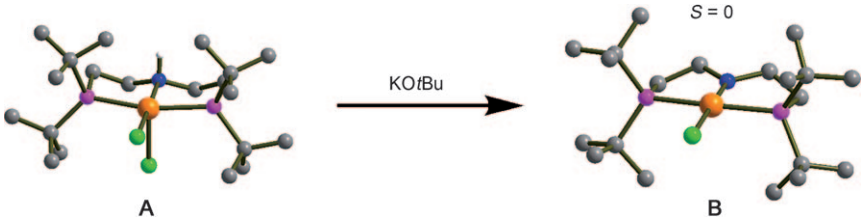
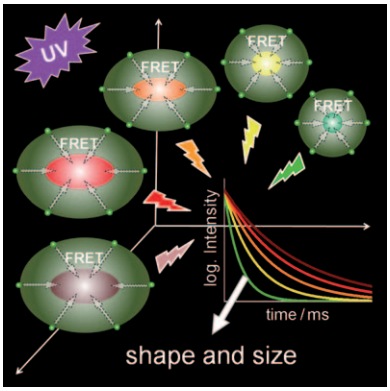


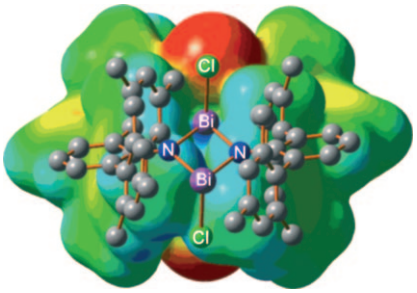
Ground-about: The ruthenium(II) complex $[RuCl\{N(CH_2CH_2PtBu_2)_2\}]$ (**B**) is obtained in high yield by the reaction of $[RuCl_2\{HN(CH_2CH_2PtBu_2)_2\}]$ (**A**) with KO*t*Bu. Complex **B** exhibits an unusual electronic low-spin ($S=0$) ground-state configuration. Comparison with Caulton's $[RuCl\{N(SiMe_2CH_2PtBu_2)_2\}]$ (ground state: $S=1$) shows that the ground-state spin multiplicity in these complexes is controlled by the N→Ru π-donor strength.

Square-Planar Ru^{II}

Nanoshapes and sizes: A time-resolved multicolor optical analysis of Förster resonance energy transfer (FRET) from a luminescent terbium complex to different semiconductor quantum dots allows the rapid and accurate measurement of the size and shape of different functionalized quantum dots under physiological conditions. This spectroscopic ruler opens the possibility of a simultaneous analysis of different biological processes at subnanomolar concentrations.

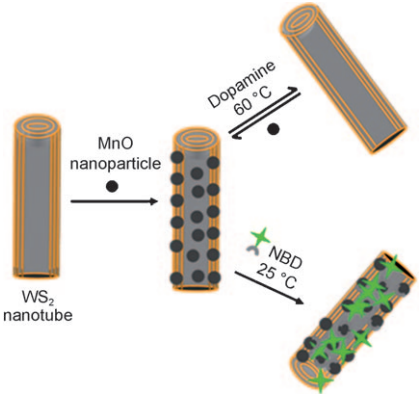


Molecular Rulers



Labile but stable: Despite a labile Bi–N bond, the first example of a dichlorocyclodibismadiazane (see picture) is prepared by treatment of terphenyl–N(H)$BiCl_2$ with the base DBU. The product only decomposes above 205 °C and is stable under argon at room temperature in the solid state and in benzene solution. The background shows the electrostatic potential mapped onto the electron density of the molecule.

Bi–N Heterocycles



Softly, softly: A novel modification strategy for layered chalcogenide nanoparticles (NPs) takes advantage of the chalcophilic affinity of Mn^{2+}. Surface-bound MnO NPs can be selectively bound to the surface of WS_2 nanotubes and functionalized with the fluorescent dopamine derivative NBD at room temperature. The MnO NPs can also be reversibly detached from the chalcogenide surface with excess dopamine at elevated temperatures.

Surface Functionalization

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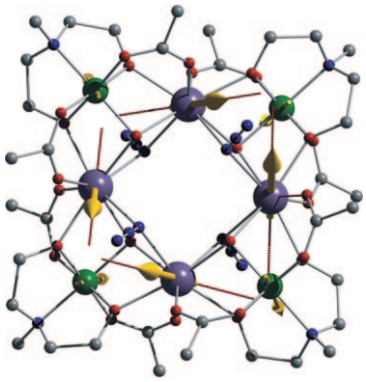
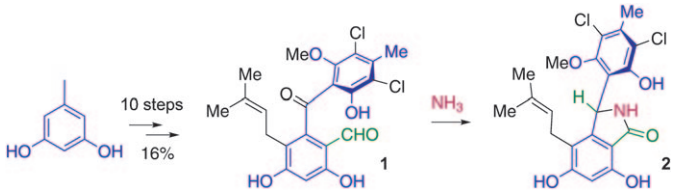


"Square-within-a-square": The first Cr–Dy single-molecule magnet (SMM) with an energy barrier to spin reorientation of 15 K is presented. The anisotropy in this octanuclear compound arises from the orientations of the four Dy^{III} centers (dark blue), which, in conjunction with the contributions from the Cr^{III} centers (green), leads to the SMM behavior.



Surprise, surprise! The total synthesis of the marine natural product pestalone (**1**), a highly substituted benzophenone with strong antibiotic acitivity, has provided insight into the surprising tendency of this and related molecules to undergo intramolecular Cannizzaro–Tishchenko-type reactions. Pestalone can be readily converted into pestalachloride A, a strongly antifungal metabolite isolated from an endophytic fungus, by simple treatment with ammonia at pH 8.

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

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