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:

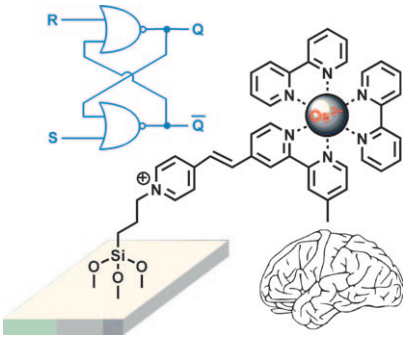
Author Profile

"The best advice I have ever been given is honesty is the best policy.
The worst advice I have ever been given was to give up my academic career …"
This and more about Norbert Krause can be found on page 1354.

Books

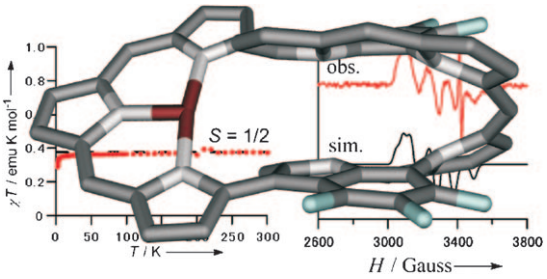
Highlights

Commit to memory: Whereas combinational logic devices are indifferent with respect to the history of input application, sequential logic is related to a memory function. A proof-of-principle of the sequential logic concept at the molecular level was demonstrated recently with a surface-confined osmium complex (see picture). This is an important conceptual advance toward molecular information processing.



Molecular Electronics

Contents



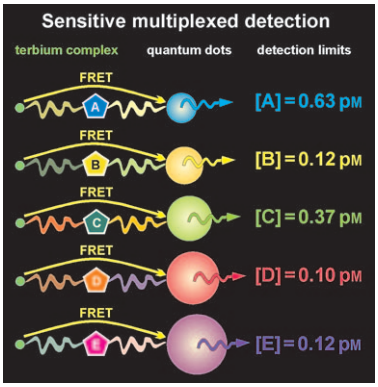
Luck and skill were both needed to find out that tetraaryl[32]heptaphyrin-(1.1.1.1.1.1.1) and its fourfold-fused derivative stabilize divalent copper in an unprecedented T-shaped geometry of the coordinating environment (see picture; Cu red, F blue, N light gray, C dark gray).

Reviews

At the very beginning was the dyeing of glass, a first application of nanoparticular functional materials (see picture). Today diverse perspectives for the increasing complexity of technical developments are offered. To prepare high-value nanoparticles a number of influences must be considered, and evaluation of particle properties requires the expertise of different fields. This background defines both the challenge and the attraction of nanoscience.

Communications

Colorful bioassays: Time- and color-resolved detection of Förster resonance energy transfer (FRET) from luminescent terbium complexes to different semiconductor quantum dots results in a fivefold multiplexed bioassay with sub-picomolar detection limits for all five bioanalytes (see picture). The detection of up to five biomarkers occurs with a sensitivity that is 40–-240-fold higher than one of the best-established single-analyte reference assays.



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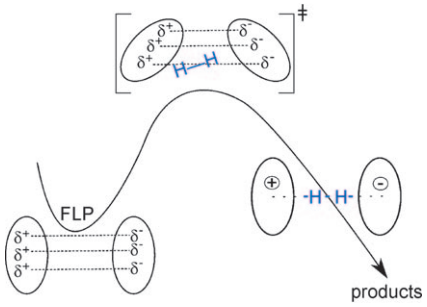
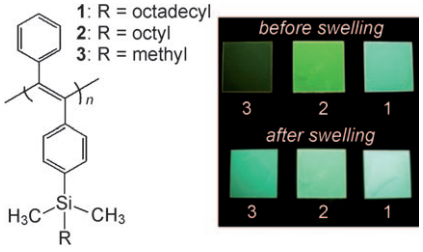
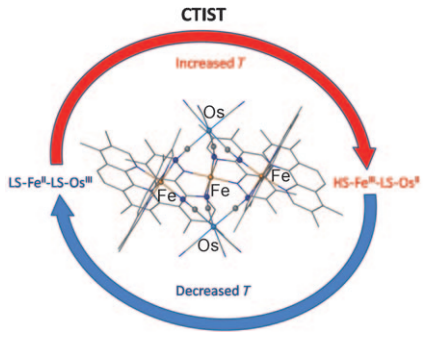


A new picture of H_2 activation is given by state-of-the-art quantum chemical calculations of potential energy surfaces and transition states and a thorough theoretical analysis. Key factors for activation of H_2 and other small molecules by so-called frustrated Lewis pairs (FLP) are entrance (preparation) steps and the electric field strength inside the FLP cavity.

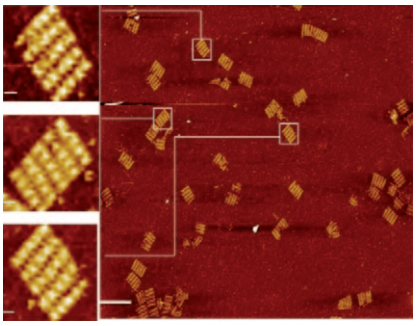
Swollen up: Poly(diphenylacetylene) derivatives with different alkyl groups show intramolecular excimer emission that arises from the phenyl–phenyl stack structure in the side chains. The excimer emission is intrinsically correlated with lamellar layer distance. Film-swelling experiments verify that the excimer emission can be modulated by changing the lamella layer distance (see picture).





High 'n low: The novel $\{[Fe(tmphen)_2]_3[Os(CN)_6]_2\}$ complex (see structure) is the first example of a cluster in which a high-spin Fe^{III} ion is in a coordination environment of four imine nitrogen atoms and two N-coordinated cyanides. Magnetic studies reveal an unprecedented type of reversible charge transfer induced spin transition (CTIST) between the low-spin Fe^{II}–N≡C–Os^{III} and high-spin Fe^{III}–N≡C–Os^{II} systems.

Into the fold: A new strategy is presented to scale up DNA origami using multihelical DNA tiles as folding staples. Atomic force microscopy images (see picture) demonstrate the two-dimensional structures formed by using this strategy.



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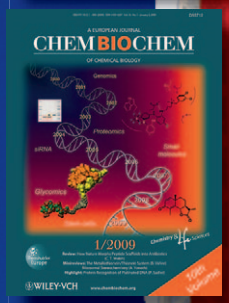

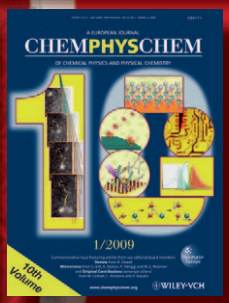

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at the Maison de la Chimie
(near the Eiffel Tower and Les Invalides)

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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


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Michel Orrit


Nicolas Winssinger

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J. T. Hynes, J.-M. Lehn

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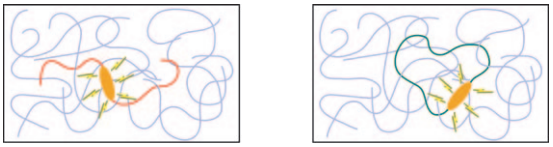
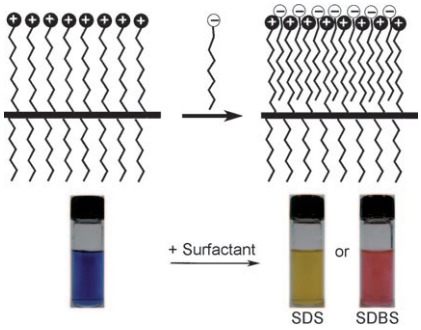


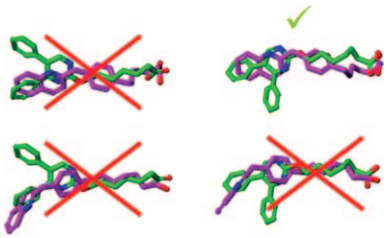
Molecular twister: A single-molecule study in a semi-dilute regime on a synthetic ring polymer containing a fluorescent perylene diimide unit (see picture, orange) reveals the heterogeneity of the system. The investigation indicates partial threading of the cyclic chains with the linear polymer matrix.

Polymers

Showing their true colors: Polymers based on polydiacetylene and imidazolium show selective color response to anionic surfactants. Furthermore, this system easily distinguishes between the anionic surfactants sodium dodecyl sulfate (SDS) and sodium dodecylbenzenesulfonic acid (SDBS).

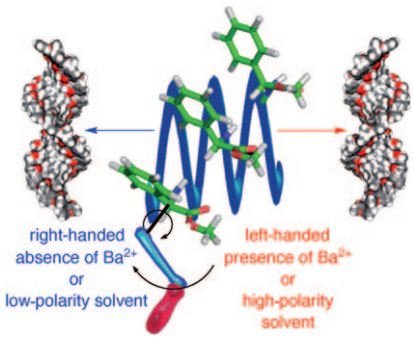


Sensors



A nonradioactive binding assay relying on NMR methods has been devised for a G-protein-coupled receptor; in addition the INPHARMA methods give access to the relative orientation of multiple ligands and supports ligand-based drug design (see picture of superimposed ligands). The method is fast and does not require any structural information from protein crystal structures.

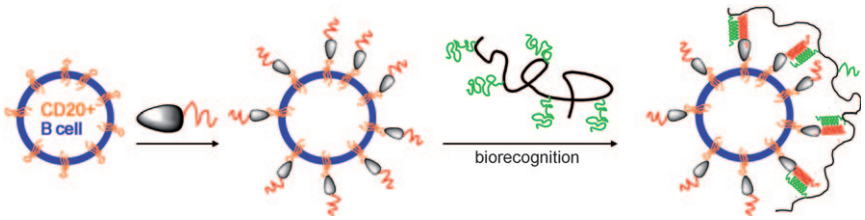
Drug Design



Helix sense selection: Tuning the conformational equilibrium of the pendants of poly(phenylacetylene)s allows selection of the helicity of the polymer in a reversible way. Complexation with appropriate metal cations (e.g. Ba^{2+}) or changing the polarity of the solvent permits the reversible selection of the desired helix sense. A full picture of the mechanism explaining this phenomenon is presented.

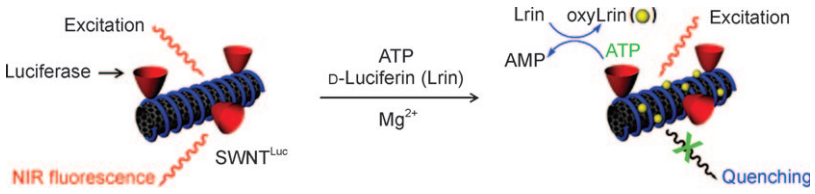
Helicity

Contents



Peptide biorecognition: The heterodimerization of complementary randomly coiled peptides, one (red) bound to an antibody fragment (gray) and one (green) grafted to a copolymer (black), to form coiled coils resulted in the cross-linking of CD20 target antigens (orange) on Raji B cells and consequently the initiation of apoptosis (see schematic representation).

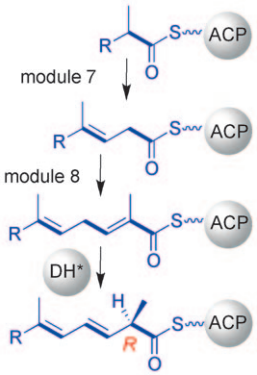
Biorecognition



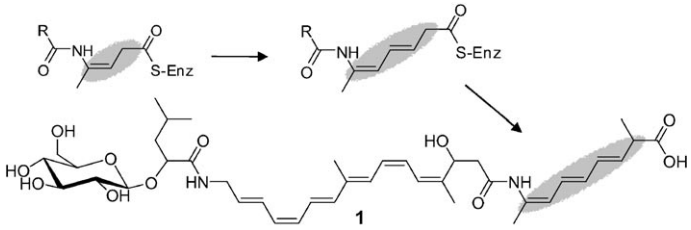
Take the tube: The title conjugate provides spatiotemporal information of ATP in living cells by a two-step fluorescence quenching mechanism. OxyLrin, which is generated enzymatically in the reaction between ATP and D-luciferin (Lrin), is adsorbed onto the nanotubes and quenches their fluorescence (see picture). The sensor is highly selective toward ATP.

ATP Detection

Shift work: Biochemical analysis of the rhizoxin pathway revealed that the diene moiety is not shifted all at once, but through distinct enzymatic operations. The first shift occurs by a formal β,γ-dehydration in module 7, while the second double bond is first generated by module 8 and then shifted by an unprecedented "shift module" with a novel type of DH* domain (see scheme). ACP = acyl carrier protein, DH* = dehydratase-like shift domain.



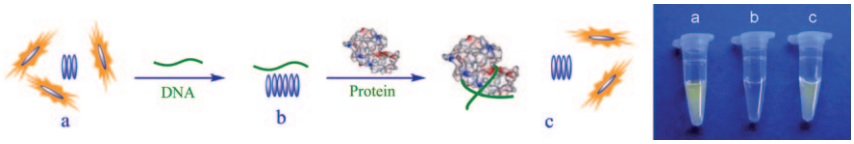
Polyketide Biosynthesis



Caught in the act: Genetic pathway engineering in conjunction with HPLC–NMR spectroscopy of highly labile intermediates provided direct evidence for the installation of β,γ double bonds during polyketide elongation to form the antibiotic bacillaene. The novel congener bacillaene B (**1**) was also discovered as an elusive true end product of the pathway in *Bacillus amyloliquefaciens*.

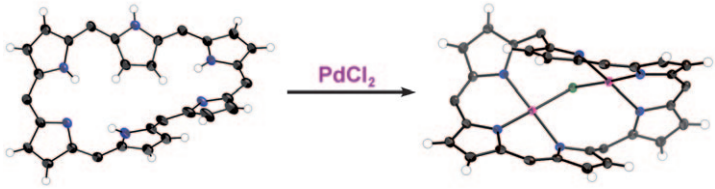
Polyketide Biosynthesis

Contents



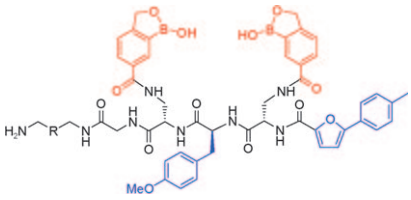
Sensitivity that won't break the bank: The addition of an anti-lysozyme DNA aptamer (a polyanion) to a cationic perylene probe that exists in aqueous solution as a mixture of the fluorescent free monomer and aggregate forms shifted the equilibrium and resulted in fluorescence quenching (see schematic representation). The subsequent introduction of lysozyme weakened DNA binding to the perylene aggregates and led to fluorescence recovery.

Biosensors



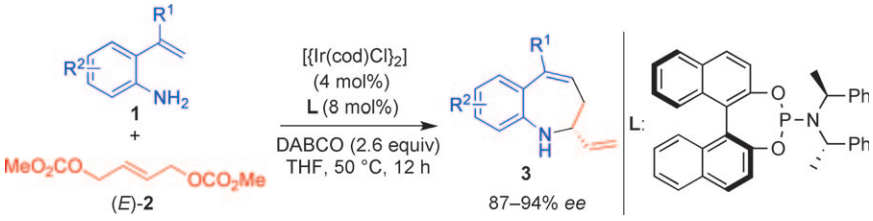
One more twist of a Möbius strip: Metalation of Möbius-aromatic hexakis(pentafluorophenyl)[28]hexaphyrin (see picture; Pd red, Cl green, N blue, phenyl rings omitted) provides a highly stable organic radical that is delocalized over a doubly twisted π-conjugation system. The two-photon absorption cross-section is distinctly larger than that of non-aromatic expanded porphyrins.

Expanded Porphyrins



Mini lectins: A new class of oligosaccharide receptors (see example) was designed by exploiting several modes of molecular recognition, including the unique ability of benzoboroxoles to complex hexopyranosides. The synthesis is modular, thus well suited to targeting specific oligosaccharides using combinatorial libraries.

Carbohydrate Recognition

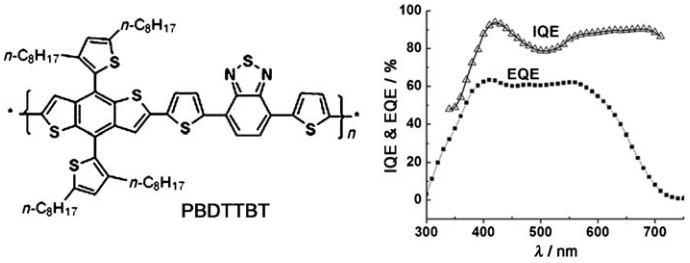


Making azacycles: The [{Ir(cod)Cl}$_2$]/**L** complex efficiently catalyzes the tandem allylic vinylation and asymmetric allylic amination of (*E*)-**2** with *ortho*-amino styrene derivatives **1** to afford the title compounds **3** with excellent enantioselectivity. cod = 1,5-cyclooctadiene, DABCO = 1,4-diazabicyclo[2.2.2]octane.

Homogeneous Catalysis

Contents

Solar Cells



Sun catcher: The new benzo[1,2-*b*:4,5-*b*′]-dithiophene-containing polymer PBDTTBT exhibits a power conversion efficiency of up to 5.66%. The high open-circuit voltage (0.92 V) originates from the low HOMO level of the polymer and the high internal and external quantum efficiencies over a wide spectral range. PBDTTBT is a promising donor material for application in polymer solar cells.

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).

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