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:*

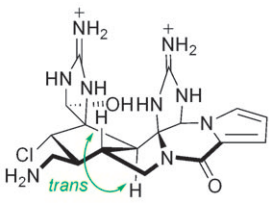
Author Profile

"If I wasn't a scientist, I would be an art and antiquities researcher. The secret of being a successful scientist is to be creative and innovative, to work hard, and most importantly, to be lucky …"
This and more about Itamar Willner can be found on page 2968.

Books

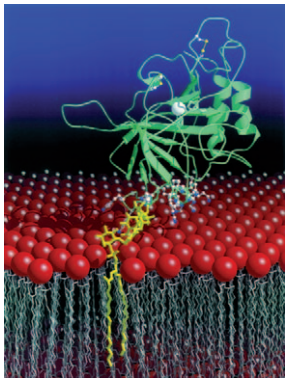
Highlights

The marine alkaloid palau'amine has been prepared for the first time in totally synthetic form by a series of cascade and one-pot transformations. These reactions exploit the inherent reactivity of functional groups and deliver interesting solutions to daunting synthetic challenges.



Naural Product Synthesis

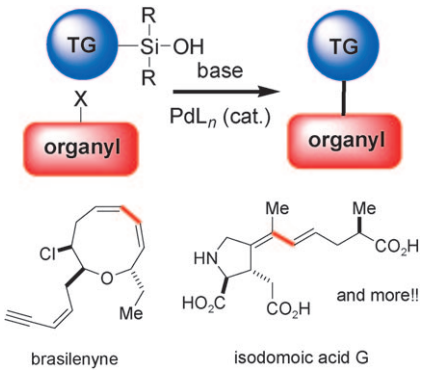
Contents



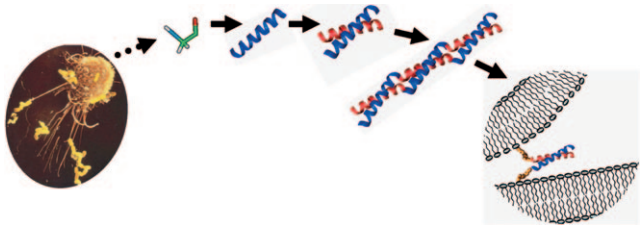
Sensational findings: The fizzy taste sensation we perceive when we consume carbonated beverages is mediated by carbonic anhydrase IV, an enzyme catalyzing the conversion of carbon dioxide to hydrogen carbonate and free protons. The picture shows the enzyme (green) linked to a membrane through a glycosylphosphatidylinositol tail (yellow). The zinc ion of the active site is represented by a white sphere.

Minireviews

Versatile but underutilized: Transition-metal-catalyzed cross-coupling reactions have revolutionized the synthesis of complex organic molecules. Recent advances in organosilicon chemistry have significantly expanded the utility of these coupling partners. This Minireview presents case studies wherein silicon-based cross-coupling reactions play a strategic role in the total synthesis of selected natural products (see scheme; TG = transferable group).



Reviews



Cues from nature: The coiled-coil motif is a simple molecular building block ubiquitous in nature that has an impressive range of functions, with roles in protein binding, the formation of structural edifices, and dynamic processes. These functions inspire research in synthetic biology, in which the coiled-coil motif is utilized in functional units, assemblies, and systems.

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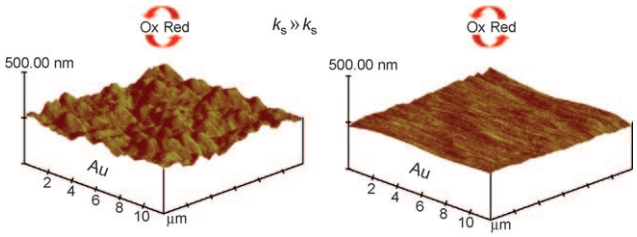
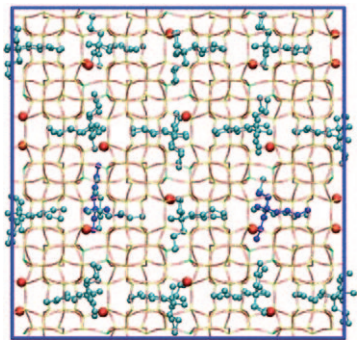
Communications

Electrochemistry



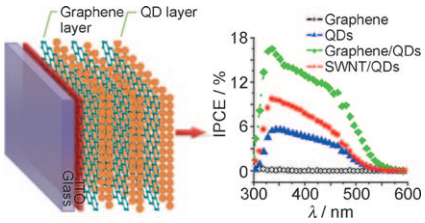
It's a knockout! When the surface of gold electrodes is treated with hydroxyl radicals, the electron-transfer rates k_s of electrochemical reactions involving radical intermediates are drastically reduced (see picture). This observation can be explained by the selective knockout of gold active sites associated with partially filled d orbitals.

Enantioseparation



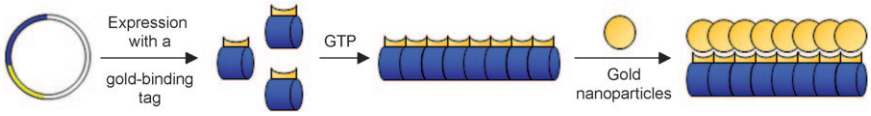
Minority excluded: If mixtures of chiral compounds are adsorbed in Al-substituted MFI zeolite containing nonframework cations, a process occurs that ultimately might be used for enantioseparation. If one enantiomer is present in excess it will organize the nearby cations, which in turn influence all other cations through long-range interaction, such that all adsorption sites become effectively chiral. This suppresses the minority enantiomer.

Photovoltaics



Layering in the sun: Layered graphene and quantum dot (QD) films can be fabricated simply on transparent conducting indium tin oxide (ITO) substrates from aqueous solutions. The structure and favorable work function of graphene make it effective for the collection and transfer of photogenerated charges to the electrode, resulting in a high-performance photovoltaic device (see picture; IPCE = incident photon-to-charge-carrier conversion efficiency, SWNT = single-walled carbon nanotube).

Nanotechnology



Naturally born nanowires: The spontaneous self-assembly of the bacterial cytoskeletal protein FtsZ was used to position metal nanoparticles in an orderly fashion to fabricate a metal nanowire (see scheme). The genetic fusion of each monomer with an appropriate short protein motif enables the specific binding not only of nanoparticles, but also of other inorganic particles and biological molecules.

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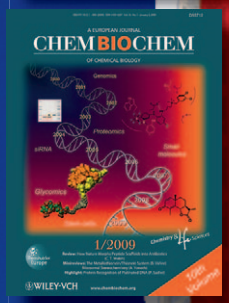

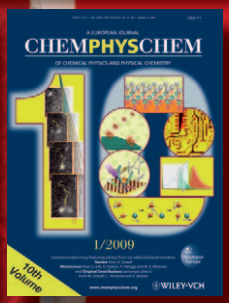

On 21st May 2010 in Paris
at the Maison de la Chimie
(near the Eiffel Tower and Les Invalides)

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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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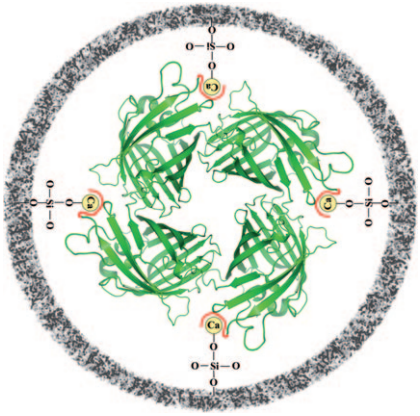
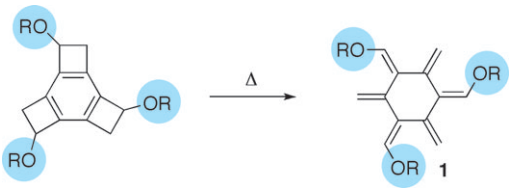
Si'l vous plait? A facile and general method has been developed to encapsulate polyhistidine-tagged proteins in silica nanoparticles (NPs; gray, see picture) using calcium ions (yellow). The enhanced green fluorescence protein (EGFP) encapsulated in the silica NPs shows a substantial increase in fluorescence intensity and stability against denaturants, protease, and heat.



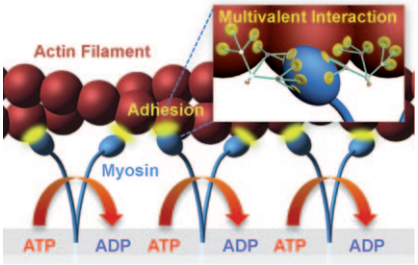
Protein Encapsulation



You rang m'lord? Thermally induced successive ring openings of tris(alkoxytricyclobutabenzene) to hexaradialene are described. The isomerization reaction was highly stereoselective to afford a stereodefined hexaradialene **1**, given that the hydroxy groups on the four-membered rings were protected by bulky substituents.

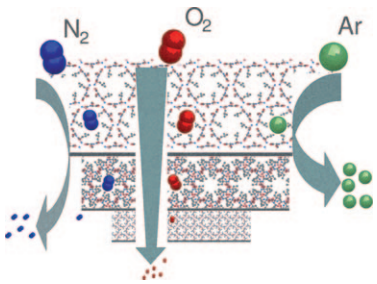
Ring Opening Reactions

A sticky end: A heterotropic conjugate of actin and myosin–actomysin–is stabilized by a water-soluble dendritic "molecular glue" bearing nine pendant guanidinium ions (see picture; ATP = adenosine triphosphate, ADP = adenosine diphosphate). The ATP-driven sliding motion of actin filaments on a myosin-functionalized coverslip is decelerated or totally arrested with a higher-generation dendrimer, but not with a lower-generation one.



Molecular Motion

Selective pores: Microporous dipeptide crystals can be used as single-crystal membranes. In permeation experiments with N_2, O_2, and Ar, the main components of air, the crystals show high permeabilities and excellent selectivities (see picture). L-Alanyl-L-alanine crystals exhibit extremely high O_2/N_2 selectivities.



Permselective Crystals

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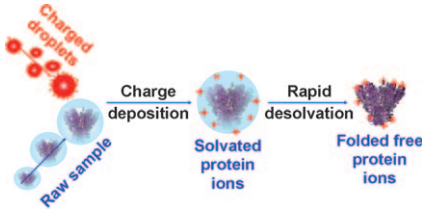
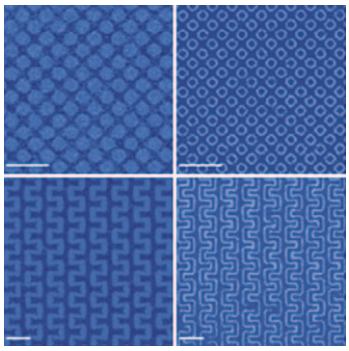


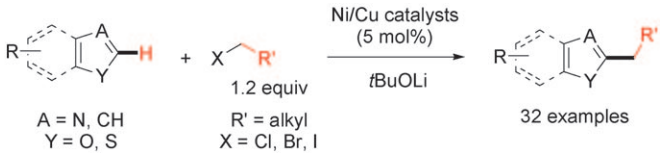
"Soft" ionization: EESI deposits charges on native proteins, which are separated from any high electric field. In this way native proteins can be characterized by mass spectrometry even from raw biological samples without significant conformational changes or reduction in activity. EESI-MS is a sensitive tool for the high-throughput analysis of trace levels of proteins under the native conditions.

Analytical Methods



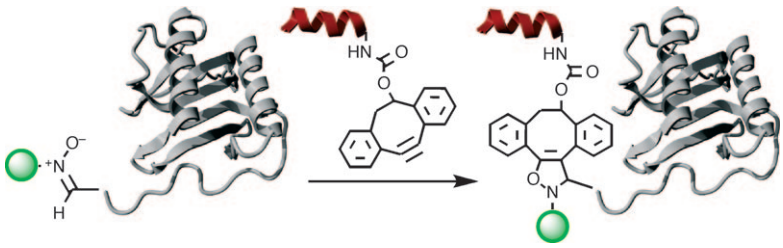
There's more behind these masks: Masks composed of Au nanohole-array films on a poly(dimethylsiloxane) (PDMS) slab were used to create high-density molecular patterns. Nanohole films of different thicknesses produced either edge patterns or 1:1 patterns (see examples; scale bars: 2 μm). Hierarchical patterns were created with a single nanostencil mask by using a patterned PDMS slab or by combining nanostencil printing with microcontact printing.

Nanostencil Printing



Too selective: A general and straightforward protocol for the cross-coupling of non-activated alkyl halides with heterocyclic C–H bonds has been developed. The transformation is chemo- and regioselective and many functional groups on both coupling partners are tolerated. The method employs cheap nickel/copper catalysts, and expands significantly the scope of C–H functionalization (see scheme).

C–H Activation



Quicker and slicker: An efficient metal-free 1,3-dipolar cycloaddition of dibenzocyclooctynes with nitrones proceeded with rate constants of up to 39 $M^{-1} s^{-1}$, or up to 300 times faster than similar reactions with azides. This strategy is useful for the site-specific N-terminal modification of peptides and proteins (see scheme).

Bioorthogonal Reactions

Contents

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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