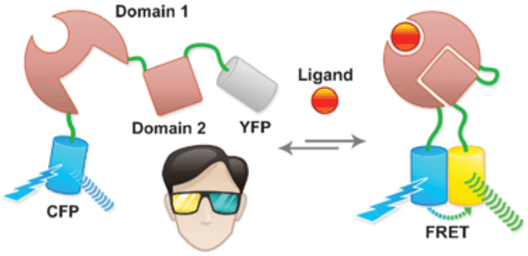
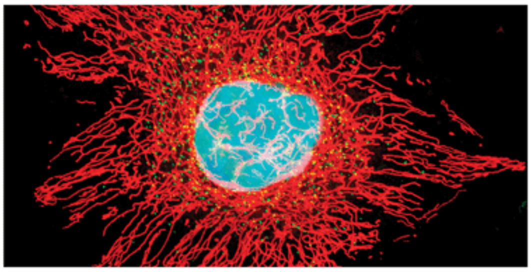
- Genetically encoded biosensors based on engineered fluorescent proteins
  Frommer, W. B.; Davidson, M. W.; Campbell, R. E. *Chem. Soc. Rev.* **2009**, *38*, 2833 – 2841.
  Abstract:



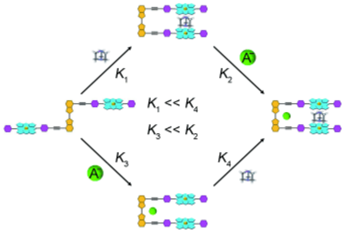
Fluorescent proteins have revolutionized cell biology by allowing researchers to non-invasively peer into the inner workings of cells and organisms. While the most common applications of fluorescent proteins are to image expression, localization, and dynamics of protein chimeras, there is a growing interest in using fluorescent proteins to create biosensors for minimally invasive imaging of concentrations of ions and small molecules, the activity of enzymes, and changes in the conformation of proteins in living cells. This *tutorial review* provides an overview of the progress made in the development of fluorescent protein-based biosensors to date.

- The fluorescent protein palette: tools for cellular imaging
  Day, R. N.; Davidson, M. W. *Chem. Soc. Rev.* **2009**, *38*, 2887 – 2921.
  Abstract:



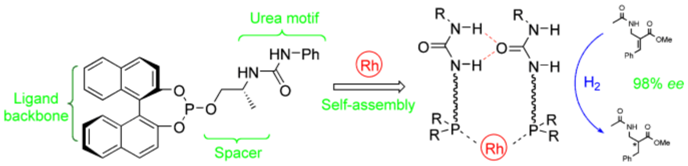
This *critical review* provides an overview of the continually expanding family of fluorescent proteins (FPs) that have become essential tools for studies of cell biology and physiology. Here, we describe the characteristics of the genetically encoded fluorescent markers that now span the visible spectrum from deep blue to deep red. We identify some of the novel FPs that have unusual characteristics that make them useful reporters of the dynamic behaviors of proteins inside cells, and describe how many different optical methods can be combined with the FPs to provide quantitative measurements in living systems (227 references). “If wood is rubbed with the *Pulmo marinus*, it will have all the appearance of being on fire; so much so, indeed, that a walking-stick, thus treated, will light the way like a torch” (translation of Pliny the Elder from John Bostock, 1855).

- Biindole-Bridged Porphyrin Dimer as Allosteric Molecular Tweezers
  Lee, C.-H.; Yoon, H.; Jang, W.-D. *Chem. Eur. J.* **2009**, *15*, 9972 – 9976.
  Abstract:



Allosteric molecular tweezers: By the introduction of porphyrin units to anion-acceptable biindole moiety (see scheme), the binding affinity of Cl^- was significantly enhanced owing to the π-π interaction of porphyrin units. Furthermore, the biindole-bridged zinc porphyrin dimer binds Cl^- as well as 1,4-diazabicyclo[2.2.2]octane (DABCO) in a strong positive allosteric manner.

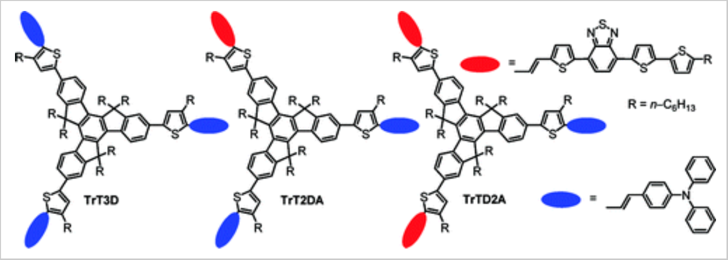
- Application of a Supramolecular-Ligand Library for the Automated Search for Catalysts for the Asymmetric Hydrogenation of Industrially Relevant Substrates
  Meeuwissen, J.; Kuil, M.; van der Burg, A. M.; Sandee, A. J.; Reek, J. N. H. *Chem. Eur. J.* **2009**, *15*, 10272 – 10279.
  Abstract:



Prepare, assemble, and screen: A strategy is presented for the automated screening and lead optimization of enantioselective homogeneous catalysts based on the supramolecular assembly of urea-functionalized ligands. Multiple building blocks are used to prepare these ligands, which are employed in the asymmetric hydrogenation of industrially relevant substrates (see scheme).

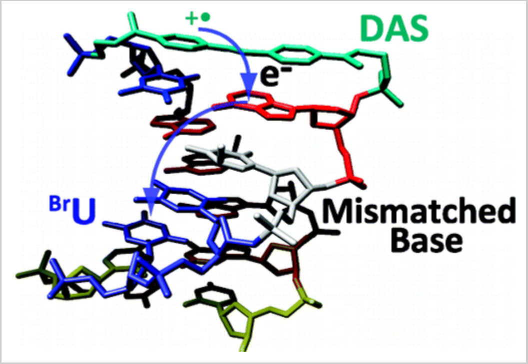
A procedure is described for the automated screening and lead optimization of a supramolecular-ligand library for the rhodium-catalyzed asymmetric hydrogenation of five challenging substrates relevant to industry. Each catalyst is (self-) assembled from two urea-functionalized ligands and a transition-metal center through hydrogen-bonding interactions. The modular ligand structure consists of three distinctive fragments: the urea binding motif, the spacer, and the ligand backbone, which carries the phosphorus donor atom. The building blocks for the ligand synthesis are widely available on a commercial basis, thus enabling access to a large number of ligands of high structural diversity. The simple synthetic steps enabled the scale-up of the ligand synthesis to multigram quantities. For the catalyst screening, a library of twelve new chiral ligands was prepared that comprised substantial variation in electronic and steric properties. The automated procedures employed ensured the fast catalyst assembly, screening, and direct acquisition of samples for analysis. It appeared that the most selective catalyst was different for every substrate investigated and that small variations in the building blocks had a major impact on the catalyst performance. For two substrates, a catalyst was found that provided the product with outstanding enantioselectivity. The subsequent automated optimization of these two leads showed that an increase of catalyst loading, dihydrogen pressure, and temperature had a positive effect on the catalyst activity without affecting the catalyst selectivity.

- Star-Shaped D-π-A Conjugated Molecules: Synthesis and Broad Absorption Bands
  Wang, J.-L.; Tang, Z.-M.; Xiao, Q.; Ma, Y.; Pei, J. *Org. Lett.* **2009**, *11*, 863–866.
  Abstract:



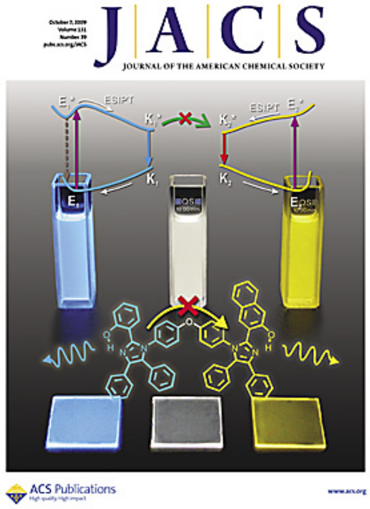
Two donor–acceptor hybrid star-shaped D-π-A molecules were facilely developed. The absorption spectra of TrTD2A and TrT2DA, which almost covered the whole visible range, were tuned by changing the ratio of donor and acceptor groups. However, the PL quantum effieciencies of TrTD2A and TrT2DA in solutions were dramatically reduced after the introduction of benzothiadiazole unit as acceptor chromophore.

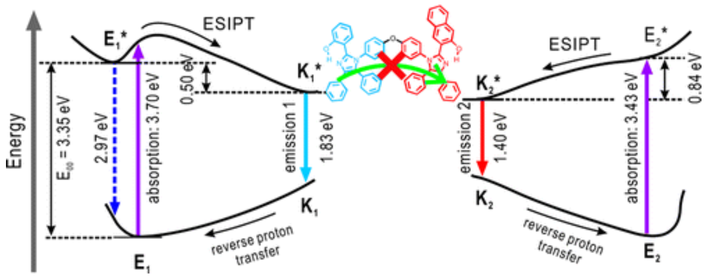
- DNA Hairpins Containing a Diaminostilbene Derivative as a Photoinduced Electron Donor for Probing the Effects of Single-Base Mismatches on Excess Electron Transfer in DNA
  Ito, T.; Hayashi, A.; Kondo, A.; Uchida, T.; Tanabe, K.; Yamada, H.; Nishimoto, S. *Org. Lett.* **2009**, *11*, 927–930.
  Abstract:



To investigate the effects of local structural disorder induced by a single-base mismatch on excess electron transfer (EET) in DNA, a novel hairpin DNA containing diaminostilbene (DAS) as a photoinducible electron donor has been developed. It was clearly demonstrated that EET efficiency depends on the electron injection modes from the electron donors and redox properties of the mismatched bases.

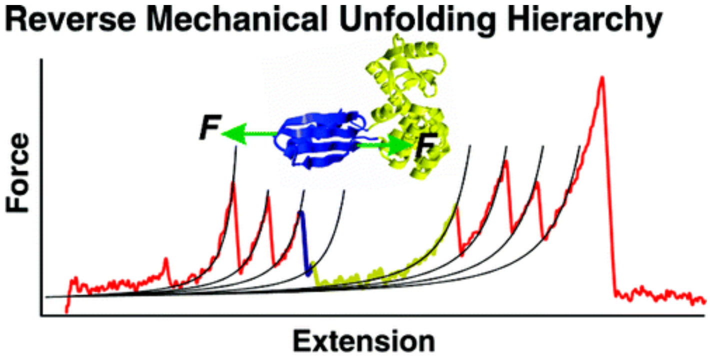
- A White-Light-Emitting Molecule: Frustrated Energy Transfer between Constituent Emitting Centers
  Park, S.; Kwon, J. E.; Kim, S. H.; Seo, J.; Chung, K.; Park, S.-Y.; Jang, D.-J.; Medina, B. M.; Gierschner, J.; Park, S. Y. *J. Am. Chem. Soc.* **2009**, *131*, 14043–14049.
  Abstract:





White-light-emitting single molecules are promising materials for use in a new generation of displays and light sources because they offer the possibility of simple fabrication with perfect color reproducibility and stability. To realize white-light emission at the molecular scale, thereby eliminating the detrimental concentration- or environment-dependent energy transfer problem in conventional fluorescent or phosphorescent systems, energy transfer between a larger band-gap donor and a smaller band-gap acceptor must be fundamentally blocked. Here, we present the first example of a concentration-independent ultimate white-light-emitting molecule based on excited-state intramolecular proton transfer materials. Our molecule is composed of covalently linked blue- and orange-light-emitting moieties between which energy transfer is entirely frustrated, leading to the production of reproducible, stable white photo- and electroluminescence.

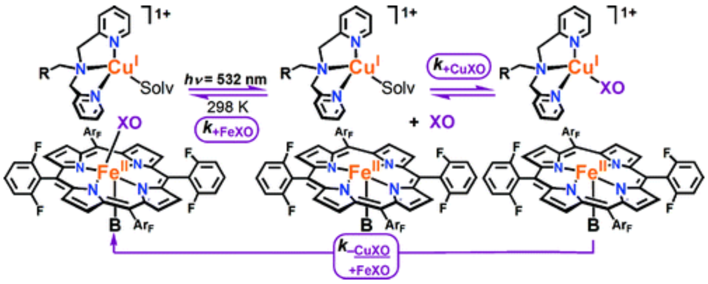
- Domain Insertion Effectively Regulates the Mechanical Unfolding Hierarchy of Elastomeric Proteins: Toward Engineering Multifunctional Elastomeric Proteins
  Peng, Q.; Li, H. *J. Am. Chem. Soc.* **2009**, *131*, 14050–14056.
  Abstract:



The architecture of elastomeric proteins controls fine-tuned nanomechanical properties of this class of proteins. Most elastomeric proteins are tandem modular in structure, consisting of many individually folded domains of varying stability. Upon stretching, these elements unfold sequentially following a strict hierarchical pattern determined by their mechanical stability, where the weakest element unfolds first and the strongest unfolds last. Although such a hierarchical architecture is well-suited for biological functions of elastomeric proteins, it may become incompatible with incorporating proteins of desirable functionality in order to construct multifunctional artificial elastomeric proteins, as many of these desired proteins are not evolved for mechanical purpose.

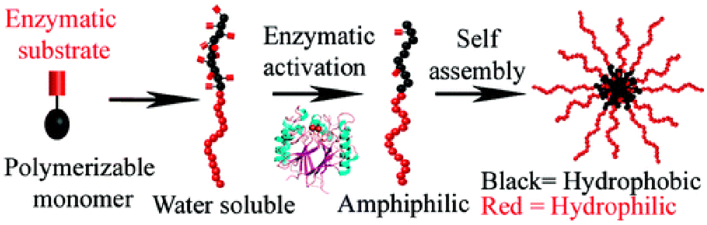
Thus, exposure to a high stretching force will result in unraveling of these proteins and lead to a loss of their functionality. To overcome this challenge, we combine protein engineering with single molecule force spectroscopy to demonstrate that domain insertion is an effective strategy to control the mechanical unfolding hierarchy of multidomain proteins and effectively protect mechanically labile domains. As a proof-of-principle experiment, we spliced a mechanically labile T4 lysozyme (T4L) into a flexible loop of a mechanically stronger host domain GL5 to create a domain insertion protein. Using single molecule force spectroscopy, we showed that the mechanically labile T4L domain unfolds only after the mechanically stronger host domain GL5 has unfolded. Such a reverse mechanical unfolding hierarchy effectively protects the mechanically labile T4L domain from applied stretching force and significantly increased the lifetime of T4L. The approach demonstrated here opens the possibility to incorporate labile proteins into elastomeric proteins for engineering novel multifunctional elastomeric proteins.

- Carbon Monoxide and Nitrogen Monoxide Ligand Dynamics in Synthetic Heme and Heme−Copper Complex Systems
  Lucas, H. R. ; Meyer, G. J. ; Karlin, K. D. *J. Am. Chem. Soc.* **2009**, *131*, 13924–13925.
  <u>Abstract:</u>



Intermolecular nitrogen monoxide (·NO) and carbon monoxide (CO) transfer from iron to copper and back, a phenomenon not previously observed, has been accomplished by employing transient-absorbance laser flash photolysis methods. A 1:1 heme/copper component system consisting of a six-coordinate ferrous species, F8FeII(CO)(DCIM) or F8FeII(NO)(thf) [F8 = tetrakis(2,6-difluorophenyl)porphyrinate(2−); DCIM = 1,5-dicyclohexylimidazole; thf = tetrahydrofuran], and two ligand−copper(I) complexes, one with tridentate [BzL = (benzyl)bis(2-pyridylmethyl)amine] and one with tetradentate coordination [PyL = tris(2-pyridylmethyl)amine], was utilized. The results suggest a lower affinity for NO versus CO binding to copper(I) and a higher rate for NO versus CO binding to heme. In fact, the latter event has been observed in cytochrome c oxidase aa3.

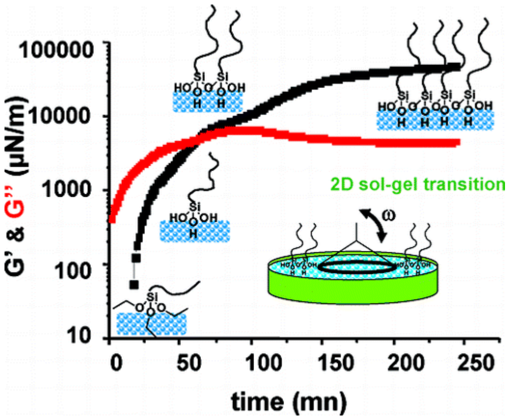
- Enzymatically Triggered Self-Assembly of Block Copolymers
  Amir, R. J. ; Zhong, S.; Pochan, D. J. ; Hawker, C. J. *J. Am. Chem. Soc.* **2009**, *131*, 13949–13951.
  <u>Abstract:</u>



The polymerization of vinyl monomers with cleavable enzymatic substrates has been shown to lead to water-soluble double-hydrophilic block copolymers which, upon enzymatic activation of the diblock copolymers, become amphiphilic and undergo self-assembly into colloidal nanostructures.

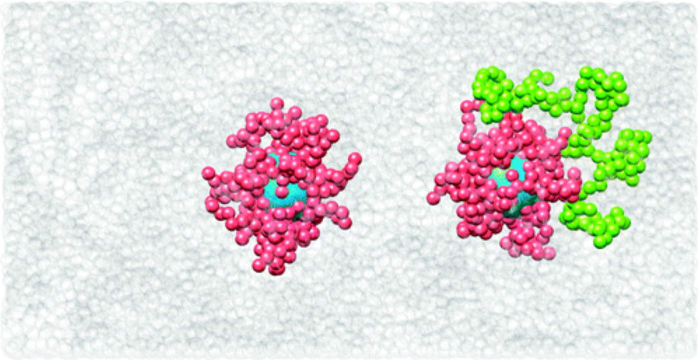
The ability to change the chemical and physical characteristics of polymeric materials by an enzymatic reaction opens the way for novel and exciting applications such as enzymatic-triggered activation of surfaces and formation of nanostructures in vivo in a highly controlled manner.

- Two-Dimensional Sol-Gel Transition in Silica Alkoxides at the Air/Water Interface
  Tadjoa, O.; Cassagnau, P.; Chapel, J.-P. *Langmuir* **2009**, *25*, 11205–11209.
  Abstract :



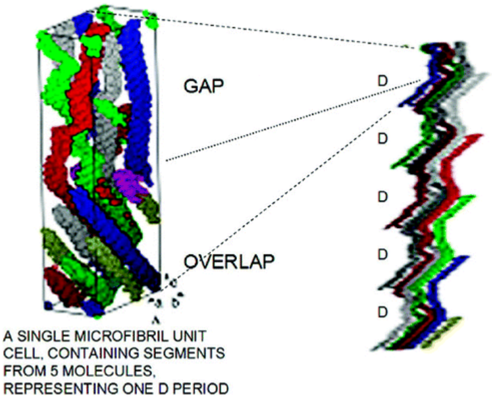
We have investigated the 2D viscoelastic behavior of the reactive sol-gel transition of silica alkoxides deposited at the air/acidic water interface of a Langmuir trough by oscillatory interfacial rheology. The storage and loss moduli increased with time as the hydrolysis- condensation reaction took place. There was evidence of a 2D gel point, which was discussed within the percolation theory framework. The power law dependence value of n=0.63 was similar to those found for bulk systems. The final network had a low fractal dimension value of df=1.17 (for a 2D system) indicating a rather open structure, in agreement with acidic catalysis, and a somewhat low effective modulus of 20 MPa

- Dispersing Nanoparticles in a Polymer Matrix: Are Long, Dense Polymer Tethers Really Necessary?
  Smith, G. D.; Bedrov, D. *Langmuir* **2009**, *25*, 11239–11243.
  Abstract:



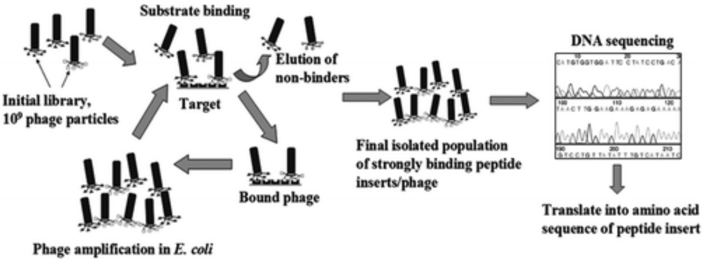
Dispersing nanoparticles in a polymer matrix is intrinsically challenging because of unfavorable entropic interactions between the matrix and the nanoparticle. Similar to suspensions of larger colloidal particles, it has been found that thermodynamically stable dispersions of nanoparticles can be achieved in polymer matrices when the nanoparticles are decorated with dense layers of polymer tethers whose molecular weight is comparable to or greater than that of the matrix. Utilizing molecular dynamics simulations, we demonstrate that, in contrast to larger colloidal particles, repulsive interactions between nanoparticles can be achieved with tethered polymers much shorter than the polymer matrix when relatively sparse grafting is employed.

- Phosphorylated Proteins and Control over Apatite Nucleation, Crystal Growth, and Inhibition
  George, A.; Veis, A. *Chem. Rev.* **2008**, *108,* 4670-4693.
  Abstract:



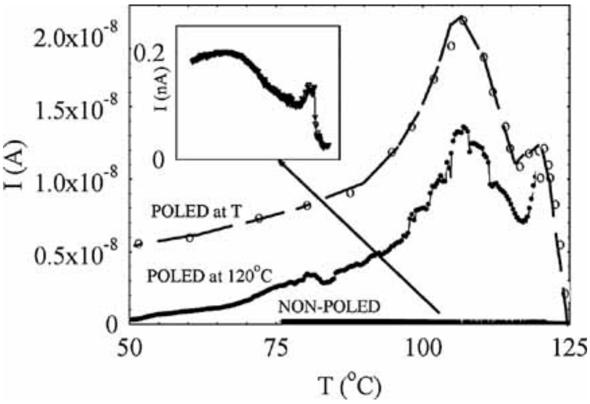
Living organisms are capable of inducing the crystallization and deposition of a wide variety of minerals, but the vertebrates mainly utilize the calcium phosphates in constructing their mineral phases in both normal circumstances in bone, dentin, and tooth enamel and in pathological ectopic mineral deposits. The predominant form of the mineral in all situations is as carbonated apatite. However, the extent of mineralization in a particular tissue or organ is quite variable and crystallite size, crystal shape, and packing and organization of the mineral crystals may also be variable. It is clear that the same physical chemical principles must apply to all, but it is equally clear that the organism must tightly regulate the local environment where the mineral is formed. This is an intrinsically complex problem because the mineral crystals of bone and dentin form in the extracellular matrix, external to the cells, which are the ultimate regulators of the process.
The principal focus of this review, however, will be on the influence of the phosphoproteins of the matrix on the formation and growth of crystals in two systems: the small, platelike crystals and crystal aggregates of carbonated apatite found in bone, dentin, and cementum; and the large, high-axial-ratio rodlike crystal aggregates found in dental enamel. As pointed out many years ago, the dentin and the enamel are formed in opposition to each other and provide direct contrasts between the nature of the compartments created by the cells, the structural matrices produced, and the extracellular matrix macromolecules that control the nucleation, growth, and structure of their carbonated apatite mineral phases. Here, we consider these two systems separately.

- Protein- and Peptide-Directed Syntheses of Inorganic Materials
  Dickerson, M. B.; Sandhage, K. H.; Naik, R. R. *Chem. Rev.* **2008**, *108,* 4935-4978.
  Abstract:



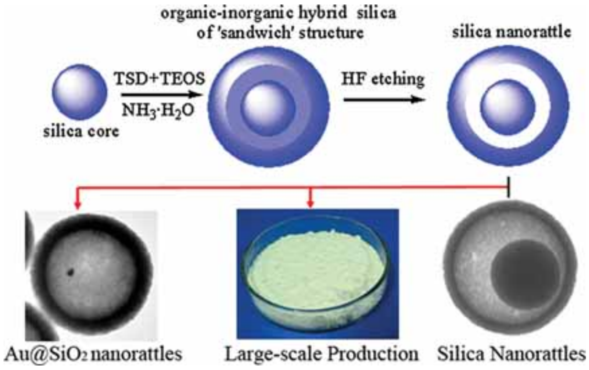
The course of evolution on our planet has resulted in the appearance, diversification, and proliferation of organisms capable of producing complex structures from hard inorganic materials, via processes known collectively as biomineralization. For example, magnetotactic bacteria produce nanoparticles of Fe_3O_4 or Fe_3S_4 that have well-defined sizes and shapes that enable these microorganisms to utilize magnetic fields for alignment and migration. Fish grow structures, known as otoliths or “ear stones”, within the inner ear that assist in inertial sensing. These otoliths are composed of the aragonite polymorph of calcium carbonate. Remarkably, mollusks produce shells that contain a single distinct crystalline form of calcium carbonate, such as aragonite, or may contain segregated layers of calcite and aragonite. In addition to the crystalline forms of calcium carbonate, an amorphous phase of this mineral is synthesized by sea urchins to produce spines (spicules). Marine sponges produce silica spicules that have been demonstrated to possess light-guiding characteristics and may reach lengths up to 3 m. The diatoms, a type of unicellular eukaryotic algae, produce intricately detailed silica cell walls, known as frustules, that are organized over multiple length scales. In each of the examples listed above, specialized biomolecules have been found, or are thought, to play a major role in directing the formation of these often complex inorganic structures. The use of peptides and proteins to direct the “bottom up” syntheses of inorganic materials *in vitro* is thus a logical outgrowth of the discoveries made in biomineralization.

- Piezoelectric and Electric-Field-Induced Properties of a Ferroelectric Bent-Core Liquid Crystal
  Jákli, A.; Pintre, I.C.; Serrano, J.L.; Ros, M. B. ; de la Fuente M. R. *Adv. Mater.* **2009,** 3784-3788.
  Abstract:



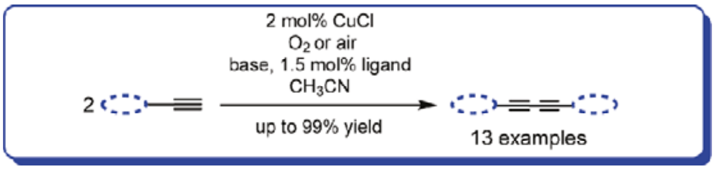
A new adamantane bent-core liquid crystal exhibiting a metastable ferroelectric phase with large polarization is synthesized and characterized. The material shows reversible switching between a birefringent (opaque) and an optically isotropic (clear) state. In the clear state, the observed piezoelectric constant is comparable to those of commercial solid-state piezotransducers.

- Facile and Scalable Synthesis of Tailored Silica “Nanorattle” Structures
  Chen, D.; Li, L.; Tang, F.; Qi, S. *Adv. Mater.* **2009,** 3804-3807.
  Abstract:



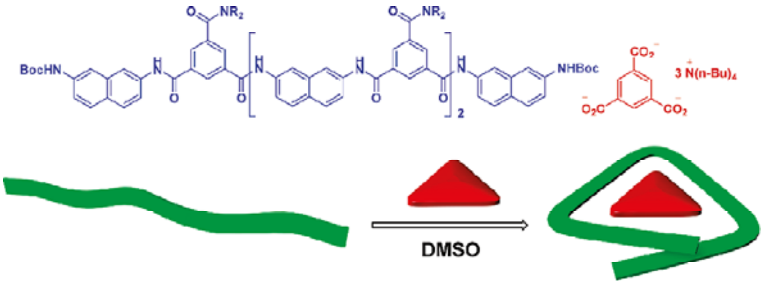
Silica “nanorattles” are fabricated by means of selective etching of ingeniously designed organic-inorganic hybrid silica spheres with a three-layer “sandwich” structure. The size (95-645 nm), shell thickness, and core diameter of the monodisperse nanorattles can be precisely controlled, even in gram-scale production. This method is also shown to be promising for development as a general method for synthesis of rattle-type functional nanomaterials.

- Influence of Bases and Ligands on the Outcome of the Cu(I)-Catalyzed Oxidative Homocoupling of Terminal Alkynes to 1,4-Disubstituted 1,3-Diynes Using Oxygen as an Oxidant
  Adimurthy, S.; Malakar, C. C.; Beifuss, U. *J. Org. Chem.* **2009**, *74*, 5648–5651.
  Abstract:



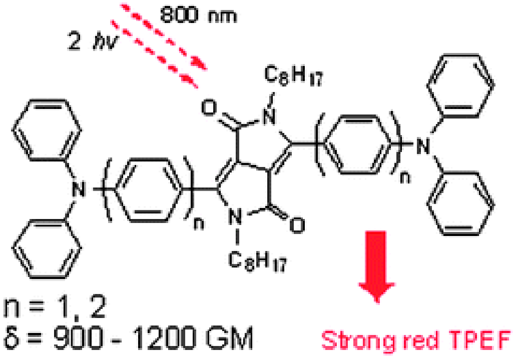
The efficient Cu(I)-catalyzed oxidative homocoupling of terminal alkynes in the presence of a base using an amine as a ligand and oxygen as an oxidant yields the symmetrical 1,3-diynes with yields of up to 99%. The outcome of the couplings critically depends on the proper choice of base and ligand as well as reaction conditions. Best results were observed with 2.0 mol%CuCl, 1.5 mol%TMEDA or DBEDA, and DBU or DABCO in acetonitrile.

- Folding of Aromatic Amide-Based Oligomers Induced by Benzene-1,3,5-tricarboxylate Anion in DMSO
  Xu, Y.-X.; Wang, G.-T.; Zhao, X.; Jiang, X.-K.; Li, Z.-T. *J. Org. Chem.* **2009**, *74*, 7267–7273.
  Abstract:



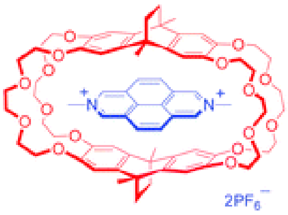
In this paper, we describe the folding of a series of linear arylamide oligomers in DMSO that is induced by benzene-1,3,5-tricarboxylate anion. The oligomers are comprised of naphthalene-2,7-diamine and 1,3,5-benzenetricarboxylic acid segments with two (*tert*-butoxycarbonylamino) groups at the ends and two to four hydrophilic *N,N*-bis(2-(2-(methoxyethoxy)ethoxy)ethyl)amino groups at one side of the backbones. (2DNOESY) ^{1}HNMR, fluorescence and UV-vis studies indicate that the oligomers do not adopt defined conformations inDMSO but fold into compact structures in the presence of the anion. It is revealed that the folded conformation is induced by intermolecular hydrogen bonds between the amide and aromatic hydrogen atoms of the oligomers and the oxygen atoms of the anion. ^{1}HNMRand UV-vis titrations support a 1:1 binding stoichiometry, and the associated constants are determined, which are found to increase with the elongation of the oligomers.

- Diphenylamine end-capped 1,4-diketo-3,6-diphenylpyrrolo[3,4-*c*]pyrrole (DPP) derivatives with large two-photon absorption cross-sections and strong two-photon excitation red fluorescence.
  Guo, E. Q.; Ren, P. H.; Zhang, Y. L.; Zhang, H. C.; Yang J . W. *Chem. Commun.* **2009**, 5859 – 5861.
  Abstract:

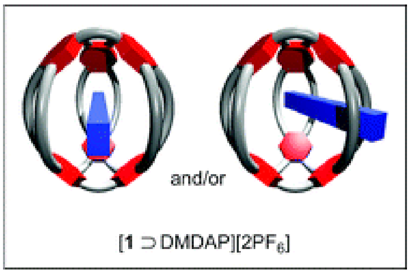


Novel donor–-bridge–acceptor–-bridge–donor (D—A—D)-type 1,4-diketo-3,6-diphenylpyrrolo[3,4-*c*]pyrrole (DPP) derivatives with end-capping diphenylamine groups have been synthesized and shown to exhibit large two-photon absorption cross-sections over a wide range of wavelengths with strong two-photon excitation red fluorescence.

- Two guest complexation modes in a cyclotriveratrylene-based molecular container
  Li, M. J.; Lai, C. C.; Liu, Y. H.; Peng, S. M.; Chiu, S. H. *Chem. Commun.* **2009**, 5814 – 5816.
  Abstract:



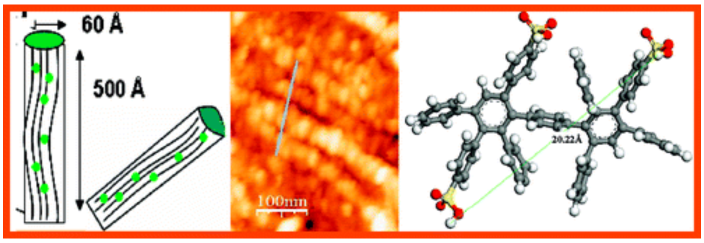
[**5** ⊃DMDAP][$2PF_6$]



[**1** ⊃DMDAP][$2PF_6$]

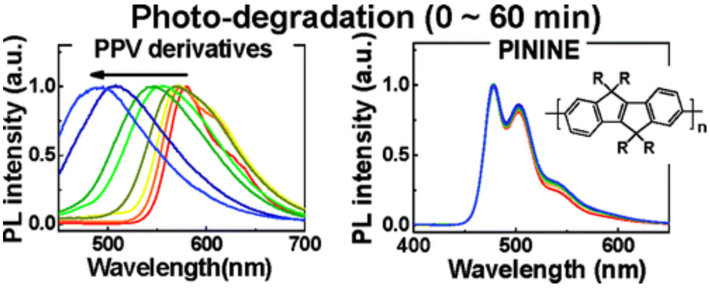
We report the synthesis of a cyclotriveratrylene-based molecular container and its distinctly different modes of complexation with dimethyldiazapyrenium and 4,4-biphenylbisdiazonium ions.

- From Solutions to Membranes: Structure Studies of Sulfonated Polyphenylene Ionomers.
  He, L.; Fujimoto, C. H.; Cornelius, C. J.; Perahia, D. *Macromolecules* **2009**, *42*, 7084–7090.
  Abstract:



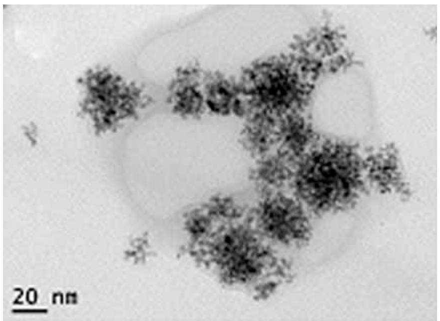
The structure of rigid sulfonated polyphenylene ionomers was investigated in bulk and in dilute organic solutions. The uniqueness of polyphenylene ionomers lies in their rigid backbone which prevents folding and therefore affects the partition into hydrophilic ionic domains and hydrophobic regions. This segregation dominates the structure of flexible ionic polymers. Small-angle neutron scattering studies of these ionomers have demonstrated that bundles of polymer molecules are formed in dilute organic solutions. This clustered building block persists in bulk dry and hydrated states of the ionomers. Hydration of these ionomers membranes results in segregation to hydrophilic and hydrophobic regions, where diffusion into interstitial spaces between the bundles of sulfonated and unsulfonated domains takes place followed by rearrangements of domains to yield locally bicontinuous regions. Only at very high sulfonation levels are fully bicontinues phases formed. With controlling the degree of continuity, the stiffness of the backbone offers a means to tune the transport in ionic polymers.

- Stabilized Polymers with Novel Indenoindene Backbone against Photodegradation for LEDs and Solar Cells.
  Song, S.; Jin, Y.; Kim, S. H.; Moon, J.; Kim, K.; Kim, Y.; Park, S. H.; Lee, K.; Suh, H. *Macromolecules* **2008**, *41*, 7296-7305.
  Abstract :



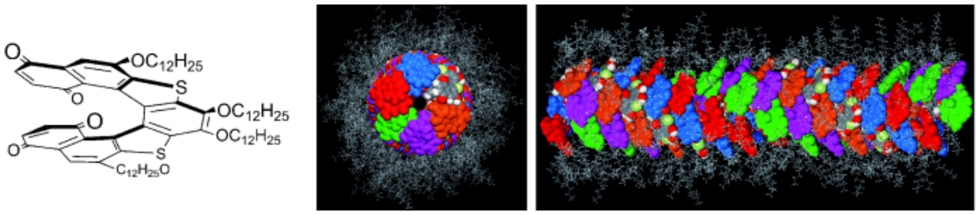
PPV derivatives, polymers with vinylene units, have their tendency to exhibit degradation, after irradiation with white light or operation of the device, resulting in the appearance of a shifted absorption and emission band in the short wavelength regions of the spectra. In this paper, we report the synthesis and properties of new polymers utilizing new backbone, poly(5,5,10,10-tetrakis(2-ethylhexyl)-5,10-dihydroindeno[2,1-*a*]indene-2,7-diyl) (PININE). In order to reduce oxidation of the vinylene group, the vinylene group was cyclized using two 5-membered rings. While poly(*p*-phenylenevinylene) derivatives show significantly blue-shifted and decreased peaks of UV-vis, blue-shifted maximum peaks of photoluminescence (PL) after irradiation with white light in air, and blue-shifted maximum peaks of electroluminescence (EL) after operation of the device, PININE shows stable spectra of UV-vis, and PL, and EL under the same conditions. PININE copolymers with benzothiadiazole and thiophene units exhibit high power conversion efficiency (PCE) for polymer solar cells. Under white light illumination (AM 1.5 G, 100 mW/cm2), the cell based on PININEDTBT/PCBM as the active layer has a short circuit current density (*I*sc) of 5.93 mA/cm2, a fill factor (FF) of 43%, and PCE of 1.88%. These copolymers have not only good processability due to the indenoindene unit, in which four alkyl groups can be incorporated, but also strong and uniform absorbance in the whole visible region.

- Colloidal Nanoparticles as a Wireless Booster for Electroenzymatic Reaction
  Lee, S. H.; Won, K.; Song, H.-K.; Park, C. B. *Small* **2009**, *5*, 2162 – 2166.
  Abstract:



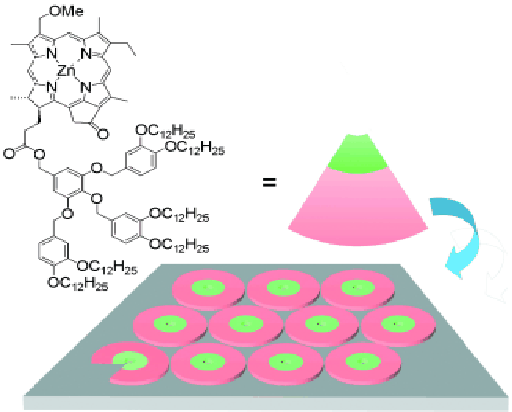
Nanoparticles in a wireless form are employed to overcome the extremely low efficiency of electroenzymatic synthesis reactions. The nanoparticle-mediated electrochemical regeneration of cofactor (NADH) is used in the enzymatic conversion of α-ketoglutarate to L-glutamate (see picture). The use of colloidal nanoparticles in electrolyte provides a new strategy for electroenzymatic catalysis.

- Hollow Six-Stranded Helical Columns of a Helicene
  Shcherbina, M. A.; Zeng, X.-B.; Tadjiev, T.; Ungar, G.; Eichhorn, S. H.; Phillips, K. E. S.; Katz, T. J. *Angew. Chem. Int. Ed*. **2009,** *48*, 7837-7840.
  Abstract:



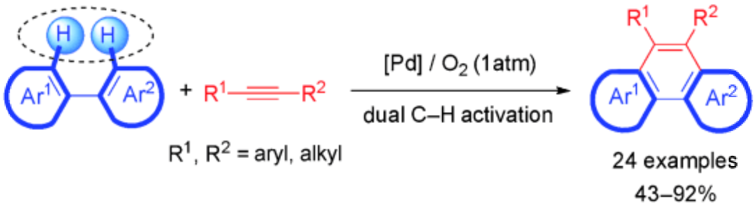
Do the twist: A helicenebisquinone (see formula), both enantiopure and racemic, forms hexagonal columnar phases in which the internal structures of the columns are 13_2 hollow helices comprising six-molecule repeat units (see axial and side views). The enantiopure compound forms a true hexagonal structure; the racemate segregates enantiomers into right and left helical columns that are interlocked and longitudinally displaced for optimal packing.

- Cyclic Self-Assembled Structures of Chlorophyll Dyes on HOPG by the Dendron Wedge Effect
  Uemura, S.; Sengupta, S.; Wurthner, F. *Angew. Chem. Int. Ed*. **2009**, *48*, 7825-7828.
  Abstract:



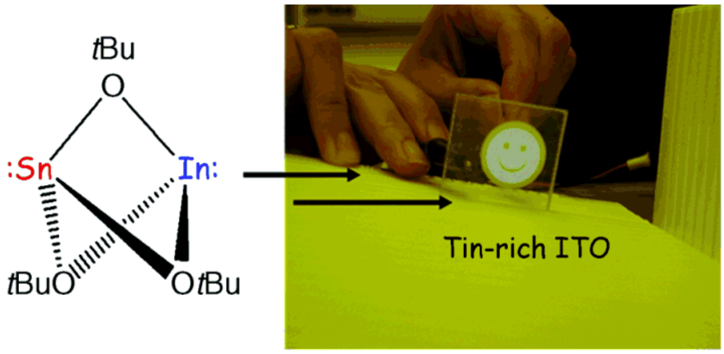
A molecular cake: Zinc chlorins with different dendron wedges can form linear or circular self-assembled structures with different molecular packing. In particular, zinc chlorins with six alky chains in the dendron group self-assemble into hexameric cyclic structures on HOPG (see picture). Such cyclic structures are reminiscent of (bacterio)chlorophyll organization in natural light-harvesting systems.

- A Palladium-Catalyzed Oxidative Cycloaromatization of Biaryls with Alkynes Using Molecular Oxygen as the Oxidant
  Shi, Z.; Ding, S.; Cui, Y.; Jiao, N. *Angew. Chem. Int. Ed*. **2009**, *48*, 7895-7898.
  Abstract:



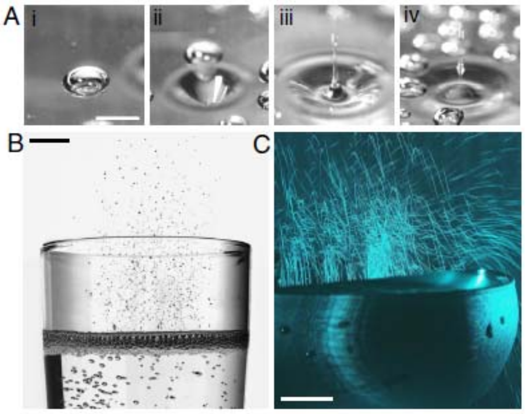
Dual activation of C—H bonds has enabled the preparation of polycyclic aromatics from arylindoles and arylbenzofurans in the absence of a directing group, and with using O_2 as the oxidant (see scheme). Synthetically and medicinally important polycyclic aromatics have been easily prepared, and some of the resulting polycyclic heteroaromatics exhibit intense fluorescence.

- A Low-Temperature Molecular Approach to Highly Conductive Tin-Rich Indium Tin Oxide Thin Films with durable Electro-Optical Performance
  Aksu, Y.; Driess, M. *Angew. Chem. Int. Ed***. 2009,** *48,* 7778-7782.
  Abstract:



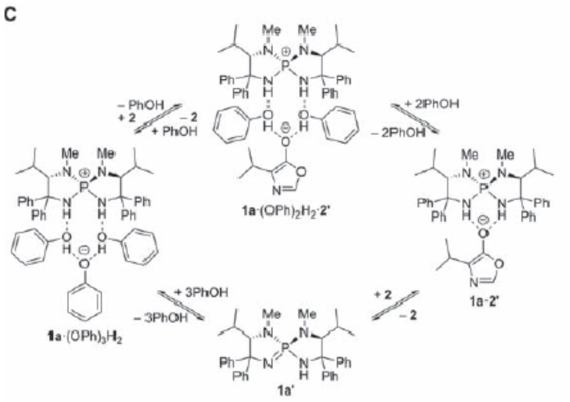
Save energy, smile! Highly conductive tin-rich indium tin oxide (ITO) composites are easily accessible using the molecular precursor Sn(*t*BuO)$_3$In. The as-prepared transparent and highly conductive thin films on glass substrates are atomically flat and show the best performance to date in ITO-based electroluminescent applications.

- Unraveling different chemical fingerprints between a champagne wine and its aerosols
  Liger-Belair, G.; Cilindre, C.; Gougeon, R. D.; Lucio, M.; Gebefügi, I.; Jeandet, P.; Schmitt-Kopplin, P. *Proc. Nat. Acad. Sci. USA* **2009**, *106*, 16545–16549.
  Abstract:



As champagne or sparkling wine is poured into a glass, the myriad of ascending bubbles collapse and radiate a multitude of tiny droplets above the free surface into the form of very characteristic and refreshing aerosols. Ultrahigh-resolution MS was used as a nontargeted approach to discriminate hundreds of surface active compounds that are preferentially partitioning in champagne aerosols; thus, unraveling different chemical fingerprints between the champagne bulk and its aerosols. Based on accurate exact mass analysis and database search, tens of these compounds overconcentrating in champagne aerosols were unambiguously discriminated and assigned to compounds showing organoleptic interest or being aromas precursors. By drawing a parallel between the fizz of the ocean and the fizz in Champagne wines, our results closely link bursting bubbles and flavor release; thus, supporting the idea that rising and collapsing bubbles act as a continuous paternoster lift for aromas in every glass of champagne.

- Chiral Organic Ion Pair Catalysts Assembled Through a Hydrogen-Bonding Network
  Uraguchi, D.; Ueki, Y.; Ooi, T. *Science* **2009**, *326*, 120-122.
  Abstract:



Research to develop structurally discrete, chiral supramolecular catalysts for asymmetric organic transformations has met with limited success. Here, we report that a chiral tetraaminophosphonium cation, two phenols, and a phenoxide anion appear to self-assemble into a catalytically active supramolecular architecture through intermolecular hydrogen bonding. The structure of the resulting molecular assembly was determined in the solid state by means of x-ray diffraction analysis. Furthermore, in solution the complex promotes a highly stereoselective conjugate addition of acyl anion equivalents to a,b-unsaturated ester surrogates with a broad substrate scope. All structural components of the catalyst cooperatively participate in the stereocontrolling event.