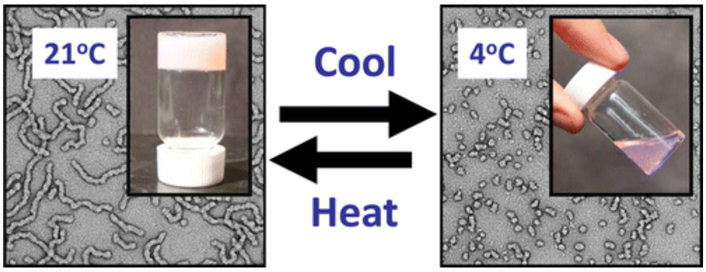
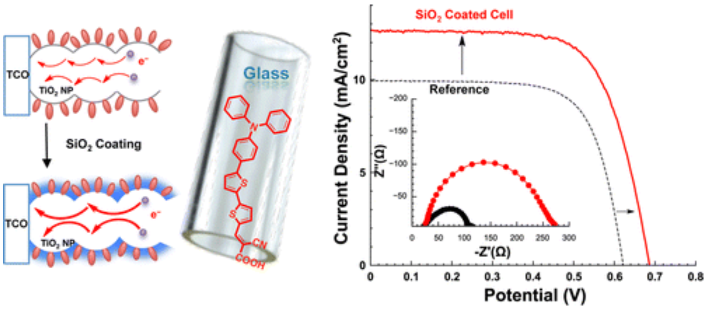
- Sterilizable Gels from Thermoresponsive Block Copolymer Worms
  Blanazs, A.; Verber, R.; Mykhaylyk, O. O.; Ryan, A. J.; Heath, J. Z.; Douglas, C. W. I.; Armes, S. P. *J. Am. Chem. Soc.* **2012**, *134*, 9741–9748.
  Abstract:



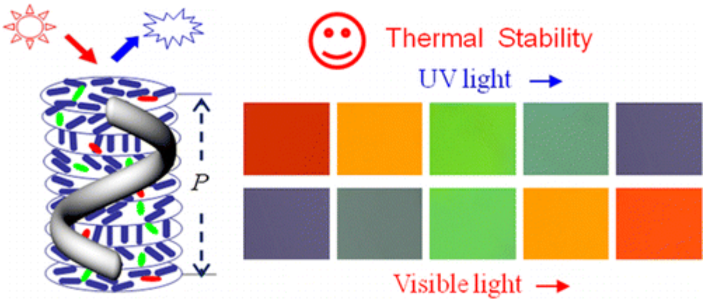
Biocompatible hydrogels have many applications, ranging from contact lenses to tissue engineering scaffolds. In most cases, rigorous sterilization is essential. Herein we show that a biocompatible diblock copolymer forms wormlike micelles via polymerization-induced self-assembly in aqueous solution. At a copolymer concentration of 10.0 w/w %, interworm entanglements lead to the formation of a free-standing physical hydrogel at 21 °C. Gel dissolution occurs on cooling to 4 °C due to an unusual worm-to-sphere order–order transition, as confirmed by rheology, electron microscopy, variable temperature ^{1}H NMR spectroscopy, and scattering studies. Moreover, this thermo-reversible behavior allows the facile preparation of sterile gels, since ultrafiltration of the diblock copolymer nanoparticles in their low-viscosity spherical form at 4 °C efficiently removes micrometer-sized bacteria; regelation occurs at 21 °C as the copolymer chains regain their wormlike morphology. Biocompatibility tests indicate good cell viabilities for these worm gels, which suggest potential biomedical applications.

- Glass-Encapsulated Light Harvesters: More Efficient Dye-Sensitized Solar Cells by Deposition of Self-Aligned, Conformal, and Self-Limited Silica Layers
  Son, H.-J.; Wang, X.; Prasittichai, C.; Jeong, N. C.; Aaltonen, T.; Gordon, R. G.; Hupp, J. T. *J. Am. Chem. Soc.* **2012**, *134*, 9537–9540.
  Abstract:



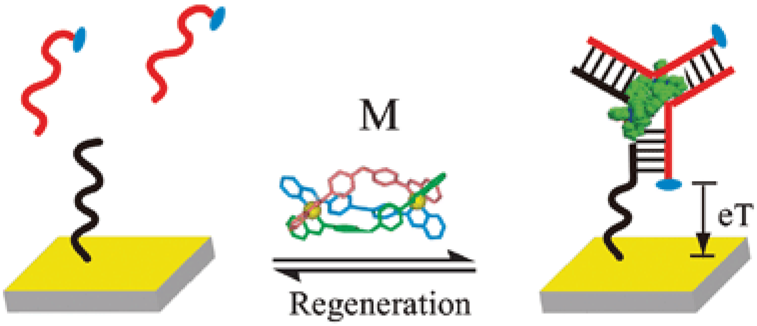
A major loss mechanism in dye-sensitized solar cells (DSCs) is recombination at the TiO_2/electrolyte interface. Here we report a method to reduce greatly this loss mechanism. We deposit insulating and transparent silica (SiO_2) onto the open areas of a nanoparticulate TiO_2 surface while avoiding any deposition of SiO_2 over or under the organic dye molecules. The SiO_2 coating covers the highly convoluted surface of the TiO_2 conformally and with a uniform thickness throughout the thousands of layers of nanoparticles. DSCs incorporating these selective and self-aligned SiO_2 layers achieved a 36% increase in relative efficiency versus control uncoated cells.

- Reversible Light-Directed Red, Green, and Blue Reflection with Thermal Stability Enabled by a Self-Organized Helical Superstructure
  Li, Y.; Urbas, A.; Li, Q. *J. Am. Chem. Soc.* **2012**, *134*, 9573–9576.
  Abstract:



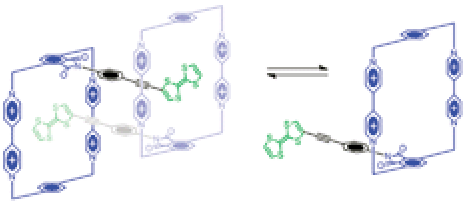
Adding external, remote, and dynamic control to self-organized superstructures with desired properties is an important leap necessary in leveraging the fascinating molecular subsystems for employment in applications. Here two novel light-driven dithienylethene chiral molecular switches possessing remarkable changes in helical twisting power during photoisomerization as well as very high helical twisting powers were found to experience photochemically reversible isomerization with thermal stability in both isotropic organic solvents and anisotropic liquid crystal media. When doped into a commercially available achiral liquid crystal host, the chiral switch was able to either immediately induce an optically tunable helical superstructure or retain an achiral photoresponsive liquid crystal phase whose helical superstructure was induced and tuned reversibly upon light irradiation. Moreover, reversible light-directed red, green, and blue reflection colors with thermal stability in a single thin film were demonstrated.

- Electrochemical DNA three-way junction based sensor for distinguishing chiral metallo-supramolecular complexes
  Feng, L.; Zhao, C.; Xiao, Y.; Wu, L.; Ren, J.; Qu, X. *Chem. Commun.* **2012**, *48*, 6900-6902.
  Abstract:



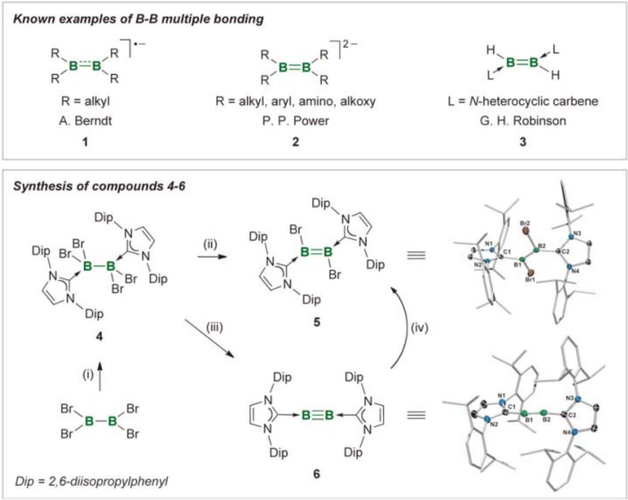
A simple, signal-on and regeneratable three-way junction based-electrochemical DNA sensor was presented and used for discrimination of chiral metallo-supramolecular complexes.

- A rigid donor–acceptor daisy chain dimer
  Cao, D.; Wang, C.; Giesener, M. A.; Liu, Z.; Stoddart, J. F. *Chem. Commun.* **2012**, *48*, 6791-6793.
  Abstract:



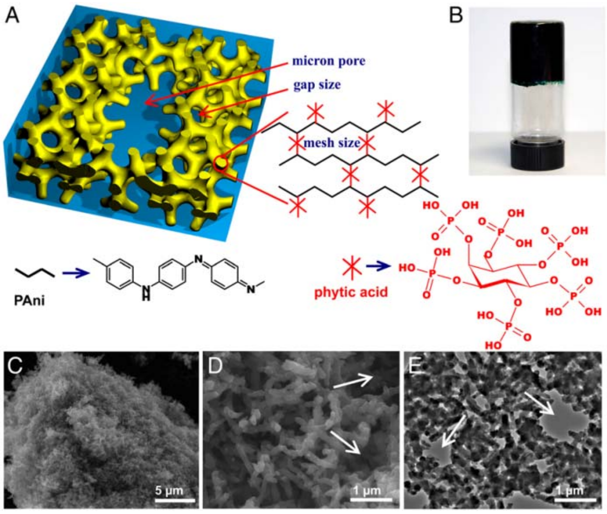
A functionalised cyclobis(paraquat-*p*-phenylene) attached by a rigid linker to a tetrathiafulvalene unit, which is incapable of self-complexation, forms preferentially a [*c*2]daisy chain which undergoes rapid disassociation and reassociation on the 1H NMR time-scale above room temperature.

- Ambient-Temperature Isolation of a Compound with a Boron-Boron Triple Bond
  Braunschweig, H.; Dewhurst, R. D.; Hammond, K.; Mies, J.; Radacki, K.; Vargas, A. *Science* **2012***, 336*, 1420-1422.
  Abstract:



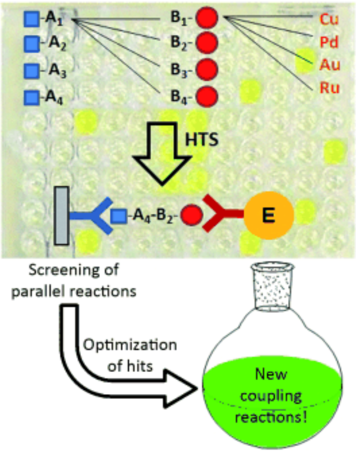
Homoatomic triple bonds between main-group elements have been restricted to alkynes, dinitrogen, and a handful of reactive compounds featuring trans-bent heavier elements of groups 13 and 14. Previous attempts to prepare a compound with a boron-boron triple bond that is stable at ambient temperature have been unsuccessful, despite numerous computational studies predicting their viability. We found that reduction of a bis(N-heterocyclic carbene)-stabilized tetrabromodiborane with either two or four equivalents of sodium naphthalenide, a one-electron reducing agent, yields isolable diborene and diboryne compounds. Crystallographic and spectroscopic characterization confirm that the latter is a halide-free linear system containing a boron-boron triple bond.

- Hierarchical nanostructured conducting polymer hydrogel with high electrochemical activity.
  Pan, L.; Yu, G.; Zhai, D.; Lee, H. R.; Zhao, W.; Liu, N.; Wang, H.; Tee, B. C.-K.; Shi, Y.; Cui, Y.; Bao, Z. *Proc. Nat. Acad. Sci. USA* **2012***, 109*, 9287-9292.
  Abstract:



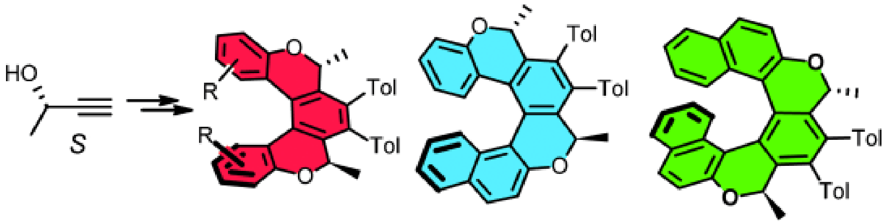
Conducting polymer hydrogels represent a unique class of materials that synergizes the advantageous features of hydrogels and organic conductors and have been used in many applications such as bioelectronics and energy storage devices. They are often synthesized by polymerizing conductive polymer monomer within a nonconducting hydrogel matrix, resulting in deterioration of their electrical properties. Here, we report a scalable and versatile synthesis of multifunctional polyaniline (PAni) hydrogel with excellent electronic conductivity and electrochemical properties. With high surface area and three-dimensional porous nanostructures, the PAni hydrogels demonstrated potential as high-performance supercapacitor electrodes with high specific capacitance (~480 F·g^{-1}), unprecedented rate capability, and cycling stability (~83% capacitance retention after 10,000 cycles). The PAni hydrogels can also function as the active component of glucose oxidase sensors with fast response time (~0.3 s) and superior sensitivity (~16.7 μA·mM^{-1}). The scalable synthesis and excellent electrode performance of the PAni hydrogel make it an attractive candidate for bioelectronics and future-generation energy storage electrodes.

- Reaction Discovery by Using a Sandwich Immunoassay
  Quinton, J.; Kolodych, S.; Chaumonet, M.; Bevilacqua, V.; Nevers, M.-C.; Volland, H.; Gabillet, S.; Thuéry, P.; Créminon, C.; Taran, F. *Angew. Chem. Int. Ed.* **2012**, *51*, 6144-6148.
  Abstract:



Mmm, a reaction sandwich… Using an immunoassay-based technique able to monitor any kind of cross-coupling reaction, a systematic and rapid evaluation of a large panel of random reactions was carried out. This approach led to the discovery of two new copper-promoted reactions: a desulfurization reaction of thioureas leading to isoureas and a cyclization reaction leading to thiazole derivatives from alkynes and N-hydroxy thioureas.

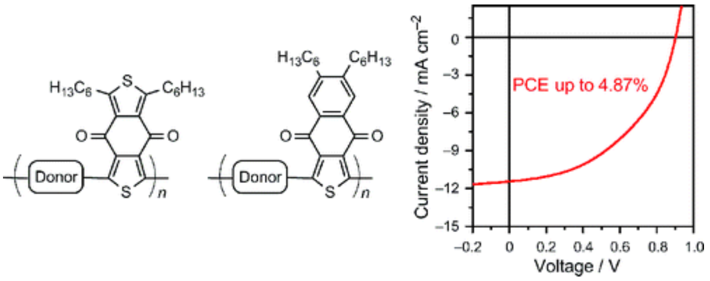
- A General Approach to Optically Pure [5]-, [6]-, and [7]Heterohelicenes
  Žádný, J.; Jančařík, A.; Andronova, A.; Šámal, M.; Vacek Chocholoušová, J.; Vacek, J.; Pohl, R.; Šaman, D.; Císařová, I.; Stará, I. G.; Starý, I. *Angew. Chem. Int. Ed.* **2012**, *51*, 5857-5861.
  Abstract:



9 helicenes: all optically pure *M,R,R*

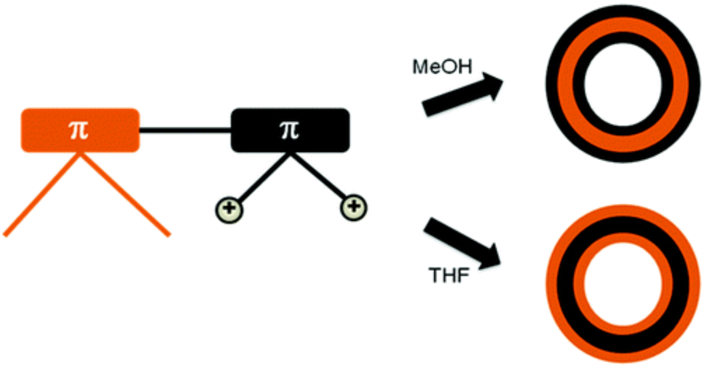
Spiral staircases: A general method for the preparation of optically pure [5]-, [6]-, and [7]heterohelicenes is based on a CoI- or Ni0-catalyzed diastereoselective [2+2+2] cycloisomerization of centrally chiral triynes to deliver helicenes comprising two 2H-pyran rings. The configuration, which can be predicted, does not depend on helicene length or functional groups present.

- Synthesis, Properties, and Photovoltaic Performances of Donor–Acceptor Copolymers Having Dioxocycloalkene-Annelated Thiophenes As Acceptor Monomer Units
  Ie, Y.; Huang, J.; Uetani, Y.; Karakawa, M.; Aso, Y. *Macromolecules* **2012**, *45*, 4564–4571.
  Abstract:



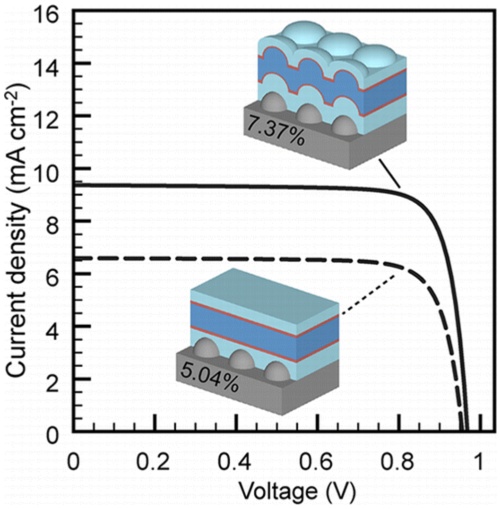
New donor–acceptor-type copolymers containing dioxocycloalkene-annelated thiophenes as electron-accepting units have been designed and synthesized for application to p-type organic semiconducting materials in organic photovoltaics. The investigation of their photophysical and electrochemical properties revealed that these copolymers possessed low optical bandgaps (from 1.63 to 1.92 eV) and low-lying HOMO energy levels (from −5.41 to −5.33 eV). Organic field-effect transistor measurements revealed that these copolymers had hole-transporting characteristics with mobilities on the order of 10^{-7}–10^{-4} cm^2 V^{-1} s^{-1}. The bulk-heterojunction photovoltaic devices fabricated from blends of these copolymers with fullerene derivatives as acceptors showed high power conversion efficiencies of up to 4.87%, with an open-circuit voltage of 0.90 V, a short-circuit current of 11.46 mA cm^{-2}, and a fill factor of 0.48 under air mass 1.5 simulated solar illumination.

- Cationic Polyfluorene-*b*-Neutral Polyfluorene “Rod–Rod” Diblock Copolymers
  Gutacker, A.; Lin, C.-Y.; Ying, L.; Nguyen, T. Q.; Scherf, U.; Bazan, G. C. *Macromolecules* **2012**, *45*, 4441–4446.
  Abstract:



All-conjugated "rod–rod" diblock copolymers are an emerging class of polymeric materials of considerable interest for applications in chemical and biological sensors or as components for optoelectronic devices. Here, we report a novel cationic diblock copolymer containing a neutral polyalkylfluorene block covalently bound to a polar polyfluorene counterpart—poly[9,9-bis(6-trimethylammoniumhexyl)-2,7-fluorene]-*b*-poly(3-hexyl-2,5-thiophene) (PF6NBr-*b*-PF8)—which was synthesized in a sequential Suzuki–Miyaura polymerization and was made ionic with trimethylamine in a subsequent quaternization step. The optical properties of this material were investigated by UV/vis and photoluminescence spectroscopies in three different solvents: methanol, THF and THF/methanol 1:1. Atomic force microscopic (AFM) imaging experiments provided evidence for solvent-induced aggregation. The formation of vesicles and spherical particles is observed in layers from THF and methanolic solution.

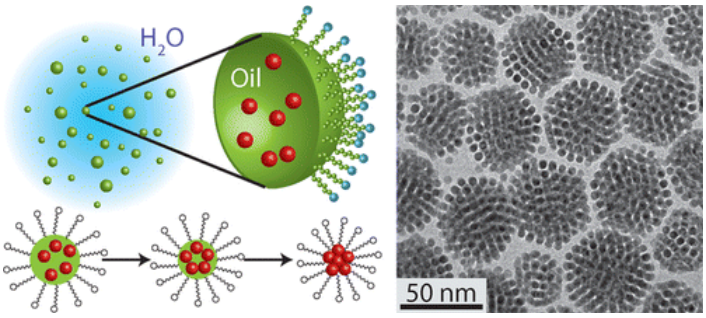
- Design of Nanostructured Solar Cells Using Coupled Optical and Electrical Modeling
  Deceglie, M. G.; Ferry, V. E.; Alivisatos, A. P.; Atwater, H. A. *Nano Letters* **2012**, *12*, 2894-2900.
  Abstract:



Nanostructured light trapping has emerged as a promising route toward improved efficiency in solar cells. We use coupled optical and electrical modeling to guide optimization of such nanostructures. We study thin-film n-i-p a-Si:H devices and demonstrate that nanostructures can be tailored to minimize absorption in the doped a-Si:H, improving carrier collection efficiency. This suggests a method for device optimization in which optical design not only maximizes absorption, but also ensures resulting carriers are efficiently collected.

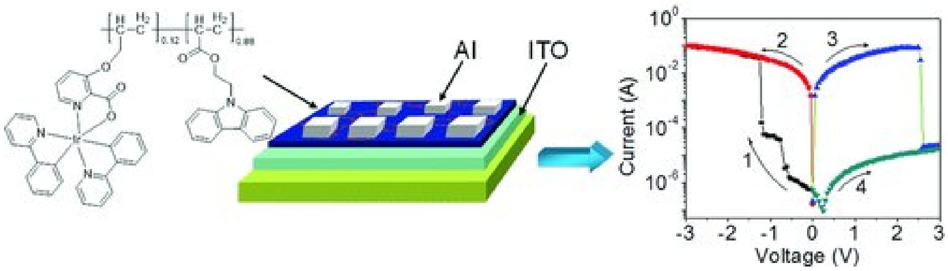
- Nanoparticle Clusters with Lennard-Jones Geometries

Lacava, J.; Born, P.; Kraus, T. *Nano Letters* **2012,** *12*, 3279-3282.
Abstract:



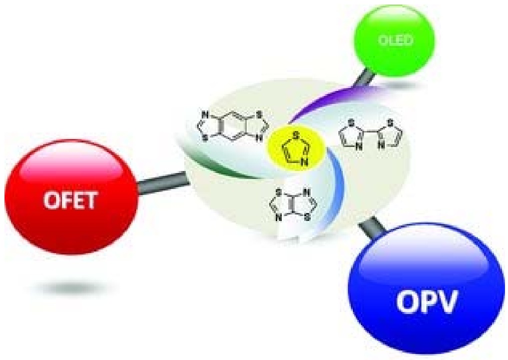
Noble gas and metal atoms form minimum-energy clusters. Here, we present analogous agglomerates of gold nanoparticles formed in oil-in-water emulsions. We exclude interfacial templating and nucleation-and-growth as formation mechanisms of these supraparticles. Similar to atomic clusters, the supraparticles form when a mobile precursor state can reconfigure until the nanoparticles' interactions with each other and with the liquid–liquid interface are maximized. This formation mechanism is in striking contrast to that previously reported for microparticle clusters.

- Single Polymer-Based Ternary Electronic Memory Material and Device
  Liu, S.-J.; Wang, P.; Zhao, Q.; Yang, H.-Y.; Wong, J.; Sun, H.-B.; Dong, X.-C.; Lin, W.-P.; Huang, W. *Adv. Mater.* **2012**, *24*, 2901–2905.
  Abstract:


Single Polymer-Based Ternary Memory Material and Device

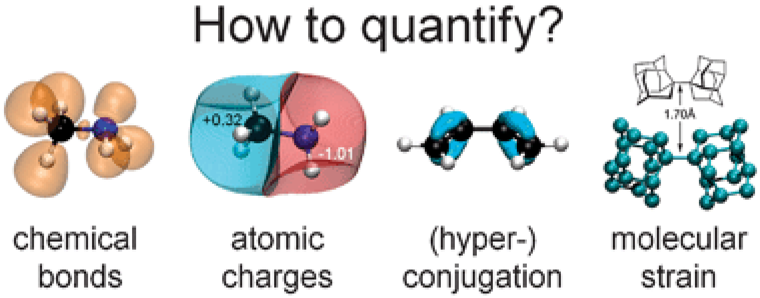
A ternary polymer memory device based on a single polymer with on-chain Ir(III) complexes is fabricated by combining multiple memory mechanisms into one system. Excellent ternary memory performances—low reading, writing, and erasing voltages and good stability for all three states—are achieved.

- Thiazole-Based Organic Semiconductors for Organic Electronics
  Lin, Y.; Fan, H.; Li, Y.; Zhan, X. *Adv. Mater.* **2012**, *24*, 3087–3106.
  Abstract:



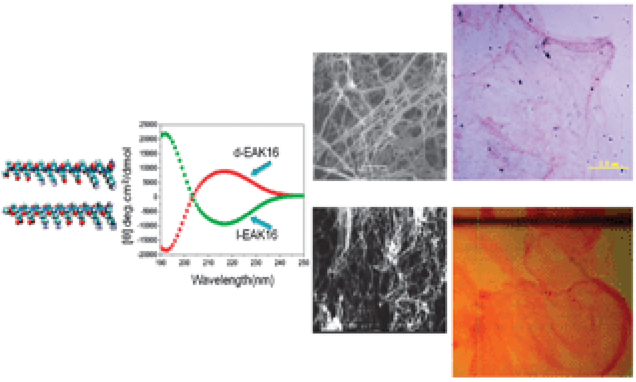
Over the past two decades, organic semiconductors have been the subject of intensive academic and commercial interests. Thiazole is a common electron-accepting heterocycle due to electron-withdrawing nitrogen of imine (C=N), several moieties based on thiazole have been widely introduced into organic semiconductors, and yielded high performance in organic electronic devices. This article reviews recent developments in the area of thiazole-based organic semiconductors, particularly thiazole, bithiazole, thiazolothiazole and benzobisthiazole-based small molecules and polymers, for applications in organic field-effect transistors, solar cells and light-emitting diodes. The remaining problems and challenges, and the key research direction in near future are discussed.

- Quantification of “fuzzy” chemical concepts: a computational perspective
  Gonthier, J. F.; Steinmann, S. N.; Wodrich, M. D.; Corminboeuf, C. *Chem. Soc. Rev.* **2012**, *41*, 4671-4687.
  Abstract:



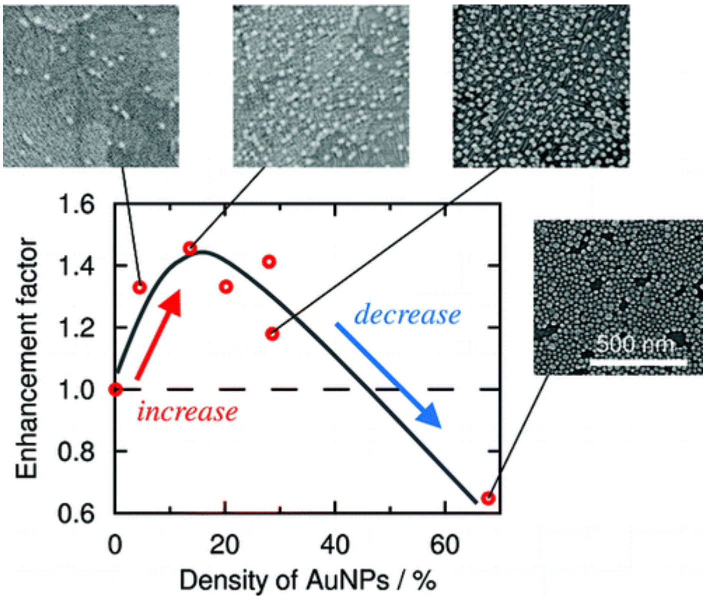
Chemists recurrently utilize “fuzzy” chemical concepts (*e.g.* atomic charges, the chemical bond, strain, aromaticity, branching, *etc.*), which lack unique quantitative assessments but, nonetheless, are frequently employed as tools for understanding the intricacies of chemical behaviour. This *tutorial review* provides an overview of the computational schemes specifically developed to quantify four of the most commonly employed, yet debated, chemical concepts: the chemical bond, atomic charges, (hyper)conjugation, and molecular strain. The enhanced knowledge gained from these schemes not only helps in the depiction of molecules with unique properties, but also provides breadth to our fundamental understanding of chemistry. Nevertheless, the numerous existing methodologies often result in different interpretations that culminate in discrepancies. Through recent examples in the literature, guidelines are provided which illustrate the strengths and weaknesses of various schemes for each individual concept.

- Designer nanomaterials using chiral self-assembling peptide systems and their emerging benefit for society
  Luo, Z.; Zhang, S. *Chem. Soc. Rev.* **2012**, *41*, 4736-4754.
  Abstract:



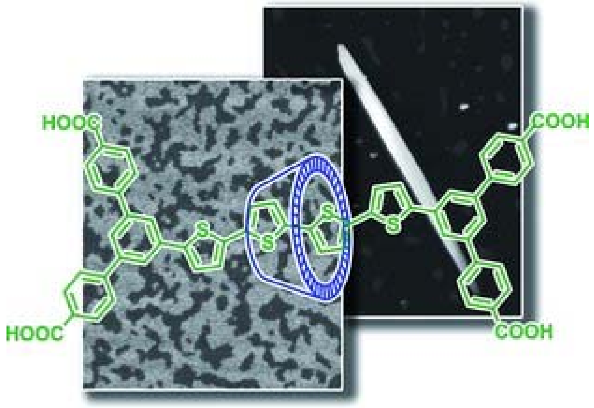
Chirality is absolutely central in chemistry and biology. The recent findings of chiral self-assembling peptides' remarkable chemical complementarity and structural compatibility make it one of the most inspired designer materials and structures in nanobiotechnology. The emerging field of designer chemistry and biology further explores biological and medical applications of these simple D,L- amino acids through producing marvellous nanostructures under physiological conditions. These self-assembled structures include well-ordered nanofibers, nanotubes and nanovesicles. These structures have been used for 3-dimensional tissue cultures of primary cells and stem cells, sustained release of small molecules, growth factors and monoclonal antibodies, accelerated wound-healing in reparative and regenerative medicine as well as tissue engineering. Recent advances in molecular designs have also led to the development of 3D fine-tuned bioactive tissue culture scaffolds. They are also used to stabilize membrane proteins including difficult G-protein coupled receptors for designing nanobiodevices. One of the self-assembling peptides has been used in human clinical trials for accelerated wound-healings. It is our hope that these peptide materials will open doors for more and diverse clinical uses. The field of chiral self-assembling peptide nanobiotechnology is growing in a number of directions that has led to many surprises in areas of novel materials, synthetic biology, clinical medicine and beyond.

- Electropolymerized Polythiophene Photoelectrodes with Density-Controlled Gold Nanoparticles
  Takahashi, Y.; Taura, S.; Akiyama, T.; Yamada, S. *Langmuir* **2012**, *28*, 9155-9160.
  Abstract:



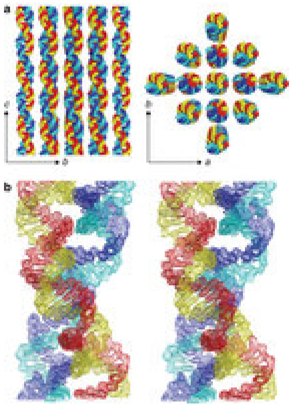
A polythiophene thin film was fabricated on gold nanoparticle (AuNP)-deposited indium–tin-oxide (ITO) electrodes with electropolymerization, whereas AuNPs were predeposited on the ITO surface. A photocurrent via photoexcited polythiophene increased with AuNPs which was attributed to the localized surface plasmon resonance. Investigation of the AuNP-density dependence on the relative enhancement of photocurrent revealed the maximum effect at 14% of AuNP-density, while 68% of AuNP-density exhibited smaller photocurrent than the polythiophene electrode without AuNPs. We have revealed that the effects of AuNPs saturate in the fairly low density region, and that the excess AuNPs even in the range of submonolayer resulted in the decrement of photocurrents.

- A Quaterthiophene-Based Rotaxane: Synthesis, Spectroscopy, and Self-Assembly at Surfaces
  Zalewski, L.; Mativetsky, J. M.; Brovelli, S.; Bonini, M.; Crivillers, N.; Breiner, T.; Anderson, H. L.; Cacialli, F.; Samorì, P. *Small* **2012**, *8*, 1835–1839.
  <u>Abstract:</u>



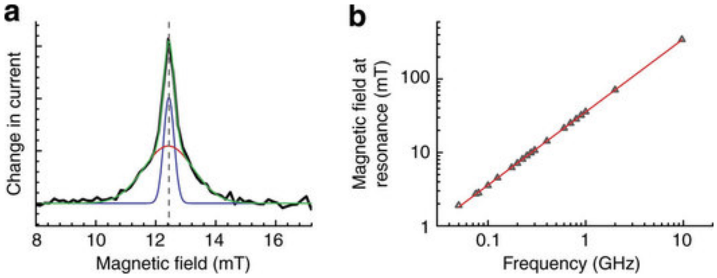
Threaded molecular wires are shown to feature tunable properties. A new rotaxane based on a quaterthiophene threaded through a single β-cyclodextrin exhibits delocalization of the aromatic system that is also extended onto the central phenyl rings of the *m*-terphenylene end-groups. The rotaxane can undergo self-assembly that is better than the analogous bithiophene derivative, due to the increased π–π interactions.

- Crystal structure of a plectonemic RNA supercoil
  Stagno, J. R.; Ma, B.; Li, J.; Altieri, A. S.; Byrd, R. A.; Ji, X. *Nature Communications* **2012**, *3*, 901.
  <u>Abstract:</u>



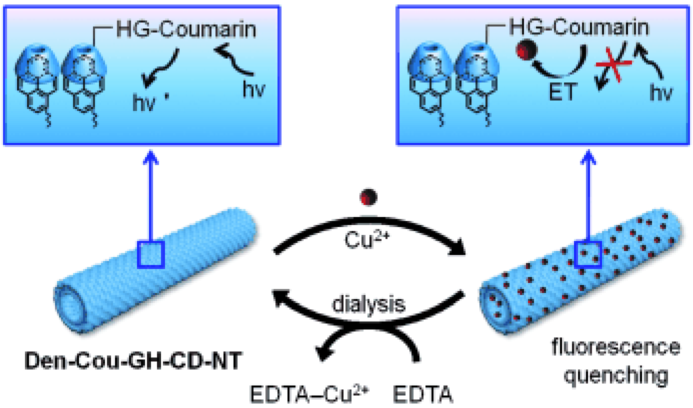
Genome packaging is an essential housekeeping process in virtually all organisms for proper storage and maintenance of genetic information. Although the extent and mechanisms of packaging vary, the process involves the formation of nucleic-acid superstructures. Crystal structures of DNA coiled coils indicate that their geometries can vary according to sequence and/or the presence of stabilizers such as proteins or small molecules. However, such superstructures have not been revealed for RNA. Here we report the crystal structure of an RNA supercoil, which displays one level higher molecular organization than previously reported structures of DNA coiled coils. In the presence of an RNA-binding protein, two interlocking RNA coiled coils of double-stranded RNA, a 'coil of coiled coils', form a plectonemic supercoil. Molecular dynamics simulations suggest that protein–RNA interaction is required for the stability of the supercoiled RNA. This study provides structural insight into higher order packaging mechanisms of nucleic acids.

- Robust absolute magnetometry with organic thin-film devices
  Baker, W. J.; Ambal, K.; Waters, D. P.; Baarda, R.; Morishita, H.; Schooten, K.; McCamey, D. R.; Lupton, J. M.; Boehme, C. *Nature Communications* **2012,** *3,* 898.
  Abstract:



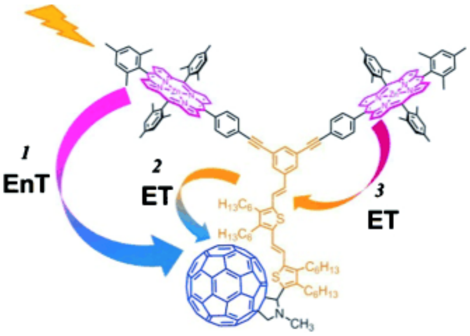
Magnetic field sensors based on organic thin-film materials have attracted considerable interest in recent years as they can be manufactured at very low cost and on flexible substrates. However, the technological relevance of such magnetoresistive sensors is limited owing to their narrow magnetic field ranges (~30 mT) and the continuous calibration required to compensate temperature fluctuations and material degradation. Conversely, magnetic resonance (MR)-based sensors, which utilize fundamental physical relationships for extremely precise measurements of fields, are usually large and expensive. Here we demonstrate an organic magnetic resonance-based magnetometer, employing spin-dependent electronic transitions in an organic diode, which combines the low-cost thin-film fabrication and integration properties of organic electronics with the precision of a MR-based sensor. We show that the device never requires calibration, operates over large temperature and magnetic field ranges, is robust against materials degradation and allows for absolute sensitivities of <50 nT $Hz^{-1/2}$.

- Fluorescent Dendron–Cyclodextrin Nanotubes with Surface Peptide Spacer as a Recyclable Sensory Platform
  Lee, J.; Park, S.; Lohani, C. R.; Lee, K.-H.; Kim, C. *Chem. Eur. J.* **2012**, *18*, 7351–7356.
  Abstract:



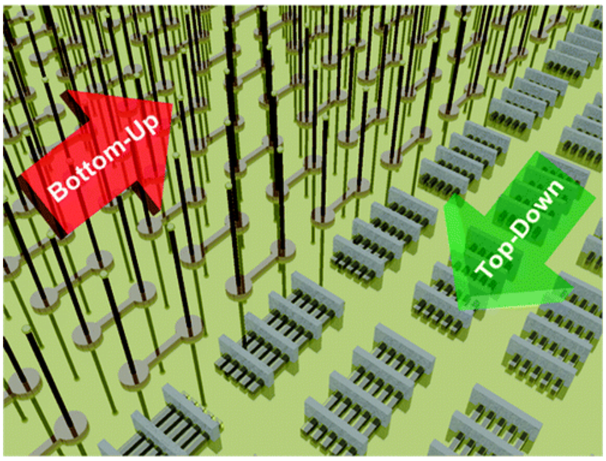
Nanotube sensory platform: Dendron–cyclodextrin nanotubes with a surface coumarin unit attached by a GH dipeptide spacer were constructed by a combination of molecular recognition and self-assembly. These unique fluorescent nanotubes can serve as a recyclable metal ion sensory platform with high selectivity and sensitivity (see scheme).

- Photoinduced Energy and Electron Transfer in Phenylethynyl-Bridged Zinc Porphyrin–Oligothienylenevinylene–C60 Ensembles
  Urbani, M.; Ohkubo, K.; Islam, D. M. S.; Fukuzumi, S.; Langa, F. *Chem. Eur. J.* **2012**, *18*, 7473–7485.
  Abstract:



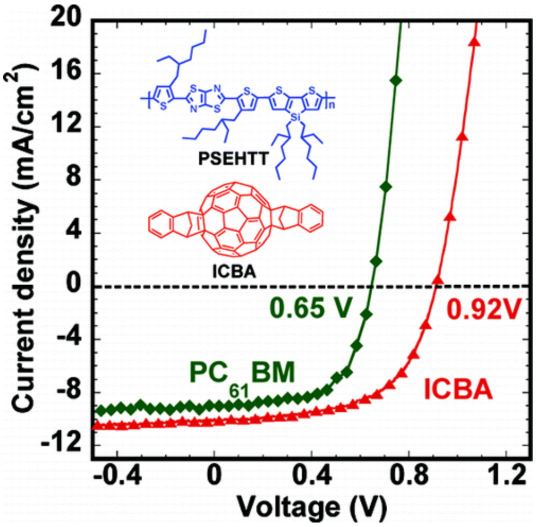
Donor–bridge–acceptor triad (Por-2TV-C_{60}) and tetrad molecules ($(Por)_2$-2TV-C_{60}), which incorporated C_{60} and one or two porphyrin molecules that were covalently linked through a phenylethynyl-oligothienylenevinylene bridge, were synthesized. Their photodynamics were investigated by fluorescence measurements, and by femto- and nanosecond laser flash photolysis. First, photoinduced energy transfer from the porphyrin to the C_{60} moiety occurred rather than electron transfer, followed by electron transfer from the oligothienylenevinylene to the singlet excited state of the C_{60} moiety to produce the radical cation of oligothienylenevinylene and the radical anion of C_{60}. Then, back-electron transfer occurred to afford the triplet excited state of the oligothienylenevinylene moiety rather than the ground state. Thus, the porphyrin units in (Por)-2TV-C_{60} and $(Por)_2$-2TV-C_{60} acted as efficient photosensitizers for the charge separation between oligothienylenevinylene and C_{60}.

- Semiconductor Nanowire Fabrication by Bottom-Up and Top-Down Paradigms
  Hobbs, R. G.; Petkov, N.; Holmes, J. D.; Tamayo, A. B.; Walker, B.; Wu, G.; Nguyen, T.-Q.; Wang, Z.; Hu, R.; Xie, N.; Kwok, H. S.; Zhang, Y.; Sun, J. Z.; Tang, B. Z. *Chem. Mater.* **2012**, *24*, 1975–1991.
  Abstract:



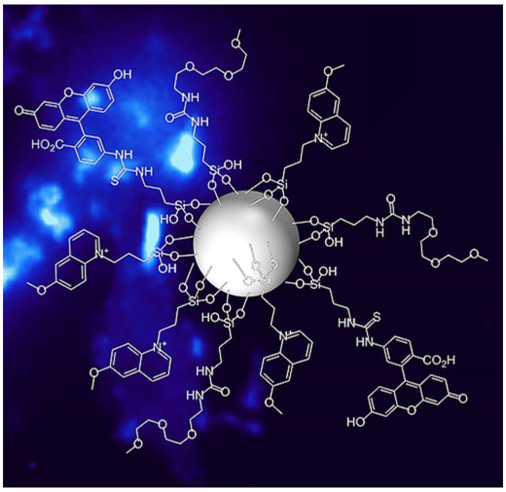
Semiconductor nanowires have been the subject of intensive research investment over the past few decades. Their physical properties afford them applications in a vast network of active microelectronic research fields, including logic device scaling in very large scale integrated circuits, sensor devices, and energy harvesting. A range of routes to semiconductor nanowire production have opened up as a result of advances in nanowire fabrication techniques over the last number of decades. These nanowire fabrication routes can usually be categorized into one of two paradigms, bottom-up or top-down. Microelectronic systems typically rely on integrated device platforms, where each device and component thereof can be individually addressed. This requirement for precise addressability places significant demands on the mode of fabrication, specifically with regard to device definition, placement and density, which have typically been strengths of top-down fabrication processes. However, in recent years, advances in bottom-up fabrication processes have opened up the possibility of a synergy between bottom-up and top-down processes to achieve the benefits of both. This review article highlights the important considerations required for the continued advancement of semiconductor nanowire fabrication with a focus on the application of semiconductor nanowire fabrication for next-generation field-effect transistor devices.

- Enhanced Open Circuit Voltage and Efficiency of Donor–Acceptor Copolymer Solar Cells by Using Indene-C60 Bisadduct
  Xin, H.; Subramaniyan, S.; Kwon, T.-W.; Shoaee, S.; Durrant, J. R.; Jenekhe, S. A.; Su, C.-Y.
  Chem. Mater. **2012**, *24*, 1995–2001.
  Abstract:



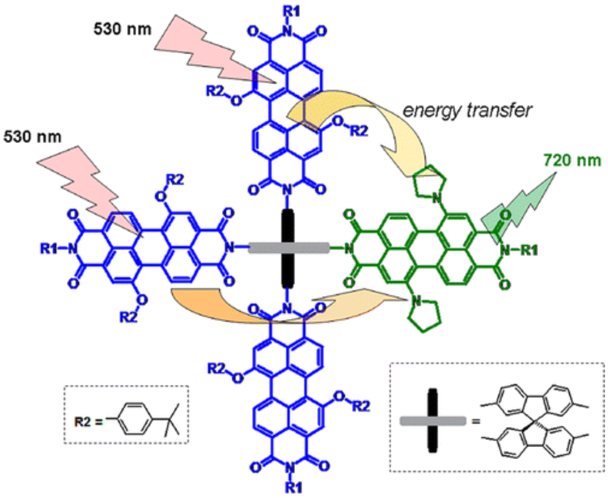
The photovoltaic properties of bulk heterojunction solar cells using indene-C60 bisadduct (ICBA) as the electron acceptor were investigated by using three donor–acceptor copolymers (PSEHTT, PSOTT, and PSOxTT) in comparison with $PC_{61}BM$-based solar cells. The open circuit voltage of the copolymer:ICBA devices was 0.82–0.92 V, which is 0.25 V enhanced compared to the copolymer:PCBM solar cells. Compared to PCBM-based solar cells, the photocurrent density of ICBA-based devices was significantly increased in the case of PSEHTT but decreased in PSOTT and PSOxTT. This variation of photocurrent density with the copolymer structure was correlated with the charge photogeneration efficiency as determined by transient absorption spectroscopy. A power conversion efficiency of 5.4% was achieved in PSEHTT:ICBA solar cells, which represents a 50% enhancement in efficiency compared to $PC_{61}BM$ devices. Our results demonstrate that ICBA can significantly increase the open circuit voltage, current density, and power conversion efficiency of donor–acceptor copolymer-based BHJ solar cells.

- A Cell-Penetrating Ratiometric Nanoprobe for Intracellular Chloride
  Baù, L.; Selvestrel, F.; Arduini, M.; Zamparo, I.; Lodovichi, C.; Mancin, F. *Org. Lett.* **2012**, *14*, 2984-2987.
  Abstract:



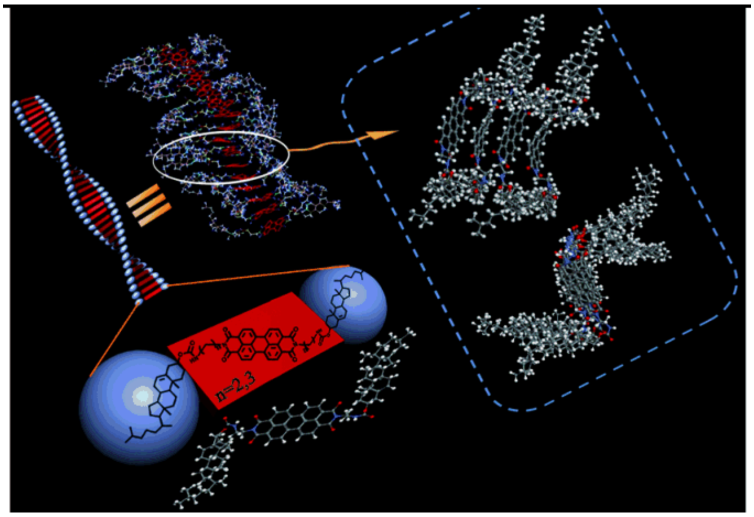
NanoChlor, a nanoparticle-based fluorescent probe for chloride that is both ratiometric and capable of spontaneously penetrating neuronal cells at submillimolar concentrations, was designed and studied. NanoChlor is built on silica nanoparticles grafted with 6-methoxyquinolinium as the chloride-sensitive component and fluorescein as the reference dye. A Stern–Volmer constant of 50 M^{-1} was measured in Ringer's buffer at pH 7.2, and the response to chemically induced chloride currents was recorded in real time in hippocampal cells.

- Perylenetetracarboxylic Diimide Derivatives Linked with Spirobifluorene
  Du, Y.; Jiang, L.; Zhou, J.; Qi, G.; Li, X.; Yang, Y. *Org. Lett.* **2012**, *14*, 3052-3055.
  Abstract:



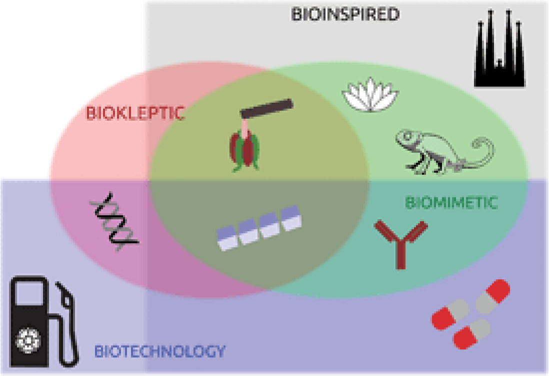
A series of perylenetetracarboxylic diimide (PDI) compounds linked with spirobifluorene have been prepared. The orthogonal configuration of the PDI subunits efficiently hindered their molecular aggregation in solution. Energy transfer from a 1,7-diphenoxyl group substituted PDI (PO-PDI) to a 1,7-dipyrrolidinyl group substituted PDI (PY-PDI) occurred with a large efficiency when PO-PDI was selectively excited, despite the orthogonal orientation of the two units. This observation was in direct conflict with predictions derived from the Förster theory. More interestingly, this efficient energy transfer also occurred in the solid state.

- An Ultrasensitive Fluorescent Sensing Nanofilm for Organic Amines Based on Cholesterol-Modified Perylene Bisimide
  Peng, H.; Ding, L.; Liu, T.; Chen, X.; Li, L.; Yin, S.; Fang, Y. *Chem. Asian J.* **2012**, *7*, 1576–1582.
  <u>Abstract:</u>



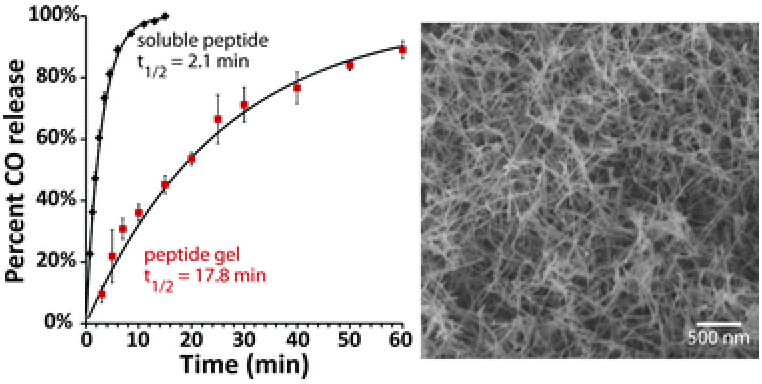
A stable, ultrasensitive, and fully reversible fluorescent sensing film for organic amines has been fabricated by assembling cholesterol (Chol)-derived perylene bisimide on a glass plate surface. The compound exhibits excellent film formation properties and forms well-defined nanofibers, as evidenced by SEM and AFM measurements. It has been revealed that besides the molecular structure of the specially designed perylene derivative, the existence of nanofibers in the film is another key factor to endow the film with superior sensing ability for organic amines, including aniline. The detection limit of the amine is ca. 150.0 ppt in the vapor phase and at room temperature. Furthermore, the sensing process is free of interference from common organic solvents, nitroaromatics, and particularly phenols, which makes the film a potential candidate to be used in lung cancer diagnoses and related applications.

- Innovation through imitation: biomimetic, bioinspired and biokleptic research
  Rawlings, A. E.; Bramble, J. P.; Staniland, S. S. *Soft Matter* **2012**, *8*, 2675-2679.
  Abstract:



While biomimetic research is becoming increasingly popular the term is being used for a broader range of research and it is becoming more difficult for researchers to understand and define. In this opinion article we discuss how biomimetic research overlaps with and differs from the complementary fields of biotechnology, biokleptic and bioinspired research as we attempt to describe each area with definitions, examples and discussion. What makes research biomimetic, bioinspired or biokleptic is put under scrutiny as we ask: can different components, parts and processes of an experiment be categorised separately? What is the difference between a biological and synthetic system/component? Is the scientist or biology in control? The answers to which aim to untangle the subtleties of the biomimetics field.

- A peptide-based material for therapeutic carbon monoxide delivery
  Matson, J. B.; Webber, M. J.; Tamboli, V. K.; Weber, B.; Stupp, S. I. *Soft Matter* **2012**, *8*, 2689-2692.
  Abstract:



We report on the preparation of the first material for therapeutic delivery of CO. A peptide amphiphile was synthesized with a covalently attached ruthenium tricarbonyl. Self-assembled nanofiber gels containing this peptide spontaneously released CO with prolonged release kinetics compared to soluble CO donors. Oxidatively stressed cardiomyocytes had improved viability when treated with this peptide, demonstrating its potential as a biodegradable gel for localized therapeutic CO delivery.