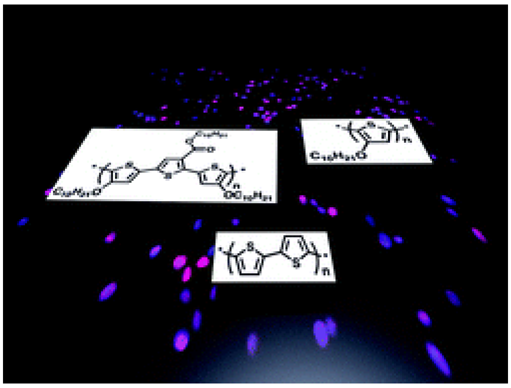
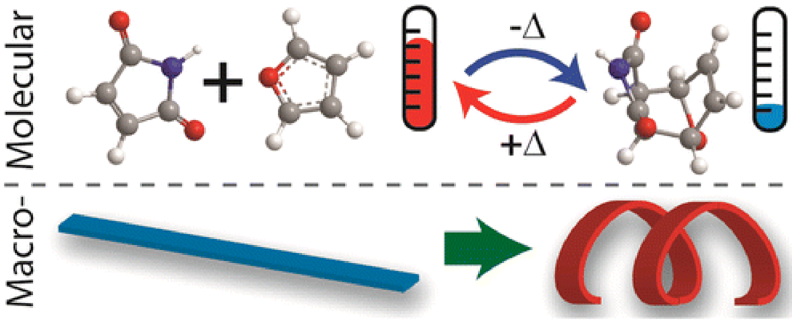
- In vitro growth and differentiation of primary myoblasts on thiophene based conducting polymers
  Quigley, A. F.; Wagner, K.; Kita, M.; Gilmore, K. J.; Higgins, M. J.; Breukers, R. D.; Moulton, S. E.; Clark, G. M.; Penington, A. J.; Wallace, G. G.; Officer, D. L.; Kapsa, R. M. I. *Biomater. Sci.* **2013**, *1*, 983-995.
  Abstract:



Polythiophenes are attractive candidate polymers for use in synthetic cell scaffolds as they are amenable to modification of functional groups as a means by which to increase biocompatibility. In the current study we analysed the physical properties and response of primary myoblasts to three thiophene polymers synthesized from either a basic bithiophene monomer or from one of two different thiophene monomers with alkoxy functional groups. In addition, the effect of the dopants *p*TS$^-$ and ClO_4^- was investigated. In general, it was found that *p*TS$^-$ doped polymers were significantly smoother and tended to be more hydrophilic than their ClO_4^- doped counterparts, demonstrating that the choice of dopant significantly affects the polythiophene physical properties. These properties had a significant effect on the response of primary myoblasts to the polymer surfaces; LDH activity measured from cells harvested at 24 and 48 h post-seeding revealed significant differences between numbers of cells attaching to the different thiophene polymers, whilst all of the polymers equally supported cell doubling over the 48 h period. Differences in morphology were also observed, with reduced cell spreading observed on polymers with alkoxy groups. In addition, significant differences were seen in the polymers' ability to support myoblast fusion. In general *p*TS$^-$ doped polymers were better able to support fusion than their ClO_4^- doped counterparts. These studies demonstrate that modification of thiophene polymers can be used to promote specific cellular response (*e.g.* proliferation over differentiation) without the use of biological agents.

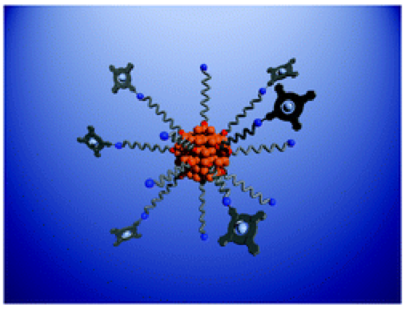
- Reconfigurable Biodegradable Shape-Memory Elastomers via Diels–Alder Coupling
  Ninh, C.; Bettinger, C. J. *Biomacromolecules* **2013**, *14*, 2162-2170.
  Abstract:



Synthetic biodegradable elastomers are a class of polymers that have demonstrated far-reaching

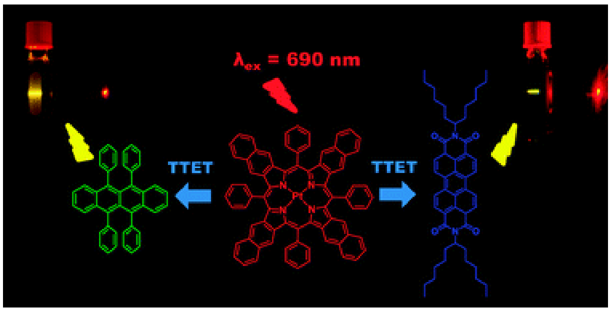
utility as biomaterials for use in many medical applications. Biodegradable elastomers can be broadly classified into networks prepared by either step-growth or chain-growth polymerization. Each processing strategy affords distinct advantages in terms of capabilities and resulting properties of the network. This work describes the synthesis, processing, and characterization of cross-linked polyester networks based on Diels–Alder coupling reactions. Hyperbranched furan-modified polyester precursors based on poly(glycerol-*co*-sebacate) are coupled with bifunctional maleimide cross-linking agents. The chemical and thermomechanical properties of the elastomers are characterized at various stages of network formation. Experimental observations of gel formation are compared to theoretical predictions derived from Flory–Stockmayer relationships. This cross-linking strategy confers unique advantages in processing and properties including the ability to fabricate biodegradable reconfigurable covalent networks without additional catalysts or reaction byproducts. Reconfigurable biodegradable networks using Diels–Alder cycloaddition reactions permit the fabrication of shape-memory polymers with complex permanent geometries. Biodegradable elastomers based on polyester networks with molecular reconfigurability achieve vastly expanded properties and processing capabilities for potential applications in medicine and beyond.

- Magneto-optical nanomaterials: a SPIO–phthalocyanine scaffold built step-by-step towards bimodal imaging
  Boudon, J.; Paris, J.; Bernhard, Y.; Popova, E.; Decréau, R. A.; Millot, N. *Chem. Commun*. **2013**, *49*, 7394-7396.
  Abstract:



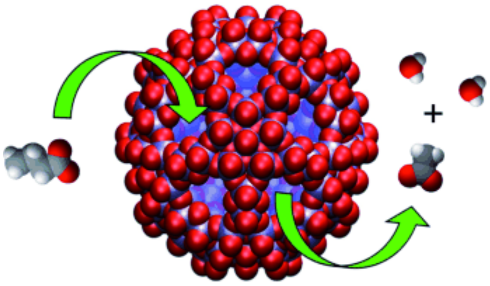
A SPIO–phthalocyanine nanohybrid is developed as a bimodal contrast agent for Optical and Magnetic Resonance Imaging. The organic coating was covalently attached onto SPIO in a step-by-step approach. Each coated-SPIO was thoroughly characterized. The hydrodynamic size of the SPIO–Pc is ca. 60 nm with a coverage of ca. 690 Pc/SPIO.

- Near-IR phosphorescent metalloporphyrin as a photochemical upconversion sensitizer
  Deng, F.; Sommer, J. R.; Myahkostupov, M.; Schanze, K. S.; Castellano, F. N. *Chem. Commun*. **2013**, *49*, 7406-7408.
  Abstract :



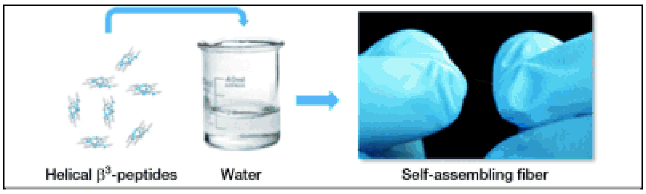
The phosphorescent metalloporphyrin sensitizer PtTPTNP (TPTNP = tetraphenyltetranaphtho[2,3]porphyrin) has been successfully coupled with perylenediimide (PDI) or rubrene utilized as triplet acceptors/annihilators to upconvert 690 nm incident photons into yellow fluorescence through sensitized triplet–triplet annihilation at overall efficiencies in the 6–7% range while exhibiting exceptional photostability.

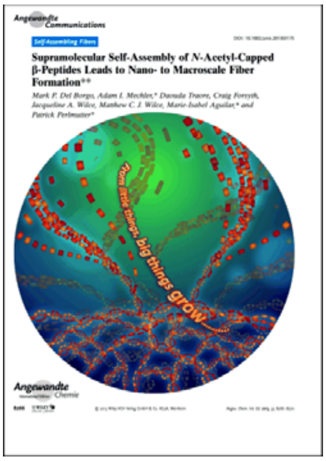
- Stepwise-Resolved Thermodynamics of Hydrophobic Self-Assembly
  Grego, A.; Müller, A.; Weinstock, I. A. *Angew. Chem. Int. Ed.* **2013**, *52*, 8358–8362.
  Abstract:



Unprecedented information concerning how the relative roles of different hydrophobic effects evolve during multistep hydrophobic assembly processes is provided by using a unique type of experiment to resolve the underlying energetics of individual growth steps in the formation of a structurally well-defined micelle-like organic aggregate of *n*-butyrate ions within a porous inorganic-oxide nanocapsule.

- Supramolecular Self-Assembly of *N*-Acetyl-Capped β-Peptides Leads to Nano- to Macroscale Fiber Formation
  Del Borgo, M. P.; Mechler, A. I.; Traore, D.; Forsyth, C.; Wilce, A. J. A.; Wilce, M. C. J.; Aguilar, M.-I.; Perlmutter, P. *Angew. Chem. Int. Ed.* **2013**, *52*, 8266–8270.
  Abstract:




Angewandte Communications

Self-Assembling Fibers

Supramolecular Self-Assembly of *N*-Acetyl-Capped β-Peptides Leads to Nano- to Macroscale Fiber Formation**

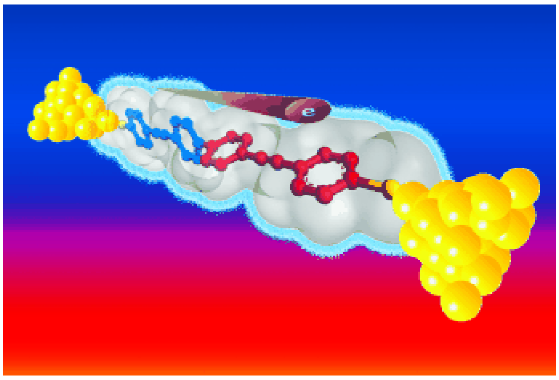
Mark P. Del Borgo, Adam I. Mechler, Daouda Traore, Craig Forsyth, Jacqueline A. Wilce, Matthew C. J. Wilce, Marie-Isabel Aguilar,* and Patrick Perlmutter**

From little things big things grow: 14-Helical *N*-acetyl β^3-peptides spontaneously self-assemble in a unique head-to-tail fashion to form fibers from solution. The fiber size can be controlled from the nano- to the macroscale. The inherent flexibility in design and ease of synthesis provide powerful new avenues for the development of novel bio- and nanomaterials by supramolecular self-assembly.

- Conformation-Controlled Electron Transport in Single-Molecule Junctions Containing Oligo(phenylene ethynylene) Derivatives

Wang, L.-Y.; Yong, A.; Zhou, K.-G.; Tan, L.; Ye, J.; Wu, G.-P.; Xu, Z.-G.; Zhang, H.-L. *Chem. Asian J.* **2013**, *8,* 1901-1909.

Abstract:

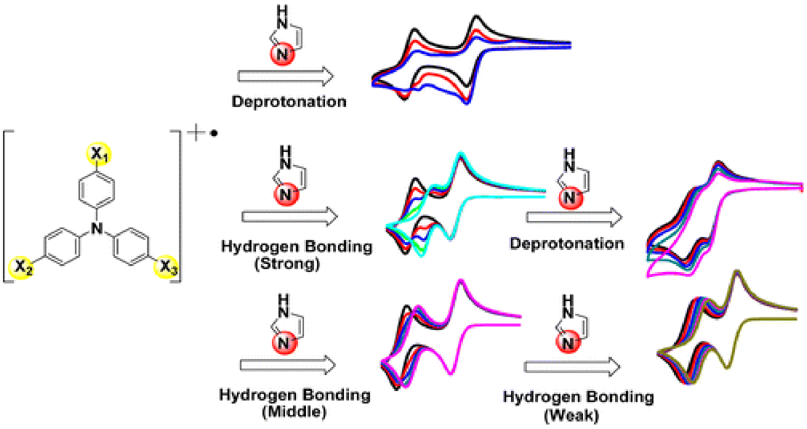


Understanding the relationships between the molecular structure and electronic transport characteristics of single-molecule junctions is of fundamental and technological importance for future molecular electronics. Herein, we report a combined experimental and theoretical study on the single-molecule conductance of a series of oligo(phenylene ethynylene) (OPE) molecular wires, which consist of two phenyl–ethynyl–phenyl π units with different dihedral angles. The molecular conductance was studied by scanning tunneling microscopy (STM)-based break-junction techniques under different conditions, including variable temperature and bias potential, which suggested that a coherent tunneling mechanism takes place in the OPE molecular wires with a length of 2.5 nm. The conductance of OPE molecular junctions are strongly affected by the coupling strength between the two π systems, which can be tuned by controlling their intramolecularconformation. A $\cos^2\vartheta$ dependence was revealed between the molecular conductance and dihedral angles between the two conjugated units. Theoretical investigations on the basis of density functional theory and nonequilibrium Green's functions (NEGF) gave consistent results with the experimental observations and provided insights into the conformation-dominated molecular conductance.

- Electrochemically Controlled Multiple Hydrogen Bonding between Triarylamines and Imidazoles

  Cheng, H.-C.; Chiu, K. Y.; Tu, Y.-J.; Yang, T.-F.; Su, Y. O. *Org. Lett.* **2013**, *15,* 3868-3871.

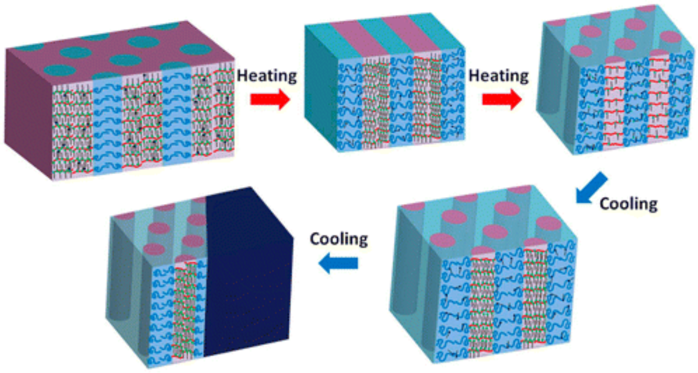
  Abstract:



By increasing the number of amino substituents on triarylamine, the extent of hydrogen bonding between the oxidized form of triarylamine and imidazole could be electrochemically controlled.

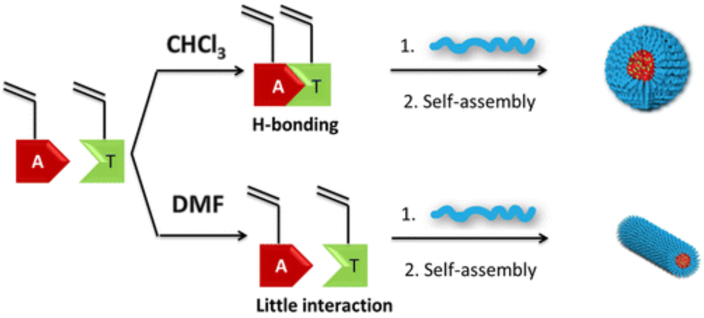
Three behaviors, depending on the interaction between oxidized amine and imidazole, were obtained in CV patterns. DFT calculation was used to confirm that the electron density of protons of the amino group decreased as the amino moiety increased.

- Thermally Controlled Morphologies in a Block Copolymer Supramolecule via Nonreversible Order-Order Transitions
  Bai, P.; Kim, M. I.; Xu, T. *Macromolecules* **2013**, *46*, 5531-5537.
  Abstract:



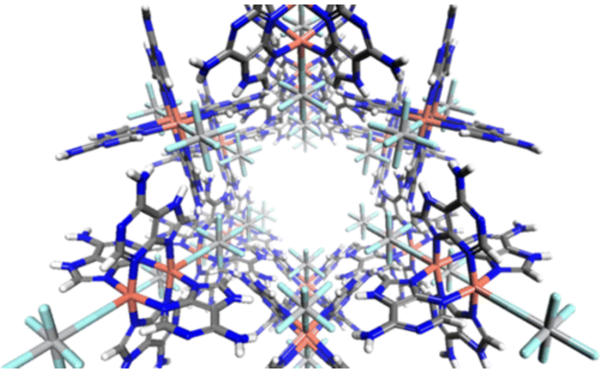
Block copolymer (BCP)-based supramolecules represent a versatile platform to generate functional nanostructures without the need for complex synthesis. The noncovalent bonding between the BCP and small molecules further opens opportunities to access thermal responsive assemblies. A BCP supramolecule containing cholesteric liquid crystal (LC) small molecules is observed to undergo thermally induced, nonreversible order-order transitions (OOTs), resulting in several well-defined morphologies readily tunable by annealing temperature. The nonreversible OOTs highlight the importance of small molecule phase transitions and intermolecular interactions on the overall phase behavior of the supramolecule. The present system also provides a route to manipulate local nanostructures via heating.

- Effect of Complementary Nucleobase Interactions on the Copolymer Composition of RAFT Copolymerizations
  Kang, Y.; Lu, A.; Ellington, A.; Jewett, M. C.; O'Reilly, R. K. *ACS Macro Lett.* **2013**, *2*, 581-586.
  Abstract:



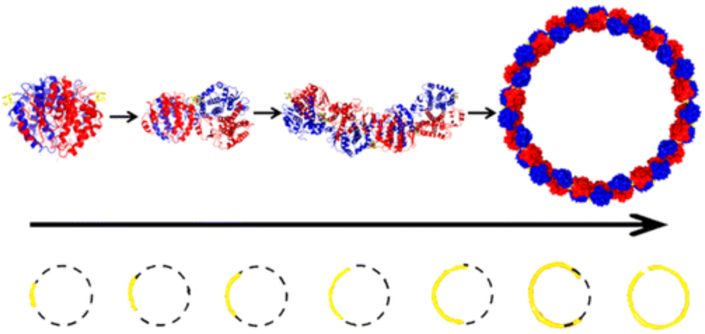
Methacryloyl-type monomers containing adenine and thymine have been successfully synthesized with good yields. The homopolymerization and copolymerization of these two new functional monomers were carried out using RAFT polymerization. The reactivity ratios of monomer pairs were measured and calculated using a nonlinear least-squares (NLLS) method, and the results confirmed that the monomer reactivities were dependent on the solvent used for polymerization. The presence and absence of hydrogen bonding affected the resultant copolymer composition where moderate alternating copolymers had a tendency to be formed in $CHCl_3$, while in DMF, statistical copolymers were formed. Furthermore, the glass transition temperatures of the copolymers were investigated, and the self-assembly of block copolymers made in solvents with different polarity were studied.

- A Robust Molecular Porous Material with High CO2 Uptake and Selectivity
  Nugent, P. S.; Rhodus, V. L.; Pham, T.; Forrest, K.; Wojtas, L.; Space, B.; Zaworotko, M. J. *J. Am. Chem. Soc.* **2013***, 135,* 10959–10953.
  Abstract:



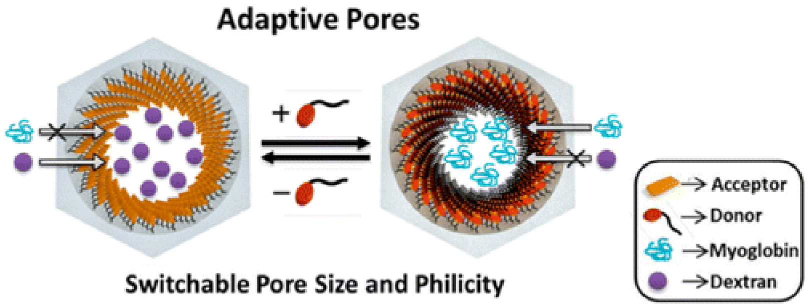
We report MPM-1-TIFSIX, a molecular porous material (MPM) based upon the neutral metal complex $[Cu_2(adenine)_4(TiF_6)_2]$, that self-assembles through a hydrogen-bonding network. This MPM is amenable to room-temperature synthesis and activation. Gas adsorption measurements and ideal adsorbed solution theory selectivity predictions at 298 K revealed enhanced CO2 separation performance relative to a previously known variant as well as the highest CO2 uptake and isosteric heat of adsorption yet reported for an MPM. MPM-1-TIFSIX is thermally stable to 568 K and retains porosity and capacity even after immersion in water for 24 h.

- Highly Ordered Protein Nanorings Designed by Accurate Control of Glutathione S-Transferase Self-Assembly
  Bai, Y.; Luo, Q.; Zhang, W.; Miao, L.; Xu, J.; Li, H.; Liu, J. *J. Am. Chem. Soc.* **2013***, 135*, 10966–10969.
  Abstract:



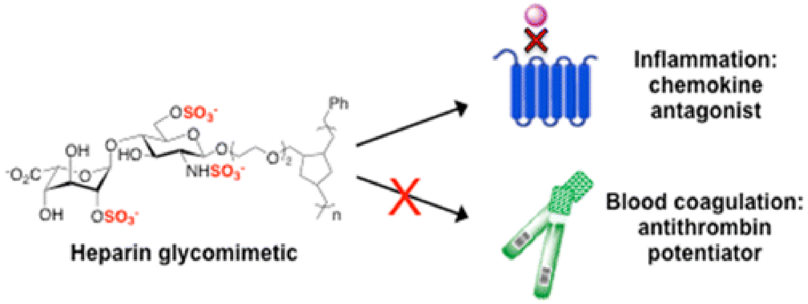
Protein self-assembly into exquisite, complex, yet highly ordered architectures represents the supreme wisdom of nature. However, precise manipulation of protein self-assembly behavior in vitro is a great challenge. Here we report that by taking advantage of the cooperation of metal-ion-chelating interactions and nonspecific protein–protein interactions, we achieved accurate control of the orientation of proteins and their self-assembly into protein nanorings. As a building block, we utilized the C2-symmetric protein sjGST-2His, a variant of glutathione S-transferase from Schistosoma japonicum having two properly oriented His metal-chelating sites on the surface. Through synergic metal-coordination and non-covalent interactions, sjGST-2His self-assembled in a fixed bending manner to form highly ordered protein nanorings. The diameters of the nanorings can be regulated by tuning the strength of the non-covalent interaction network between sjGST-2His interfaces through variation of the ionic strength of the solution. This work provides a de novo design strategy that can be applied in the construction of novel protein superstructures.

- Adaptive Pores: Charge Transfer Modules as Supramolecular Handles for Reversible Pore Engineering of Mesoporous Silica
  Kumar, B. V. V. S. P.; Rao, K. V.; Soumya, T.; George, S. J.; Eswaramoorthy, M. *J. Am. Chem. Soc.*, **2013**, *135*, 10902–10905.
  <u>Abstract:</u>



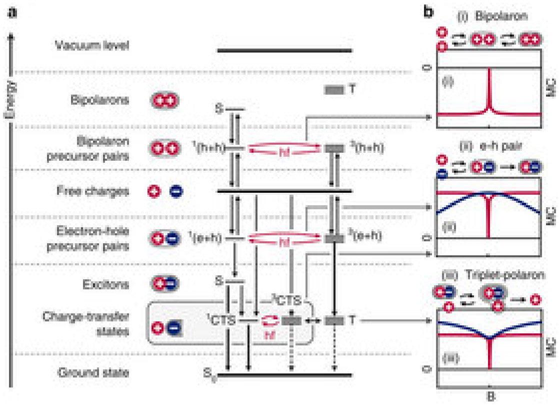
We introduce a non-covalent pore engineering approach to achieve exceptional reversibility of functionalization in SBA-15 through viologen–pyranine charge transfer (CT) modules. By employing alkyl derivatives of pyranine as donors, we could exploit the strong CT interactions between pyranine and viologen to reversibly modify the pore size and philicity. The fast binding of the donors enables quick and facile functionalization within minutes at room temperature. The modularity of the approach enables modification of pores with custom-designed compositions, components, and functions. The high selectivity exhibited by viologen on the pore wall facilitated its use in a CT affinity column.

- Tunable Heparan Sulfate Mimetics for Modulating Chemokine Activity
  Sheng, G. J.; In Oh, Y.; Chang, S.-K.; Hsieh-Wilson, L. C. *J. Am. Chem. Soc.* **2013**, *135*, 10898–10901.
  <u>Abstract:</u>



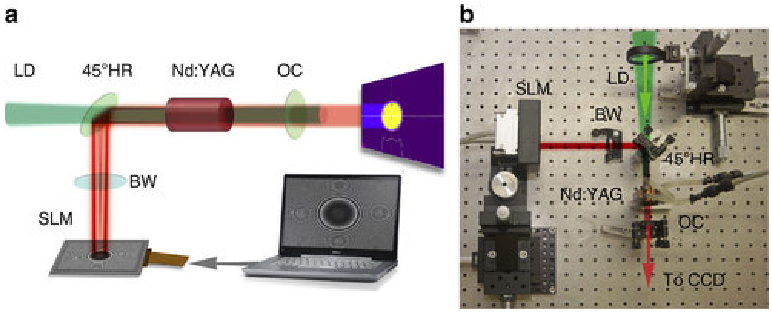
Heparan sulfate (HS) glycosaminoglycans participate in critical biological processes by modulating the activity of a diverse set of protein binding partners. Such proteins include all known members of the chemokine superfamily, which are thought to guide the migration of immune cells through their interactions with HS. Here, we describe an expedient, divergent synthesis to prepare defined HS glycomimetics that recapitulate the overall structure and activity of HS glycosaminoglycans. Our approach uses a core disaccharide precursor to produce a variety of differentially sulfated glycopolymers. We demonstrate that a specific trisulfated mimetic antagonizes the chemotactic activity of the proinflammatory chemokine RANTES with potency similar to that of heparin, without inhibiting serine proteases in the blood coagulation cascade. Our work provides a general strategy for modulating chemokine activity and dissecting the pleiotropic functions of HS/heparin through the presentation of defined sulfation motifs within polymeric scaffolds.

- Tuning organic magnetoresistance in polymer-fullerene blends by controlling spin reaction pathways
  Janssen, P.; Cox, M.; Wouters, S. H. W.; Kemerink, M.; Wienk, M. M.; Koopmans, B. *Nature Commun.* **2013**, *4*, 2286.
  Abstract:



Harnessing the spin degree of freedom in semiconductors is generally a challenging, yet rewarding task. In recent years, the large effect of a small magnetic field on the current in organic semiconductors has puzzled the young field of organic spintronics. Although the microscopic interaction mechanisms between spin-carrying particles in organic materials are well understood nowadays, there is no consensus as to which pairs of spin-carrying particles are actually influencing the current in such a drastic manner. Here we demonstrate that the spin-based particle reactions can be tuned in a blend of organic materials, and microscopic mechanisms are identified using magnetoresistance lineshapes and voltage dependencies as fingerprints. We find that different mechanisms can dominate, depending on the exact materials choice, morphology and operating conditions. Our improved understanding will contribute to the future control of magnetic field effects in organic semiconductors.

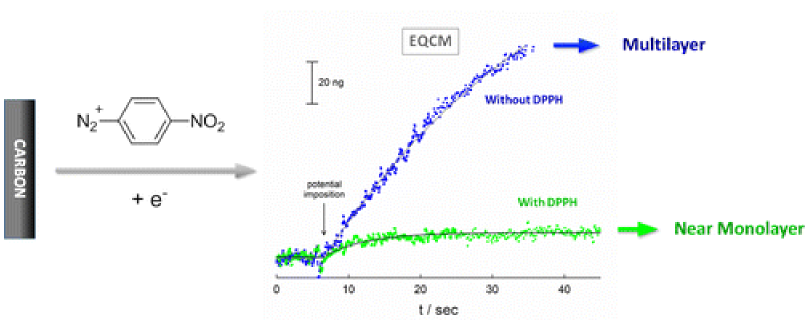
- A digital laser for on-demand laser modes
  Ngcobo, S.; Litvin, I.; Burger, L.; Forbes, A. *Nature Commun* **2013**, *4*, 2289.
  Abstract:



Customizing the output beam shape from a laser invariably involves specialized optical elements in the form of apertures, diffractive optics and free-form mirrors. Such optics require considerable design and fabrication effort and suffer from the further disadvantage of being immutably connected to the selection of a particular spatial mode. Here we overcome these limitations with the first digital laser comprising an electrically addressed reflective phase-only spatial light modulator as an intra-cavity digitally addressed holographic mirror. The phase and amplitude of the holographic mirror may be controlled simply by writing a computer-generated hologram in the form of a grey-scale image to the device, for on-demand laser modes. We show that we can digitally control the laser modes with ease, and demonstrate real-time switching between spatial modes in an otherwise standard solid-state laser resonator. Our work opens new possibilities for the customizing of laser modes at source.

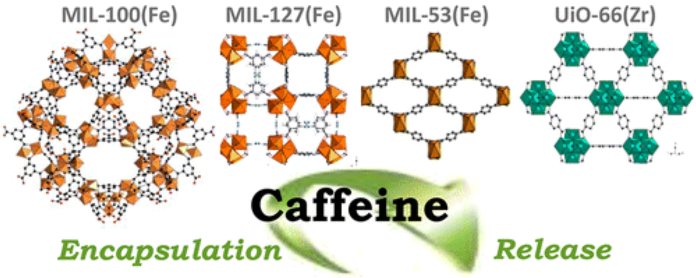
- Electrografting via Diazonium Chemistry: From Multilayer to Monolayer Using Radical Scavenger
  Menanteau, T.; Levillain, E.; Breton, T. *Chem. Mater.* **2013**, *25*, 2905-2909.
  Abstract:

From Multilayer to Monolayer using radical scavenger



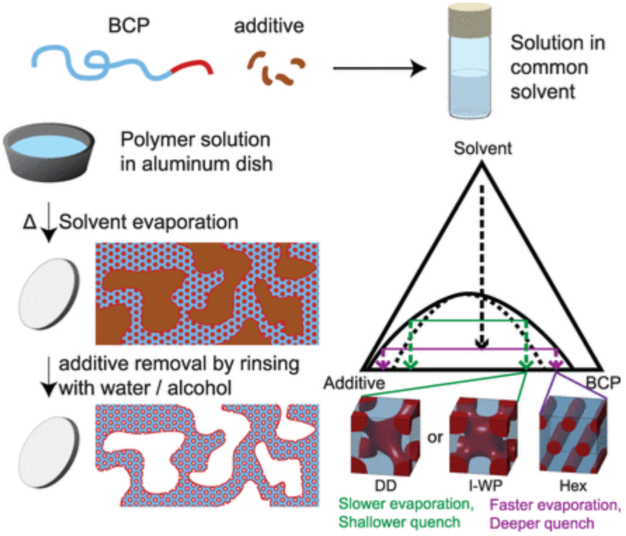
A simple strategy to avoid the formation of polyaryl layer during the functionalization of carbon surface by diazonium electroreduction is presented. The approach proposes to directly act on the polymerization mechanism by the use of a radical scavenger. The kinetic gap between the surface coupling and the multilayer formation is exploited to prevent the growth of the layer without interfering with the grafting. The well-known 4-nitrobenzenediazonium electrografting was used to demonstrate the possibility of reaching a monolayer surface coverage with an excess of DPPH (2,2-diphenyl-1-picrylhydrazyl). Experimental conditions were varied to validate the efficiency of the grafting limitation and the radical capture was confirmed by isolation of the aryl radical/DPPH coupling product.

- Rationale of Drug Encapsulation and Release from Biocompatible Porous Metal–Organic Frameworks
  Cunha, D.; Ben Yahia, M.; Hall, S.; Miller, S. R.; Chevreau, H.; Elkaïm, E.; Maurin, G.; Horcajada, P.; Serre, C. *Chem. Mater.* **2013**, *25*, 2767-2776.
  Abstract:



A joint experimental and computational systematic exploration of the driving forces that govern (i) encapsulation of active ingredients (solvent, starting material dehydration, drug/material ratio, immersion time, and several consecutive impregnations) and (i) its kinetics of delivery (structure, polarity, ...) was performed using a series of porous biocompatible metal–organic frameworks (MOFs) that bear different topologies, connectivities, and chemical compositions. The liporeductor cosmetic caffeine was selected as the active molecule. Its encapsulation is a challenge for the cosmetic industry due to its high tendency to crystallize leading to poor loadings (<5 wt %) and uncontrolled releases with a subsequent low efficiency. It was evidenced that caffeine entrapping reaches exceptional payloads up to 50 wt %, while progressive release of this cosmetic agent upon immersion in the simulated physiological media (phosphate buffer solution pH = 7.4 or distilled water pH = 6.3, 37 °C) occurred mainly depending on the degree of MOF stability, caffeine mobility, and MOF–caffeine interactions. Thus, MIL-100 and UiO-66 appear as very promising carriers for topical administration of caffeine with both spectacular cosmetic payloads and progressive releases within 24 h.

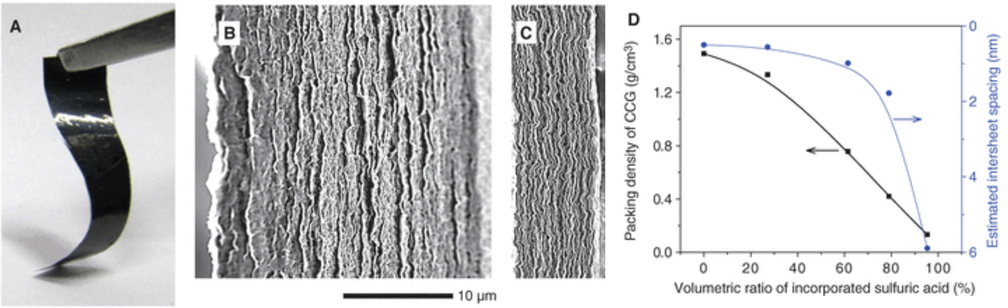
- Hierarchical Porous Polymer Scaffolds from Block Copolymers
  Sai, H.; Wee Tan, K.; Hur, K.; Asenath-Smith E.; Hovden, R.; Jiang, Y.; Riccio, M.; Muller, D. A.; Elser, V.; Estroff, L. A.; Gruner, S. M.; Wiesner, U. *Science* **2013**, *341*, 530-534.
  Abstract:



Materials with tailored pore structures can be useful as catalysis supports and for lightweight materials. When preparing medical scaffolds, restrictive preparation conditions have to be met, which can prohibit multistep preparation procedures. Sai *et al.* describe a method for making porous polymers containing both relatively large (several microns) interconnecting pores and a second population of ~ tens of nanometer pores. The process exploits spinodal decomposition of a block copolymer blended with small-molecule additives and requires a simple washing step with water, methanol, or ethanol.

Hierarchical porous polymer materials are of increasing importance because of their potential application in catalysis, separation technology, or bioengineering. Examples for their synthesis exist, but there is a need for a facile yet versatile conceptual approach to such hierarchical scaffolds and quantitative characterization of their nonperiodic pore systems. Here, we introduce a synthesis method combining well-established concepts of macroscale spinodal decomposition and nanoscale block copolymer self-assembly with porosity formation on both length scales via rinsing with protic solvents. We used scanning electron microscopy, small-angle x-ray scattering, transmission electron tomography, and nanoscale x-ray computed tomography for quantitative pore-structure characterization. The method was demonstrated for AB- and ABC-type block copolymers, and resulting materials were used as scaffolds for calcite crystal growth.

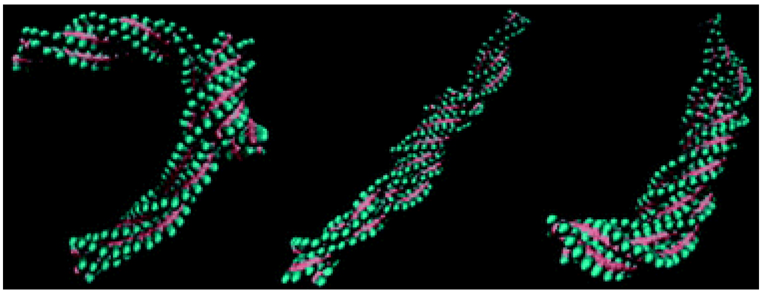
- Liquid-Mediated Dense Integration of Graphene Materials for Compact Capacitive Energy Storage
  Yang, X.; Cheng, C.; Wang, Y.; Qiu, L.; Li, D. *Science* **2013**, *341*, 534-537.
  Abstract:



Electrochemical capacitors (ECs) can rapidly charge and discharge, but generally store less energy per unit volume than batteries. One approach for improving on the EC electrodes made from porous carbon materials is to use materials such as chemically converted graphene (CCG, or reduced graphene oxide), in which intrinsic corrugation of the sheets should maintain high surface areas. In many cases, however, these materials do not pack into compact electrodes, and any ECs containing them have low energy densities. Yang *et al.* now show that capillary compression of gels of CCG containing both a volatile and nonvolatile electrolyte produced electrodes with a high packing density. The intersheet spacing creates a continuous ion network and leads to high energy densities in prototype ECs.

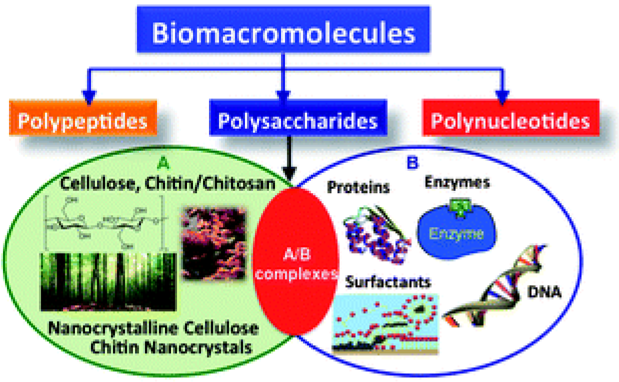
Porous yet densely packed carbon electrodes with high ion-accessible surface area and low ion transport resistance are crucial to the realization of high-density electrochemical capacitive energy storage but have proved to be very challenging to produce. Taking advantage of chemically converted graphene's intrinsic microcorrugated two-dimensional configuration and self-assembly behavior, we show that such materials can be readily formed by capillary compression of adaptive graphene gel films in the presence of a nonvolatile liquid electrolyte. This simple soft approach enables subnanometer scale integration of graphene sheets with electrolytes to form highly compact carbon electrodes with a continuous ion transport network. Electrochemical capacitors based on the resulting films can obtain volumetric energy densities approaching 60 watt-hours per liter.

- Chirality inversions in self-assembly of fibrillar superstructures: a computational study
  Gruziel, M.; Dzwolak, W.; Szymczak, P. *Soft Matter* **2013,** *9*, 8005-8013.
  Abstract:



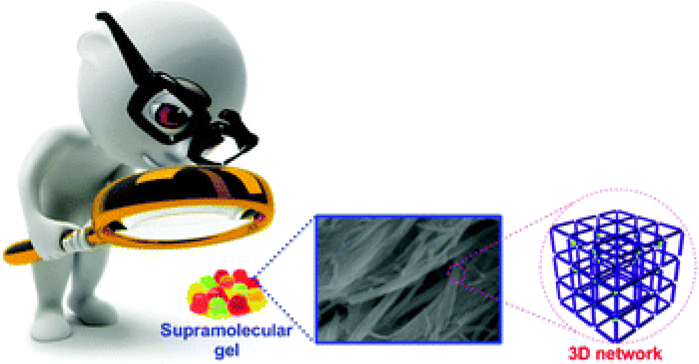
The formation of aggregates of helical fibrils is analyzed numerically. The aggregate morphology, chirality and stability are studied as a function of temperature and helical pitch of individual fibrils. The simulations show the existence of a critical pitch above which the handedness of the aggregates is opposite to that of the constituting fibrils. We also observe and analyze the process of spontaneous chirality inversion of individual fibrils within the aggregates. This inversion is accompanied by a helical wave propagating along the fibril axis, with a kink separating left-handed and right-handed regions moving along the fibril. The frequency of this process is strongly dependent on the initial pitch of the fibrils with a local maximum near the critical pitch.

- Sustainable nanomaterials derived from polysaccharides and amphiphilic compounds
  Akhlaghi, S. P.; Peng, B.; Yao, Z.; Tam, K. C. *Soft Matter* **2013,** *9*, 7905-7918.
  Abstract:



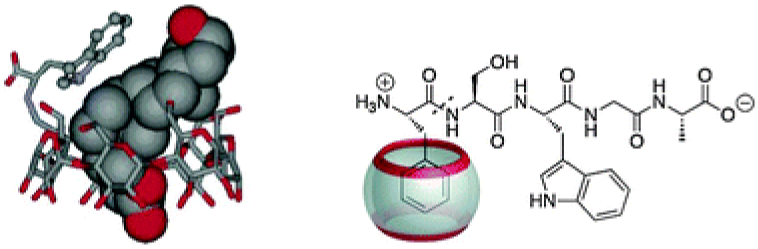
This review article describes and discusses the physical properties of three major classes of biomacromolecules, namely polysaccharides (PS), polypeptides (PP), and polynucleotides (PN). PP and PN can be classified as amphiphilic systems as they possess hydrophobic and hydrophilic moieties that are responsible for their self-organization behavior. The binding interactions between various polysaccharides and amphiphilic systems (surfactants, PP and PN) are reviewed, where the morphology and microstructures associated with their physical interactions are described. Extending this to the study on the behavior of renewable nanomaterials in the presence of various amphiphilic systems could have a major impact on the future applications of such systems in many product formulations, such as personal care, cosmetic and biomedical science. A review on the current status and future trends of renewable nanomaterials is presented.

- Characterization of supramolecular gels
  Yu, G.; Yan, X.; Hana, C.; Huang, F. *Chem. Soc. Rev.* **2013**, *42*, 6697-6722.
  Abstract:



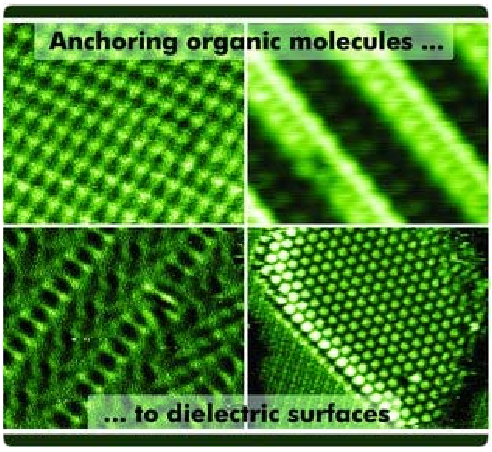
Supramolecular gels are a fascinating class of soft materials. Their gelators can self-assemble into nano- or micro-scale superstructures, such as fibers, ribbons, sheets and spheres in an appropriate solvent, thereby resulting in the formation of 3D networks. The dynamic and reversible nature of the non-covalent interactions that contribute to the formation of these network structures together gives these supramolecular gels the inherent ability to respond to external stimuli. However, the dynamic nature of supramolecular gels, which endows them with unique properties, makes their characterization diversified at the same time. Therefore, we present here a review summarizing various methods for characterizing supramolecular gels, including nuclear magnetic resonance spectroscopy, computational techniques, X-ray techniques, microscopy techniques, dynamic light scattering, thermal analysis, and rheology. Based on the gelation mechanisms and influencing factors of supramolecular gels, suitable and sufficient characterization methods should be carefully employed to make full use of their respective advantages to better investigate these materials.

- Supramolecular complexations of natural products
  Schneider, H.-J.; Agrawal, P.; Yatsimirsky, A. K. *Chem. Soc. Rev.* **2013**, *42*, 6777-6800.
  Abstract:



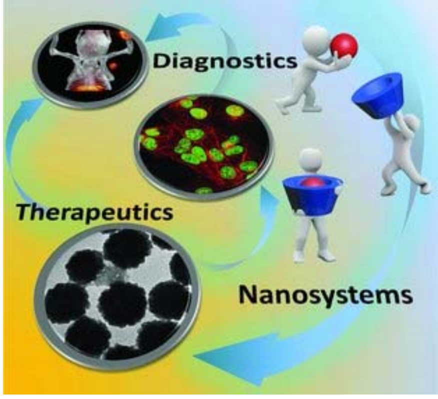
Complexations of natural products with synthetic receptors as well as the use of natural products as host compounds are reviewed, with an emphasis on possible practical uses or on biomedical significance. Applications such as separation, sensing, enzyme monitoring, and protection of natural drugs are first outlined. We then discuss examples of complexes with all important classes of natural compounds, such as amino acids, peptides, nucleosides/nucleotides, carbohydrates, catecholamines, flavonoids, terpenoids/steroids, alkaloids, antibiotics and toxins.

- Tuning Molecular Self-Assembly on Bulk Insulator Surfaces by Anchoring of the Organic Building Blocks
  Rahe, P.; Kittelmann, M.; Neff, J. L.; Nimmrich, M.; Reichling, M.; Maass, P.; Kühnle, A. *Adv. Mater.* **2013**, *25*, 3948–3956.
  Abstract:



Molecular self-assembly constitutes a versatile strategy for creating functional structures on surfaces. Tuning the subtle balance between intermolecular and molecule-surface interactions allows structure formation to be tailored at the single-molecule level. While metal surfaces usually exhibit interaction strengths in an energy range that favors molecular self-assembly, dielectric surfaces having low surface energies often lack sufficient interactions with adsorbed molecules. As a consequence, application-relevant, bulk insulating materials pose significant challenges when considering them as supporting substrates for molecular self-assembly. Here, the current status of molecular self-assembly on surfaces of wide-bandgap dielectric crystals, investigated under ultrahigh vacuum conditions at room temperature, is reviewed. To address the major issues currently limiting the applicability of molecular self-assembly principles in the case of dielectric surfaces, a systematic discussion of general strategies is provided for anchoring organic molecules to bulk insulating materials.

- Host–Guest Supramolecular Nanosystems for Cancer Diagnostics and Therapeutics
  Wang, L.; Li, L.-l.; Fan, Y.-S.; Wang, H. *Adv. Mater.* **2013**, *25*, 3888–3898.
  Abstract:



Extensive efforts have been devoted to the construction of functional supramolecular nanosystems for applications in catalysis, energy conversion, sensing and biomedicine. The applications of supramolecular nanosystems such as liposomes, micelles, inorganic nanoparticles, carbon materials for cancer diagnostics and therapeutics have been reviewed by other groups. Here, we will focus on the recent momentous advances in the implementation of typical supramolecular hosts (i.e., cyclodextrins, calixarenes, cucurbiturils and metallo-hosts) and their nanosystems in cancer diagnostics and therapeutics. We discuss the evolutive process of supramolecular nanosystems from the structural control and characterization to their diagnostic and therapeutic function exploitation and even the future potentials for clinical translation.