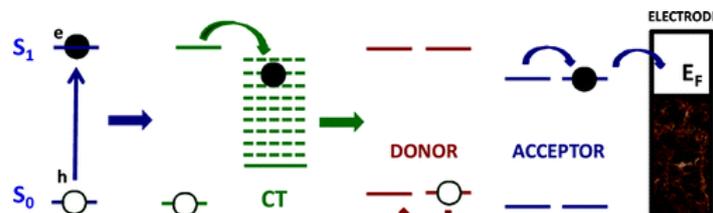


- Molecular Understanding of Organic Solar Cells: The Challenges
Brédas, J.-L.; Norton, J. E.; Cornil, J.; Coropceanu, V. *Acc. Chem. Res.* **2009**, *42*, 1691–1699.

Abstract:

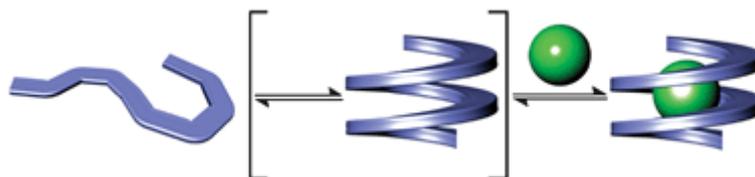


Our objective in this Account is 3-fold. First, we provide an overview of the optical and electronic processes that take place in a solid-state organic solar cell, which we define as a cell in which the semiconducting materials between the electrodes are organic, be them polymers, oligomers, or small molecules; this discussion is also meant to set the conceptual framework in which many of the contributions to this Special Issue on Photovoltaics can be viewed. We successively turn our attention to (i) optical absorption and exciton formation, (ii) exciton migration to the donor–acceptor interface, (iii) exciton dissociation into charge carriers, resulting in the appearance of holes in the donor and electrons in the acceptor, (iv) charge-carrier mobility, and (v) charge collection at the electrodes.

For each of these processes, we also describe the theoretical challenges that need to be overcome to gain a comprehensive understanding at the molecular level. Finally, we highlight recent theoretical advances, in particular regarding the determination of the energetics and dynamics at organic–organic interfaces, and underline that the right balance needs to be found for the optimization of material parameters that often result in opposite effects on the photovoltaic performance.

- Foldamers with helical cavities for binding complementary guests
Juwarker, H.; Suk, J.; Jeong, K. *Chem. Soc. Rev.* **2009**, *38*, 3316 – 3325.

Abstract:

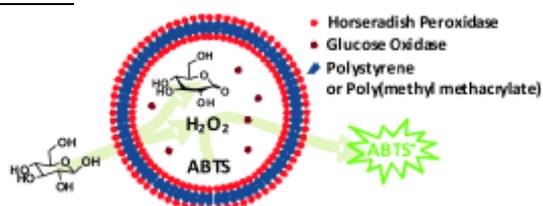


This *tutorial review* provides a summary of the binding of neutral molecules, cations and anions within helical cavities formed specifically by the folding of unnatural oligomers, called foldamers. Foldamers are emerging as a new class of synthetic receptors whose binding sites are not formed by preorganization of covalent bonds, but rather through the combination of various noncovalent interactions that induce folding and subsequent arrangement of functional groups within a helical cavity. The function of foldamers as synthetic receptors can be tuned by careful selection of modular building blocks displaying the appropriate functionality required for guest complexation. As the molecular toolbox expands to create well-defined helical structures, new and interesting functions emerge. It is the purpose of this review to provide the reader with an introduction to helical cavities formed specifically by foldamers and their subsequent function as molecular and ionic receptors. It will interest the supramolecular, organic and bioorganic communities.

- Cascade Reactions in an All-Enzyme Nanoreactor

Delaittre, G.; Reynhout, I. C.; Cornelissen, J. J. L. M.; Nolte, R. J. M. *Chem. Eur. J.* **2009**, *15*, 12600-12603.

Abstract:

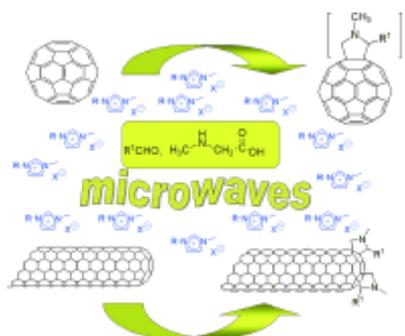


Good things come in small packages: Giant amphiphiles, consisting of a polymeric hydrophobic tail and a horseradish peroxidase head, were simultaneously synthesized and self-assembled into vesicles. During the self-assembly process, glucose oxidase was encapsulated to create enzymatic cascade nanoreactors (see picture; ABTS= 2,2'-azido-bis(3-ethylbenzthiazoline-6-sulfonic acid)).

- Microwave-Assisted Functionalization of Carbon Nanostructures in Ionic Liquids

Guryanov, I.; Toma, F. M.; López, A. M.; Carraro, M.; Da Ros, T.; Angelini, G.; D'Aurizio, E.; Fontana, A.; Maggini, M.; Prato, M.; Bonchio, M. *Chem. Eur. J.* **2009**, *15*, 12837-12845.

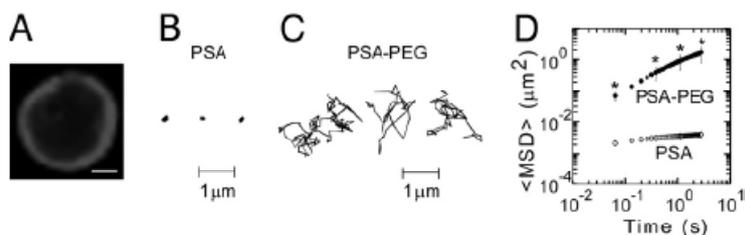
Abstract:



The effect of microwave (MW) irradiation and ionic liquids (IL) on the cycloaddition of azomethine ylides to [60]fullerene has been investigated by screening the reaction protocol with regard to the IL medium composition, the applied MW power, and the simultaneous cooling of the system. [60]fullerene conversion up to 98 % is achieved in 2-10 min, by using a 1:3 mixture of the IL 1-methyl-3-*n*-octyl imidazolium tetrafluoroborate ([omim]BF₄) and *o*-dichlorobenzene, and an applied power as low as 12 W. The mono- versus poly-addition selectivity to [60]fullerene can be tuned as a function of fullerene concentration. The reaction scope includes aliphatic, aromatic, and fluorine-tagged (FT) derivatives. MW irradiation of IL-structured bucky gels is instrumental for the functionalization of single-walled carbon nanotubes (SWNTs), yielding group coverages of up to one functional group per 60 carbon atoms of the SWNT network. An improved performance is obtained in low viscosity bucky gels, in the order [bmim]BF₄ > [omim]BF₄ > [hvim]TF₂N (bmim=1-methyl-3-*n*-butyl imidazolium; hvim=1-vinyl-3-*n*-hexadecyl imidazolium). With this protocol, the introduction of fluorine-tagged pyrrolidine moieties onto the SWNT surface (1/108 functional coverage) yields novel FT-CNS (carbon nanostructures) with high affinity for fluorinated phases.

- Biodegradable polymer nanoparticles that rapidly penetrate the human mucus barrier
- Tang, B. C.; Dawson, M.; Lai, S. K.; Wang, Y.-Y.; Suk, J. S.; Yang, M.; Zeitlin, P.; Boyle, M. P.; Fu, J.; Hanes, J. *Proc. Nat. Acad. Sci.* **2009**, *106*, 19268-19273.

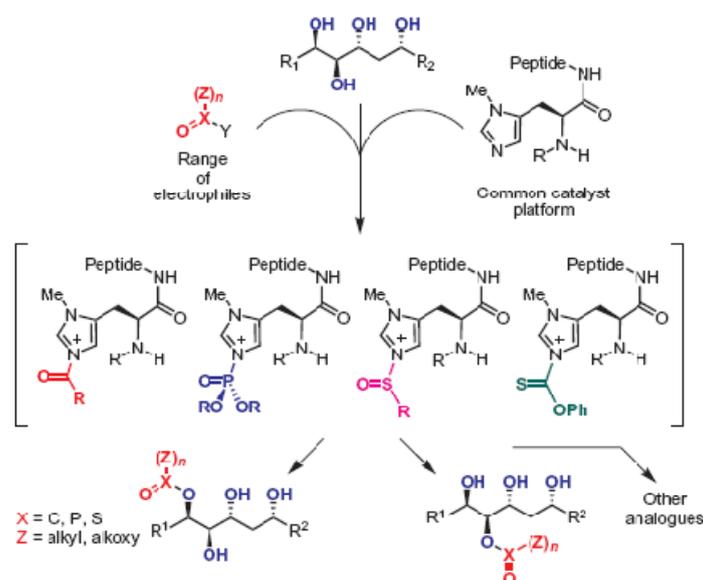
Abstract:



Protective mucus coatings typically trap and rapidly remove foreign particles from the eyes, gastrointestinal tract, airways, nasopharynx, and female reproductive tract, thereby strongly limiting opportunities for controlled drug delivery at mucosal surfaces. No synthetic drug delivery system composed of biodegradable polymers has been shown to penetrate highly viscoelastic human mucus, such as non-ovulatory cervicovaginal mucus, at a significant rate. We prepared nanoparticles composed of a biodegradable diblock copolymer of poly(sebacic acid) and poly(ethylene glycol) (PSA-PEG), both of which are routinely used in humans. In fresh undiluted human cervicovaginal mucus (CVM), which has a bulk viscosity approximately 1,800-fold higher than water at low shear, PSA-PEG nanoparticles diffused at an average = speed only 12-fold lower than the same particles in pure water. In contrast, similarly sized biodegradable nanoparticles composed of PSA or poly(lactico-glycolic acid) (PLGA) diffused at least 3,300-fold slower in CVM than in water. PSA-PEG particles also rapidly penetrated sputum expectorated from the lungs of patients with cystic fibrosis, a disease characterized by hyperviscoelastic mucus secretions. Rapid nanoparticle transport in mucus is made possible by the efficient partitioning of PEG to the particle surface during formulation. Biodegradable polymeric nanoparticles capable of overcoming human mucus barriers and providing sustained drug release open significant opportunities for improved drug and gene delivery at mucosal surfaces.

- Enantioselective sulfonylation reactions mediated by a tetrapeptide catalyst
Fiori, K. W.; Puchlopek, A. L. A.; Miller, S. J. *Nature Chem.* **2009**, *1*, 630-634.

Abstract:



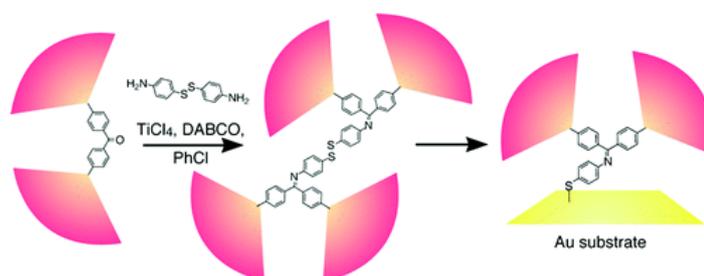
Nature excels at performing selective modifications of complex polyfunctional molecules by tailoring enzymes, but synthetic chemistry has lagged behind in this regard. In prior work, we have applied a biomimetic approach to this problem, developing small peptides to achieve various group transfer reactions on polyol substrates with high enantio- or regioselectivity. The use of sulfonates as

synthetic building blocks and the scarcity of direct, selective methods for their preparation prompted our investigation into this area. In this article we report the development of a *p*-methyl histidine-based tetrameric peptide that effects the desymmetrization of meso-1,3-diols through enantioselective mono(sulfonylation). The catalyst exhibits structural similarities to another catalyst found to be effective in orthogonal group transfers, but results in modification of the enantiotopic alcohol. The practical and mechanistic implications of this discovery may extend beyond synthetic considerations and provide analogies to the diverse roles of histidine in enzyme active sites.

- Self-Assembled Monolayers of Metal-Assembling Dendron Thiolate Formed from Dendrimers with a Disulfide Core

Satoh, N.; Yamamoto, K. *Org. Lett.* **2009**, *11*, 1729–1732.

Abstract:

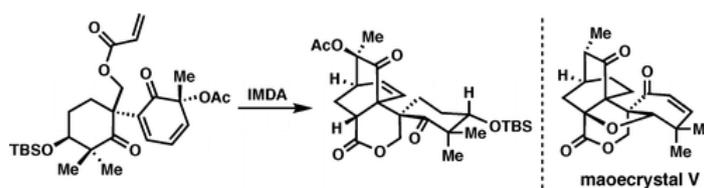


Novel phenylazomethine dendrimers with a disulfide core (SS-DPA G1–4) were synthesized in nearly quantitative yields. Although the disulfide core is shielded by the rigid dendron shell, direct formation of the self-assembled monolayers of metal-assembling dendron thiolate was observed by XPS and electrochemical reduction of the self-assembled monolayer substrates. The dendrimers showed a similar metal-assembling manner with other derivatives. The metal assembly to the self-assembled monolayers of metal-assembling dendron thiolate was also confirmed.

- A Synthesis of the Carbon Skeleton of Maoecrystal V

Krawczuk, P. J.; Schöne, N.; Baran, P. S. *Org. Lett.* **2009**, *11*, 4774–4776.

Abstract:

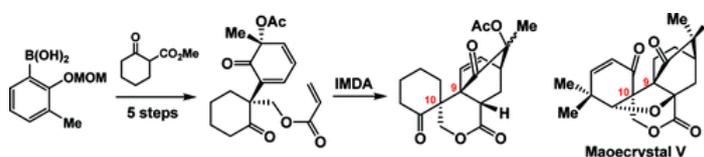


An enantioselective synthesis of the maoecrystal V (**1**) carbon skeleton is described. The key transformations include arylation of a 1,3-dicarbonyl compound with a triarylbismuth(V) dichloride species, oxidative dearomatization of a phenol, and a subsequent intramolecular Diels–Alder reaction.

- Synthetic Study toward the Total Synthesis of Maoecrystal V

Gong, J.; Lin, G.; Li, C.-C.; Yang, Z. *Org. Lett.* **2009**, *11*, 4770–4773.

Abstract:

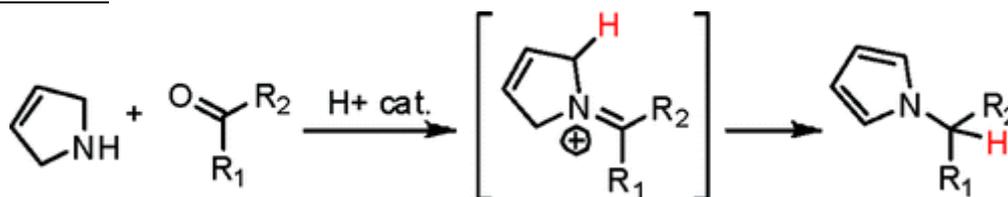


A novel and concise approach for the construction of the core structure of maoecrystal V (1) has been developed. Utilizing the lead-mediated arylation of β -ketoesters and oxidative dearomatization/IMDA reaction as key steps, the two consecutive all-carbon quaternary centers (C-9 and C-10) were constructed in a stereoselective manner. The developed chemistry paves the way for the total synthesis of this fascinating natural product.

- Formation of N-Alkylpyrroles via Intermolecular Redox Amination

Pahadi, N. K.; Paley, M.; Jana, R.; Waetzig, S. R.; Tunge, J. A. *J. Am. Chem. Soc.* **2009**, *131*, 16626–16627.

Abstract:

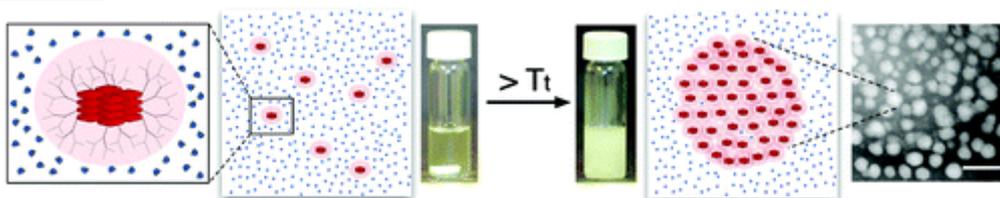


A wide variety of aldehydes, ketones, and lactols undergo redox amination when allowed to react with 3-pyrroline in the presence of a mild Brønsted acid catalyst. This reaction utilizes the inherent reducing power of 3-pyrroline to perform the equivalent of a reductive amination to form alkyl pyrroles. In doing so, the reaction avoids stoichiometric reducing agents that are typically associated with reductive aminations. Moreover, the redox amination protocol allows access to alkyl pyrroles that cannot be made via standard reductive amination.

- Nonpolymeric Thermosensitive Supramolecules

Betancourt, J. E.; Rivera, J. M. *J. Am. Chem. Soc.* **2009**, *131*, 16666–16668.

Abstract:

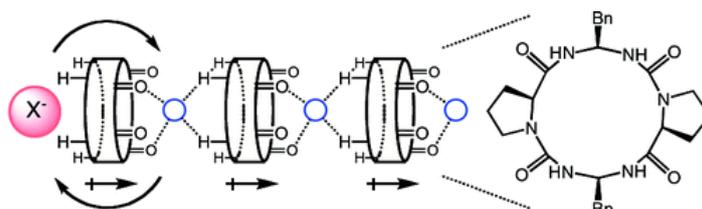


Here we show 2'-deoxyguanosine derivatives that self-assemble in aqueous media into discrete supramolecular hexadecamers and exhibit the lower critical solution temperature (LCST) phenomenon. Spectroscopic, calorimetric, and electron microscopy studies support the fact that above the transition temperature (T_t) the supramolecules further assemble into nanoscopic spherical globules of low polydispersity. Furthermore, the T_t can be tuned to higher values by the addition of a more hydrophilic derivative. These findings uncover a new paradigm in the development of smart thermosensitive materials with properties and applications complementary to those of polymers.

- Anion–Macrodipole Interactions: Self-Assembling Oligourea/Amide Macrocyces as Anion Transporters that Respond to Membrane Polarization

Hennig, A.; Fischer, L.; Guichard, G.; Matile, S. *J. Am. Chem. Soc.* **2009**, *131*, 16889–16895.

Abstract:

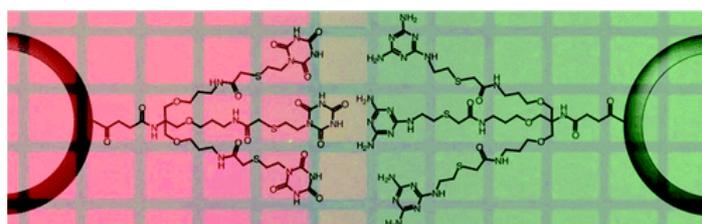


Macrocyclic urea/amide hybrids are introduced as functional, anion-selective membrane transporters in lipid bilayer membranes. Six derivatives with varying side chains (aliphatic and aromatic) and conformations (parallel and antiparallel carbonyl dipoles) are investigated by fluorescence methods, among which the more active aromatic derivatives were selected for an in-depth study. Strong response of transport activity toward anion exchange and weak response toward cation exchange establish anion selectivity for all macrocycles. “Antiparallel” macrocycles that self-assemble into “antiparallel” nanotubes without macrodipole exhibit Hofmeister selectivity. Parallel macrocycles that self-assemble into parallel nanotubes with strong macrodipole are capable of overcoming the dehydration penalty of the Hofmeister bias. Both systems show additional chloride selectivity. The activity of antiparallel and parallel nanotubes in binary mixtures of bromide/perchlorate and chloride/thiocyanate is over- and underadditive, respectively (positive and negative AMFE). The activity of antiparallel nanotubes decreases rapidly with increasing membrane polarization, whereas parallel nanotubes are inactivated at high and activated by membrane potentials at low concentration. Hill coefficients of parallel nanotubes decrease significantly with membrane polarization, whereas those of antiparallel nanotubes increase slightly. The overall unusual characteristics of parallel nanotubes call for a new transport mechanism, where macrodipole–potential interactions account for voltage sensitivity and anion–macrodipole interactions account for anion selectivity.

- Lipid Membrane Adhesion and Fusion Driven by Designed, Minimally Multivalent Hydrogen-Bonding Lipids

Ma, M.; Gong, Y.; Bong, D. *J. Am. Chem. Soc.* **2009**, *131*, 16919–16926.

Abstract:

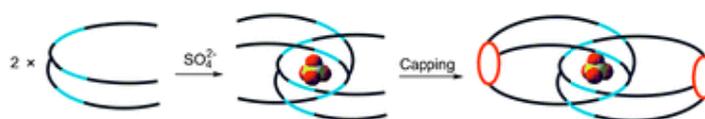


Cyanuric acid (CA) and melamine (M) functionalized lipids can form membranes that exhibit robust hydrogen-bond driven surface recognition in water, facilitated by multivalent surface clustering of recognition groups and variable hydration at the lipid–water interface. Here we describe a minimal lipid recognition cluster: three CA or M recognition groups are forced into proximity by covalent attachment to a single lipid headgroup. This trivalent lipid system guides recognition at the lipid–water interface using cyanurate–melamine hydrogen bonding when incorporated at 0.1–5 mol percent in fluid phospholipid membranes, inducing both vesicle–vesicle binding and membrane fusion. Fusion was accelerated when the antimicrobial peptide magainin was used to anchor trivalent recognition, or when added exogenously to a preassembled lipid vesicle complex, underscoring the

importance of coupling recognition with membrane disruption in membrane fusion. Membrane apposition and fusion were studied in vesicle suspensions using light scattering, FRET assays for lipid mixing, surface plasmon resonance, and cryo-electron microscopy. Recognition was found to be highly spatially selective as judged by vesicular adhesion to surface patterned supported lipid bilayers (SLBs). Fusion to SLBs was also readily observed by fluorescence microscopy. Together, these studies indicate effective and functional recognition of trivalent phospholipids, despite low mole percentage concentration, solvent competition for hydrogen bond donor/acceptor sites, and simplicity of structure. This novel designed molecular recognition motif may be useful for directing aqueous-phase assembly and biomolecular interactions.

- Sulfate anion templated synthesis of a triply interlocked capsule
Li, Y.; Mullen, K. M.; Claridge, T. D. W.; Costa, P. J.; Felix, V.; Beer, P. D. *Chem. Commun.* **2009**, 7134 – 7136.

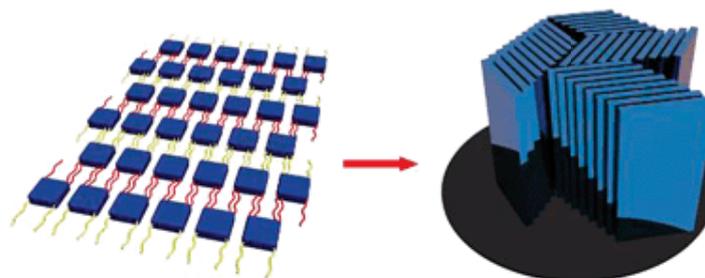
Abstract:



Sulfate templation has been used in the synthesis of a novel tris-urea-based triply interlocked capsule, whose structure has been verified by DOSY NMR, mass spectrometry and molecular modelling investigations.

- Two-dimensional self-organization of rectangular OPE amphiphiles into microcrystalline lamellae
Fernández, G.; García, F.; Aparicio, F.; Matesanz, E.; Sánchez, L. *Chem. Commun.* **2009**, 7155 – 7157.

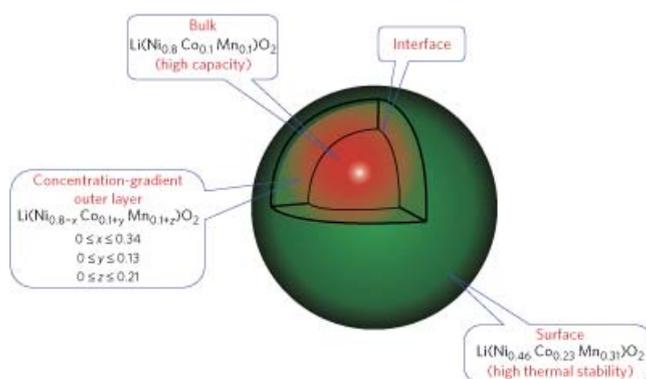
Abstract:



Nanographite-like lamellae are obtained by the self-assembly of rectangular OPE amphiphiles peripherally decorated with polar and paraffinic chains.

- High-energy cathode material for long-life and safe lithium batteries
Sun, Y.-K.; Myung, S.-T.; Park, B.-C.; Prakash, J.; Belharouak, I.; Amine, K. *Nature Materials* **2009**, 8, 320-324.

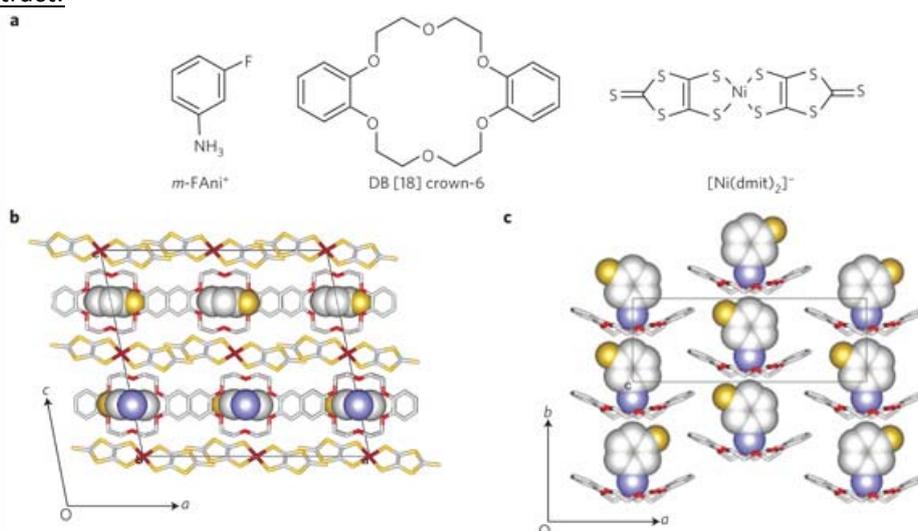
Abstract:



Layered lithium nickel-rich oxides, $\text{Li}[\text{Ni}_{1-x}\text{M}_x]\text{O}_2$ ($\text{M}=\text{metal}$), have attracted significant interest as the cathode material for rechargeable lithium batteries owing to their high capacity, excellent rate capability and low cost. However, their low thermal-abuse tolerance and poor cycle life, especially at elevated temperature, prohibit their use in practical batteries. Here, we report on a concentration-gradient cathode material for rechargeable lithium batteries based on a layered lithium nickel cobalt manganese oxide. In this material, each particle has a central bulk that is rich in Ni and a Mn-rich outer layer with decreasing Ni concentration and increasing Mn and Co concentrations as the surface is approached. The former provides high capacity, whereas the latter improves the thermal stability. A half cell using our concentration-gradient cathode material achieved a high capacity of 209 mA h g^{-1} and retained 96% of this capacity after 50 charge–discharge cycles under an aggressive test profile (55°C between 3.0 and 4.4 V). Our concentration-gradient material also showed superior performance in thermal-abuse tests compared with the bulk composition $\text{Li}[\text{Ni}_{0.8}\text{Co}_{0.1}\text{Mn}_{0.1}]\text{O}_2$ used as reference. These results suggest that our cathode material could enable production of batteries that meet the demanding performance and safety requirements of plug-in hybrid electric vehicles.

- Ferroelectricity and polarity control in solid-state flip-flop supramolecular rotators
Akutagawa, T.; Koshinaka, H.; Sato, D.; Takeda, S.; Noro, S.-I.; Takahashi, H.; Kumai, R.; Tokura, Y.; Nakamura T. *Nature Materials* **2009**, *8*, 342-347.

Abstract:



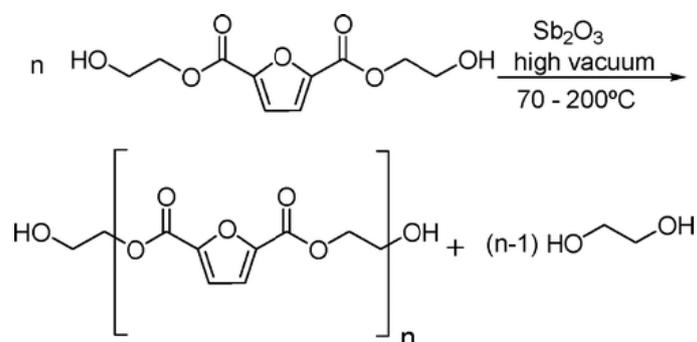
Molecular rotation has attracted much attention with respect to the development of artificial molecular motors, in an attempt to mimic the intelligent and useful functions of biological molecular motors. Random motion of molecular rotators—for example the 180° flip-flop motion of a rotatory unit—causes a rotation of the local structure. Here, we show that such motion is controllable using

an external electric field and demonstrate how such molecular rotators can be used as polarization rotation units in ferroelectric molecules. In particular, *m*-fluoroanilinium forms a hydrogen-bonding assembly with dibenzo[18]crown-6, which was introduced as the counter cation of $[\text{Ni}(\text{dmit})_2]^-$ anions ($\text{dmit}^- = 2$ -thioxo-1,3-dithiole-4,5-dithiolate). The supramolecular rotator of *m*-fluoroanilinium exhibited dipole rotation by the application of an electric field, and the crystal showed a ferroelectric transition at 348 K. These findings will open up new strategies for ferroelectric molecules where a chemically designed dipole unit enables control of the nature of the ferroelectric transition temperature.

- Polymers from Renewable Resources: A Challenge for the Future of Macromolecular Materials

Gandini, A. *Macromolecules* **2008**, *41*, 9491–9504.

Abstract:

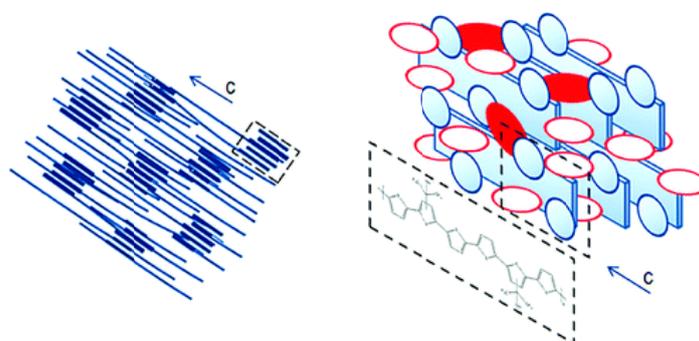


This perspective article examines the state of the art regarding the field of polymers from renewable resources and attempts to give a critical appraisal of the situation related to a representative number of specific materials, in terms of their interest, present degree of advancement, and prospective development within short and medium-term projections. The selected examples include polysaccharides and their derivatives, lignin, suberin, vegetable oils, tannins, natural monomers like terpenes, and monomers derived from sugars, with particular emphasis on furan derivatives and lactic acid, bacterial cellulose, and poly(hydroxyalkanoates), ending with a brief assessment of the potential role of glycerol and ethanol as future precursors to monomers.

- Gel Processing for Highly Oriented Conjugated Polymer Films.

Alcazar, D.; Wang, F.; Swager, T. M.; Thomas, E. L. *Macromolecules* **2008**, *41*, 9863-9868.

Abstract:

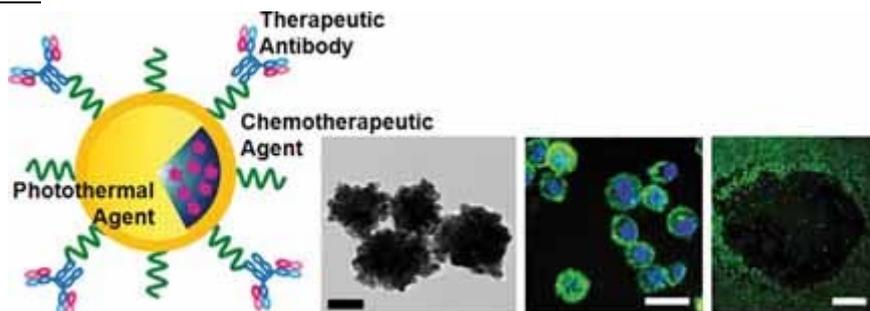


Hexafluoroisopropanol functionalized polythiophene is able to build up an isotropic self-supporting network structure. The gel network can be melted and then transformed via mechanical shearing to form an anisotropic gel with the chains highly aligned along the shearing direction and the

conjugated backbones π -stacked with respect to each other neighbors. The mechanism by which a dipole functionalized polythiophene can form a reversible network able to be deformed into structurally oriented films may be of interest in the development of novel processing routes for conjugated polymers.

- Smart Drug-Loaded Polymer Gold Nanoshells for Systemic and Localized Therapy of Human Epithelial Cancer
Yang, J.; Lee, J.; Kang, J.; Oh, S. J.; Ko, H.-J.; Son, J.-H.; Lee, K.; Suh, J.-S.; Huh, Y.-M.; Haam S. *Adv. Mater.* **2009**, 4339-4342.

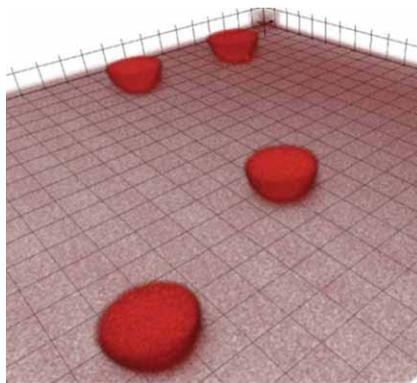
Abstract:



Near-infrared-light-sensitive multifunctional smart drug-loaded polymer gold nanoshells are fabricated as advanced prototypes, composed of chemotherapeutic agents (therapeutic antibody and anticancer drug-loaded polymeric nanoparticles) for systemic chemotherapy of human epithelial cancer and a polymer-based gold nanoshell for localized photothermal treatment by NIR light.

- Click-Engineered, Bioresponsive, Drug-Loaded PEG Spheres
Yap, H. P.; Johnston, A. P. R.; Such, G. K.; Yan, Y.; Caruso F. *Adv. Mater.* **2009**, 4348-4352.

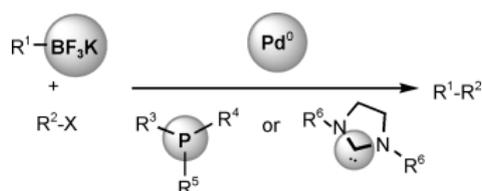
Abstract:



A click-chemistry approach to synthesize bioresponsive poly(ethylene glycol acrylate) particles is described. The particles are loaded with a model anticancer drug (doxorubicin, DOX), and undergo simultaneous particle deconstruction and DOX release upon specific activation by the simulated environment of the cellular cytoplasm.

- Organotrifluoroborates and Monocoordinated Palladium Complexes as Catalysts - A Perfect Combination for Suzuki-Miyaura Coupling
Molander, G. A.; Canturk, B. *Angew. Chem. Int. Ed.* **2009**, 48, 9240 – 9261.

Abstract:

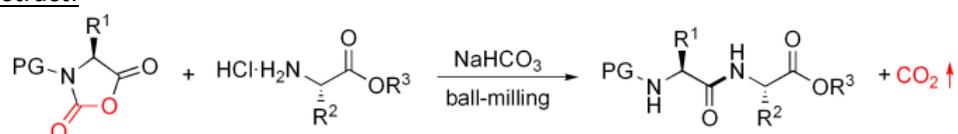


Monocoordinated palladium catalysts derived from sterically hindered, electron-rich phosphines or N-heterocyclic carbenes have revolutionized the Suzuki-Miyaura coupling reaction. The emergence of organotrifluoroborates has provided important new perspectives for the organoboron component of these reactions. In combination, these two components prove to be extraordinarily powerful partners for cross-coupling reactions.

- Solvent-Free Synthesis of Peptides

Declerck, V.; Nun, P.; Martinez, J.; Lamaty, F. *Angew. Chem. Int. Ed.* **2009**, *48*, 9318–9321.

Abstract:

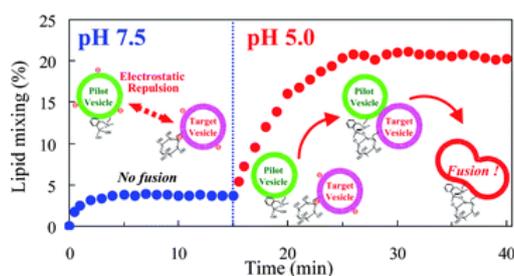


A crush on sweetness! The coupling of a urethane-protected *N*-carboxyanhydride of an amino acid with another amino acid derivative under ball-milling conditions gives a protected dipeptide in very high yield (see scheme; PG: protecting group). The reaction takes place in the solid state. The synthesis was applied to the preparation of a tripeptide and the sweetener aspartame, without any organic solvent or purification.

- Target-selective vesicle fusion system with pH-selectivity and responsiveness

Kashiwada, A.; Tsuboi, M.; Mizuno, T.; Nagasaki, T.; Matsuda, K. *Soft Matter* **2009**, *5*, 4719–4725.

Abstract:

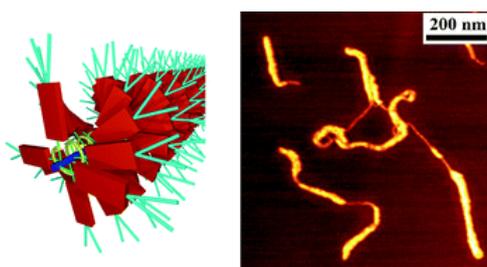


The present paper reports on induction of target-selective liposomal vesicle fusion triggered by molecular recognition on a vesicle surface. Phosphatidylinositol (PI) having a sugar-like cyclic *cis*-diol structure was selected as a recognition target. Since diol sugars are abundant on cell surfaces, vesicle fusion systems based on the recognition of diol functionalities can be relevant for liposome-based drug delivery. Here, we design and synthesize a novel phenylboronic acid derivative with a tertiary amine group adjacent to the boron atom as a pilot molecule toward PI at a physiological condition. The pilot vesicle, or EggPC liposome containing this phenylboronic acid derivative causes selective membrane fusion toward a target liposomal vesicle containing sugar-like cyclic *cis*-diol structure at a physiological condition. From lipid mixing and inner-leaflet mixing assays, we demonstrate that the fusion event activated by inter-vesicular complex formation occurs rapidly. Furthermore, we also construct the target selective fusion system working only at the endosomal pH by the use of weakly acidic lipid, 1,2-dipalmitoyl-*sn*-glycero-3-succinate (DPGS) containing the pilot vesicle. The lipid

mixing and inner-leaflet mixing assays make it clear that the vesicle fusion proceeds over pH range 5.0–5.5, whose range is upper than the pK_a of the boronic acid moiety on *cys*-diol complexation and lower than the pK_a of the carboxyl group of DPGS.

- Influence of π – π stacking on the self-assembly and coiling of multi-chromophoric polymers based on perylenebis(dicarboximides): an AFM study
Palermo, V.; Schwartz, E.; Liscio, A.; Otten, M. B. J.; Müllen, K.; Nolte, R. J. M.; Rowan, A. E.; Samorì, P. *Soft Matter* **2009**, *5*, 4680 – 4686.

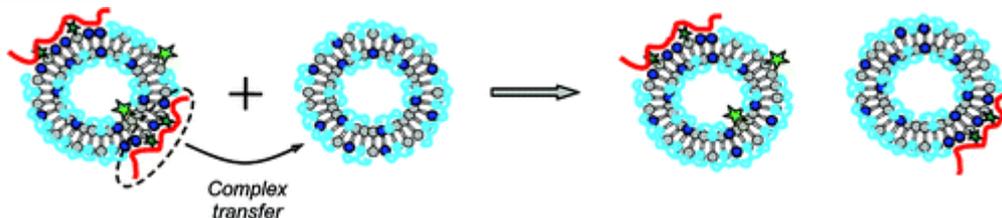
Abstract:



The assembly behavior at surfaces of very stiff polyisocyanopeptides (PICs) functionalized with semiconducting perylenebis(dicarboximide) (PDI) side chains has been investigated by atomic force microscopy. These multi-chromophoric arrays are unique as they combine an ultra-stiff central polymer main-chain scaffold upon which the PDI chromophores can self-organize through π – π stacking, making them interesting and versatile building blocks for nanoelectronics. In this paper we compare three PIC derivatives featuring different side groups: M1—no chromophores, M2—chromophores capable of π – π stacking, and M3—chromophores where the stacking is hindered by the presence of bulky substituents in the bay area of the PDI. The effect of the different side functionalizations on the macromolecule assembly at surfaces was compared by studying the morphology and aggregation tendency of all three polymers when adsorbed on silicon, mica and graphite substrates. Making use of nano-manipulation of these functional rods with the AFM tip gave insight into the polymer structure and its coiling behaviour.

- Polymer Migration among Phospholipid Liposomes
Davydov, D. A.; Yaroslavova, E. G.; Rakhnyanskaya, A. A.; Efimova, A. A.; Ermakov, Y. A.; Menger, F. M.; Yaroslavov, A. A. *Langmuir* **2009**, *30*, 13528–13533.

Abstract:



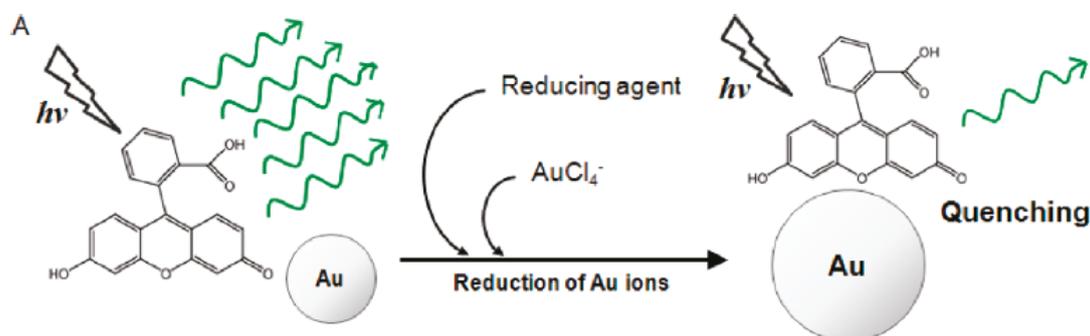
Complexation of phospholipid liposomes with a cationic polymer, poly(*N*-ethyl-4-vinylpyridinium bromide) (PEVP), and subsequent interliposomal migration of the adsorbed macromolecules, have been investigated. Liposomes of two different charge types were examined: (a) a liposomal system, with an overall charge near zero, consisting of zwitterionic phosphatidylcholine (egg lecithin, EL) with added doubly anionic phospholipid, cardiolipin (CL^{2-}), and cationic dihexadecyldimethylammonium bromide ($HMAB^+$), in a $CL^{2-}/HMAB^+$ charge-to-charge ratio of 1:1; (b) an anionic liposomal system composed of an EL/CL^{2-} mixture plus polyoxyethylene monocetyl ether (Brij 58). Both three-

component systems were designed specifically to preclude liposomal aggregation upon electrostatic association with the PEVP, a phenomenon that had complicated analysis of data from several two-component liposomes. PEVP macromolecules were found from fluorescence experiments to migrate among the charge-neutral EL/CL²⁻/HMAB⁺ liposomes. In the case of anionic EL/CL²⁻/Brij liposomes, a combination of fluorescence and laser microelectrophoresis methods showed that PEVP macromolecules travel from liposome to liposome while being electrostatically associated with anionic lipids.

- Gold Nanoparticle Enlargement Coupled with Fluorescence Quenching for Highly Sensitive Detection of Analytes

Lim, S. Y.; Kim, J. H.; Lee, J. S.; Park, C. B. *Langmuir* **2009**, *25*, 13302–13305.

Abstract:



We report a versatile and facile route for highly sensitive detection of analytes through coupling the enlargement of gold nanoparticles with fluorescence quenching. The fluorescence intensity of dye molecules (e.g., fluorescein or rhodamine B) significantly decreased with the increasing concentration of reducing agents, such as hydrogen peroxide and hydroquinone. The sensitivity for the detection of reducing agents was much higher than that of other methods based on the absorbance measurement of enlarged gold nanoparticles or quantum-dot-enzyme hybridization. We could successfully detect acetylthiocholine with the detection limit of several nanomolar concentration using an enzymatic reaction by acetylcholine esterase, a key route for the detection of toxic organophosphate compounds. The fluorescence quenching approach described in this report requires only a simple addition of fluorescence dye to the reaction solution without any chemical modification. The strategy of fluorescence quenching coupled with nanoparticle growth would provide a new horizon for the development of highly sensitive optical biosensors.