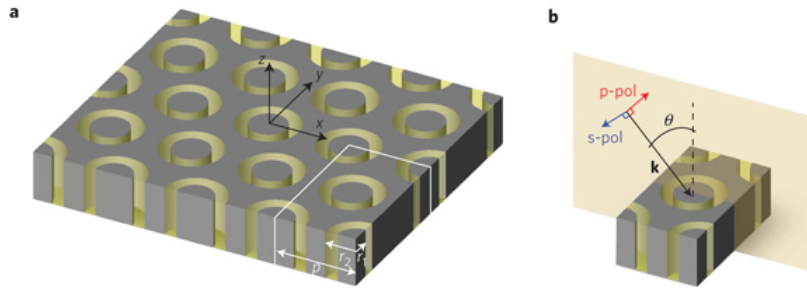
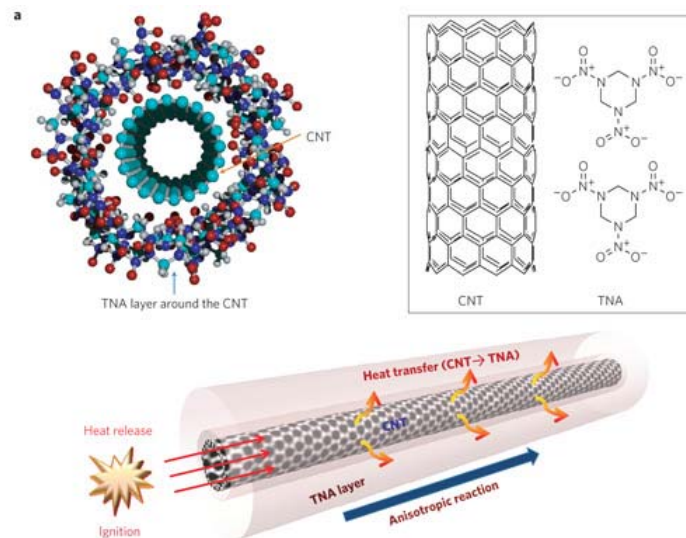


- A single-layer wide-angle negative-index metamaterial at visible frequencies  
Burgos, S. P.; deWaele, R.; Polman, A.; Atwater, H. A. *Nature Materials* **2010**, *9*, 407-412.

Abstract:

Metamaterials are materials with artificial electromagnetic properties defined by their sub-wavelength structure rather than their chemical composition. Negative-index materials (NIMs) are a special class of metamaterials characterized by an effective negative index that gives rise to such unusual wave behaviour as backwards phase propagation and negative refraction. These extraordinary properties lead to many interesting functions such as sub-diffraction imaging and invisibility cloaking. So far, NIMs have been realized through layering of resonant structures, such as split-ring resonators, and have been demonstrated at microwave to infrared frequencies over a narrow range of angles-of-incidence and polarization. However, resonant-element NIM designs suffer from the limitations of not being scalable to operate at visible frequencies because of intrinsic fabrication limitations, require multiple functional layers to achieve strong scattering and have refractive indices that are highly dependent on angle of incidence and polarization. Here we report a metamaterial composed of a single layer of coupled plasmonic coaxial waveguides that exhibits an effective refractive index of  $-2$  in the blue spectral region with a figure-of-merit larger than 8. The resulting NIM refractive index is insensitive to both polarization and angle-of-incidence over a  $\pm 50^\circ$  angular range, yielding a wide-angle NIM at visible frequencies.

- Chemically driven carbon-nanotube-guided thermopower waves  
Choi, W.; Hong, S.; Abrahamson, J. T.; Han, J.-H.; Song, C.; Nair, N.; Baik, S.; Strano, M. S. *Nature Materials* **2010**, *9*, 423-429.

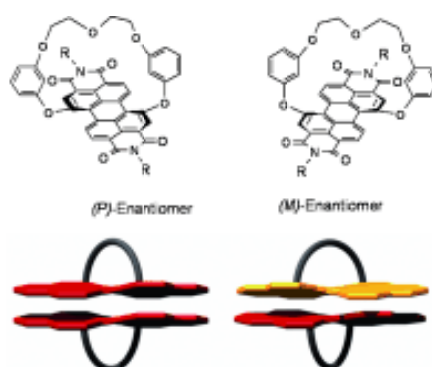
Abstract:

Theoretical calculations predict that by coupling an exothermic chemical reaction with a nanotube or nanowire possessing a high axial thermal conductivity, a self-propagating reactive wave can be driven along its length. Herein, such waves are realized using a 7-nm cyclotrimethylene trinitramine annular shell around a multiwalled carbon nanotube and are amplified by more than  $10^4$  times the bulk value, propagating faster than  $2 \text{ m s}^{-1}$ , with an effective thermal conductivity of  $1.28 \pm 0.2 \text{ kW m}^{-1} \text{ K}^{-1}$  at 2,860 K. This wave produces a concomitant electrical pulse of disproportionately high specific power, as large as  $7 \text{ kW kg}^{-1}$ , which we identify as a thermopower wave. Thermally excited carriers flow in the direction of the propagating reaction with a specific power that scales inversely with system size. The reaction also evolves an anisotropic pressure wave of high total impulse per mass ( $300 \text{ N s kg}^{-1}$ ). Such waves of high power density may find uses as unique energy sources.

- Chiral Self-Recognition and Self-Discrimination of Strapped Perylene Bisimides by  $\pi$ -Stacking Dimerization

Safont-Sempere, M. M.; Osswald, P.; Radacki, K.; Würthner, F. *Chem. Eur. J.* **2010**, *16*, 7380-7384.

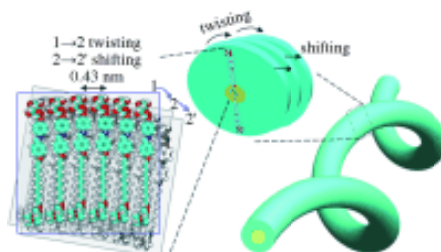
Abstract:



**Narcissism of molecules!** Configurationally restricted chiral perylene bisimide dyes show a very strong preference for the formation of homochiral dimers (self-recognition) (red pair) upon  $\pi$  stacking in solution. Minor amounts of heterochiral dimers (red- yellow pair) enable the determination of *P/M* enantiomeric ratios by  $^1\text{H}$  NMR spectroscopy without using any chiral auxiliary.

- Twist Ferrocene Wires from Self-Assembly of Chiral Rod-Coil Organometallics

Abstract:

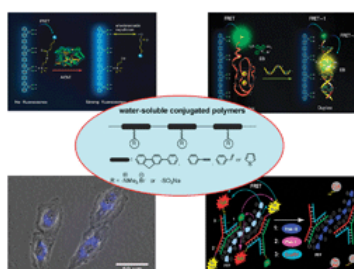


**Let's twist again!** A chiral rod-coil organometallic material, FC11, has been synthesized and shows liquid-crystalline behavior. By taking advantage of the self-assembly of the chiral Schiff based rod-coil molecule that is end-capped with ferrocene, the self-assembled superstructure can serve as a template to form iron-rich spiral superstructures (see graphic).

- Water-soluble fluorescent conjugated polymers and their interactions with biomacromolecules for sensitive biosensors

Feng, X.; Liu, L.; Wang, S.; Zhu, D. *Chem. Soc. Rev.* **2010**, *39*, 2411 – 2419.

Abstract:

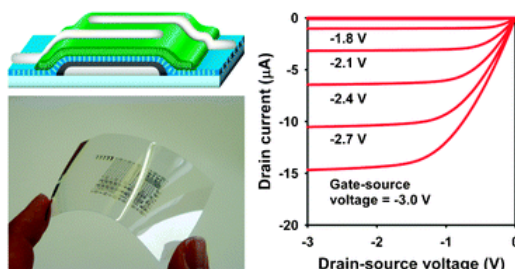


Over the past decades, water-soluble conjugated polymers (CPs) have gained increasing attention as optical platforms for sensitive detection of biomacromolecules (DNA, protein and cell) due to the amplification of fluorescent signals. To meet the requirement for high throughput assays, chip and microarray techniques based on CPs have also been developed. Very recently, fluorescence imaging *in vivo* and at the cellular level have also been successfully accomplished using these water-soluble CPs. In this *tutorial review*, we provide a brief review of the synthesis and optical properties of CPs, focusing especially on their applications in biosensors and cell imaging.

- Organic thin-film transistors

Klauk, H. *Chem. Soc. Rev.* **2010**, *39*, 2643 – 2666.

Abstract:

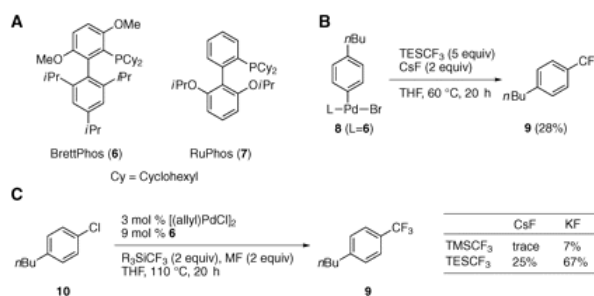


Over the past 20 years, organic transistors have developed from a laboratory curiosity to a commercially viable technology. This *critical review* provides a short summary of several important aspects of organic transistors, including materials, microstructure, carrier transport, manufacturing, electrical properties, and performance limitations (200 references).

- The Palladium-Catalyzed Trifluoromethylation of Aryl Chlorides

Cho, E. J.; Senecal, T. D.; Kinzel, T.; Zhang, Y.; Watson, D. A.; Buchwald, S. L. *Science* **2010**, *328*, 1679 – 1681.

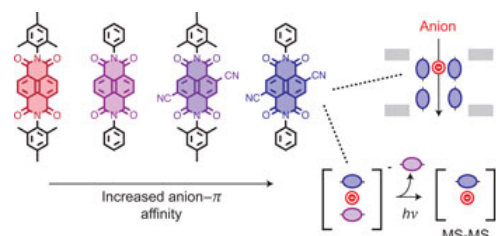
Abstract:



The trifluoromethyl group can dramatically influence the properties of organic molecules, thereby increasing their applicability as pharmaceuticals, agrochemicals, or building blocks for organic materials. Despite the importance of this substituent, no general method exists for its installment onto functionalized aromatic substrates. Current methods either require the use of harsh reaction conditions or suffer from a limited substrate scope. Here we report the palladium-catalyzed trifluoromethylation of aryl chlorides under mild conditions, allowing the transformation of a wide range of substrates, including heterocycles, in excellent yields. The process tolerates functional groups such as esters, amides, ethers, acetals, nitriles, and tertiary amines and, therefore, should be applicable to late-stage modifications of advanced intermediates. We have also prepared all the putative intermediates in the catalytic cycle and demonstrated their viability in the process.

- Experimental evidence for the functional relevance of anion- $\pi$  interactions  
Dawson, R. E.; Hennig, A.; Weimann, D. P.; Emery, D.; Ravikumar, V.; Montenegro, J.; Takeuchi, T.; Gabutti, S.; Mayor, M.; Mareda, J.; Schalley, C. A.; Matile, S. *Nature Chemistry* **2010**, 2, 533–538.

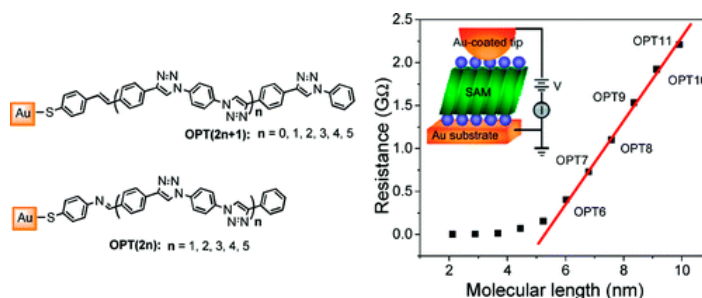
Abstract:



Attractive in theory and confirmed to exist, anion- $\pi$  interactions have never really been seen at work. To catch them in action, we prepared a collection of monomeric, cyclic and rod-shaped naphthalenediimide transporters. Their ability to exert anion- $\pi$  interactions was demonstrated by electrospray tandem mass spectrometry in combination with theoretical calculations. To relate this structural evidence to transport activity in bilayer membranes, affinity and selectivity sequences were recorded.  $\pi$ -acidification and active-site decrowding increased binding, transport and chloride > bromide > iodide selectivity, and supramolecular organization inverted acetate > nitrate to nitrate > acetate selectivity. We conclude that anion- $\pi$  interactions on monomeric surfaces are ideal for chloride recognition, whereas their supramolecular enhancement by  $\pi,\pi$ -interactions appears perfect to target nitrate. Chloride transporters are relevant to treat channelopathies, and nitrate sensors to monitor cellular signaling and cardiovascular diseases. A big impact on organocatalysis can be expected from the stabilization of anionic transition states on chiral  $\pi$ -acidic surfaces.

- Length-Dependent Conductance of Conjugated Molecular Wires Synthesized by Stepwise “Click” Chemistry  
Luo, L.; Frisbie, C. D. *J. Am. Chem. Soc.* **2010**, 132, 8854–8855.

Abstract:

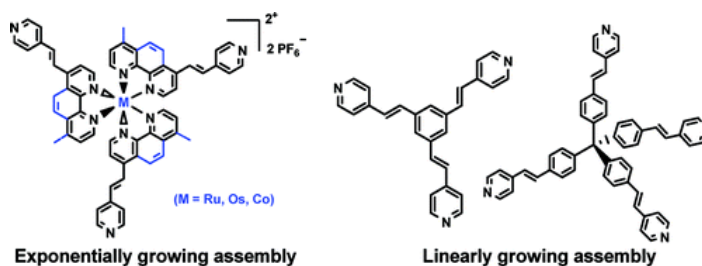


We report the preparation and electrical characterization of conjugated oligophenylenetriazole (OPT) wires having systematically varied lengths up to 10 nm. OPT wires were built from gold substrates using Cu(I)-catalyzed azide alkyne cycloaddition and characterized comprehensively by RAIRS, ellipsometry, and XPS. We observed a clear transition in direct current (DC) transport from tunneling to hopping in a length range between 4 and 5 nm as previously established for oligoarylimine wires. Stepwise click cycloaddition represents a new efficient method to prepare long conjugated molecular wire self-assembled monolayers (SAMs) on Au surfaces for conduction measurements and is expected to be compatible with a variety of functionalities and bonding architectures in the wire backbones.

- Linear vs Exponential Formation of Molecular-Based Assemblies

Choudhury, J.; Kaminker, R.; Motiei, L.; de Ruiter, G.; Morozov, M.; Lupo, F.; Gulino, A.; van der Boom, M. E. *J. Am. Chem. Soc.* **2010**, *132*, 9295–9297.

Abstract:

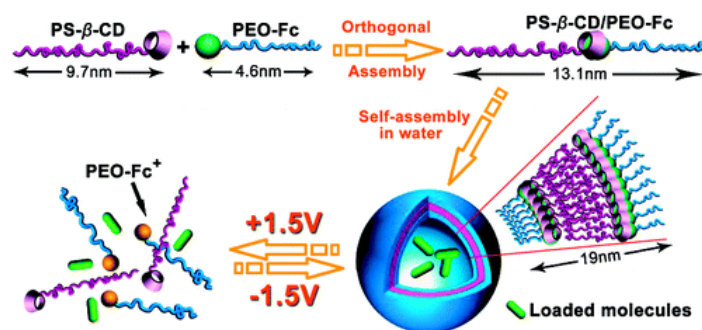


Here we present the critical role of the molecular structure and reaction parameters on the nature of thin-film growth, using a versatile two-step assembly method with organic and metal–organic chromophores cross-linked with palladium. It was found that the polypyridyl complexes exhibit exponential growth, whereas, under identical conditions, the organic systems exhibit linear behavior. The internal film morphology plays a pivotal role in the storage and usage of the palladium, where a more porous structure results in exponential growth. Interestingly, through proper tuning of the reaction conditions, the growth of the molecular assemblies can be controlled, resulting in a changeover from exponential to linear growth. These findings unequivocally demonstrate the importance of both the internal film structure and deposition conditions on the assembly of molecular-based films.

- Voltage-Responsive Vesicles Based on Orthogonal Assembly of Two Homopolymers

Yan, Q.; Yuan, J.; Cai, Z.; Xin, Y.; Kang, Y.; Yin, Y. *J. Am. Chem. Soc.* **2010**, *132*, 9268–9270.

Abstract:

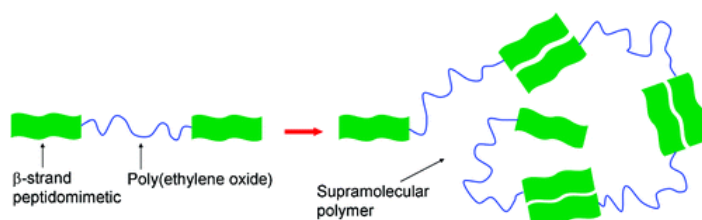


Two end-decorated homopolymers, poly(styrene)- $\beta$ -cyclodextrin (PS- $\beta$ -CD) and poly(ethylene oxide)-ferrocene (PEO-Fc), can orthogonally self-assemble into a supramolecular diblock copolymer (PS- $\beta$ -CD/PEO-Fc) in aqueous solutions based on the terminal host-guest interactions. These assemblies can further form supramolecular vesicles, and their assembly and disassembly behaviors can be reversibly switched by voltage through the reversible association and disassociation of the middle supramolecular connection. The vesicles possess an unprecedented property that their assembly or disassembly speed can be controlled by the applied voltage strength. Luminescence spectroscopy demonstrates that the vesicles act as nanocapsules carrying molecules within their hollow cavities and that the external voltage strength accurately regulates the drug release time.

- Self-Assembly of Supramolecular Polymers from  $\beta$ -Strand Peptidomimetic-Poly(ethylene oxide) Hybrids

Isimjan, T. T.; de Bruyn, J. R.; Gillies, E. R. *Macromolecules* **2010**, *43*, 4453–4459.

Abstract:

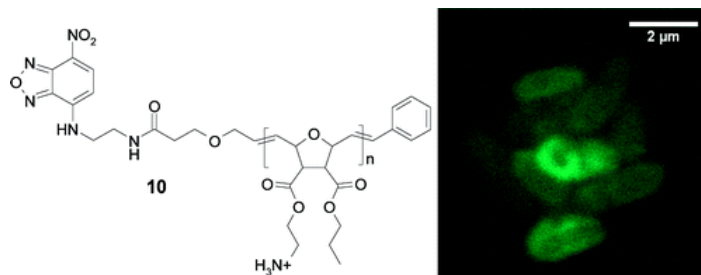


The use of hydrogen-bonding  $\beta$ -strand peptidomimetics for the preparation of supramolecular polymers is described here. The  $\beta$ -strand mimics were selected for their ability to form hydrogen bonds on only one face of the strand, allowing for controlled assembly into linear polymers. Alkyne-functionalized peptidomimetics with the capacity to form either four, six, or eight self-complementary hydrogen bonds were synthesized and conjugated to both termini of low molecular weight (MW)  $\alpha,\omega$ -diazidopoly(ethylene glycol). The assembly of these polymers into higher MW supramolecular polymers was investigated by multiangle light scattering, dynamic light scattering, and circular dichroism. It was found that the eight-hydrogen-bonding system was required for the significant formation of high MW assemblies and that the degree of assembly was dependent on the polymer concentration as well as the solvent. Thus, these peptidomimetics provide a new platform for the development of supramolecular polymers with the promise to tune their properties using functionalities on the amino acid side chains.

- End-Functionalized ROMP Polymers for Biomedical Applications

Madkour, A. E.; Koch, A. H. R.; Lienkamp, K.; Tew, G. N. *Macromolecules* **2010**, *43*, 4557–4561.

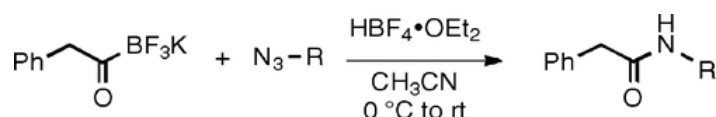
Abstract:



We present two novel allyl-based terminating agents that can be used to end-functionalize living polymer chains obtained by ring-opening metathesis polymerization (ROMP) using Grubbs' third generation catalyst. Both terminating agents can be easily synthesized and yield ROMP polymers with stable, storable activated ester groups at the chain end. These end-functionalized ROMP polymers are attractive building blocks for advanced polymeric materials, especially in the biomedical field. Dye labeling and surface coupling of antimicrobially active polymers using these end-groups were demonstrated.

- Synthesis of an Acyltrifluoroborate and Its Fusion with Azides To Form Amides  
Molander, G. A.; Raushel, J.; Ellis, N. M. *J. Org. Chem.* **2010**, *75*, 4304–4306.

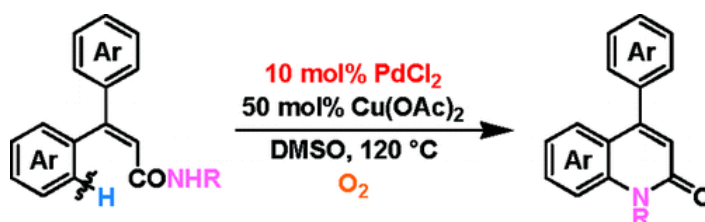
Abstract:



A uniquely stable acyl potassium trifluoroborate, potassium (2-phenylacetyl)trifluoroborate, has been synthesized and isolated. In the presence of an activating Lewis acid, this reagent reacts with azides to form amides in good yields.

- Palladium-Catalyzed Intramolecular Amidation of C(sp<sup>2</sup>)-H Bonds: Synthesis of 4-Aryl-2-quinolinones  
Inamoto, K.; Saito, T.; Hiroya, K.; Doi, T. *J. Org. Chem.* **2010**, *75*, 3900–3903.

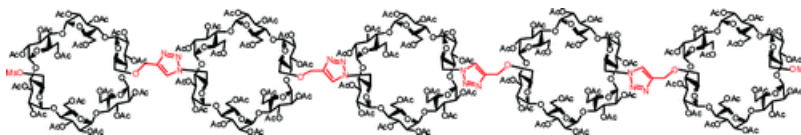
Abstract:



A catalytic synthetic approach for the synthesis of 2-quinolinone compounds through a Pd-catalyzed C(sp<sup>2</sup>)-H functionalization/intramolecular amidation sequence is described. The cyclization process efficiently proceeds in the presence of a catalytic amount of PdCl<sub>2</sub> and Cu(OAc)<sub>2</sub> under an O<sub>2</sub> atmosphere, providing practical access to a range of variously substituted 4-aryl-2-quinolinones.

- Controlled Synthesis of Linear  $\alpha$ -Cyclodextrin Oligomers Using Copper-Catalyzed Huisgen 1,3-Dipolar Cycloaddition  
Rawal, G. K.; Zhang, P.; Ling, C.-C. *Org. Lett.* **2010**, *12*, 3096–3099.

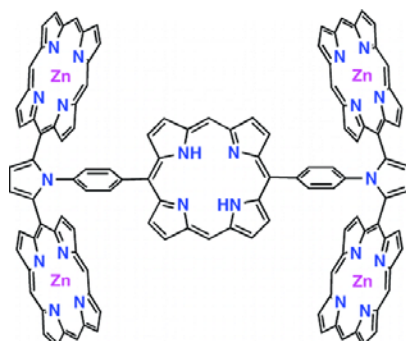
Abstract:



The design and efficient synthesis of a novel class of linear oligomers based on cyclodextrins are described. These supramolecules have relatively rigid structures with well-defined topology and sizes, which could provide them with the ability to be used as scaffolds to present bioactive molecules to their receptors as well as host molecules.

- Synthesis of *meso,meso'*-Pyrrole-Bridged Diporphyrins by Cu(I)-Mediated Annulation  
Maeda, C.; Shinokubo, H.; Osuka, A. *Org. Lett.* **2010**, *12*, 1820–1823.

Abstract :

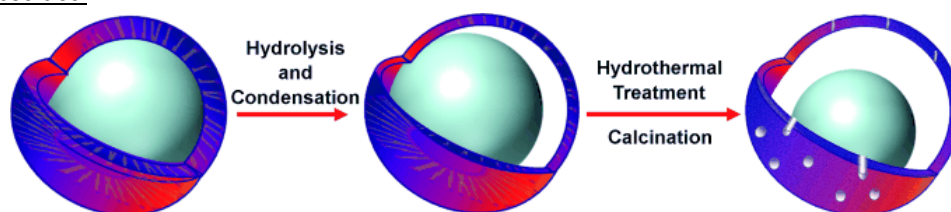


Cu(I)-mediated annulation of *meso,meso'*-1,3-butadiyne-bridged Zn(II) diporphyrin with various amines efficiently provided *meso,meso'*-pyrrole-bridged Zn(II) diporphyrins. Notable intramolecular electronic interactions in these diporphyrins were observed. A starburst porphyrin pentamer was synthesized via Suzuki–Miyaura coupling of *N*-bromophenylpyrrole-bridged diporphyrin and *meso,meso'*-diborylated porphyrin.

- Monodisperse Yolk–Shell Nanoparticles with a Hierarchical Porous Structure for Delivery Vehicles and Nanoreactors

Liu, J.; Qiao, S. Z.; Hartono, S. B.; Lu, G. Q. *Angew. Chem. Int. Ed.* **2010**, *49*, 4981–4985.

Abstract:



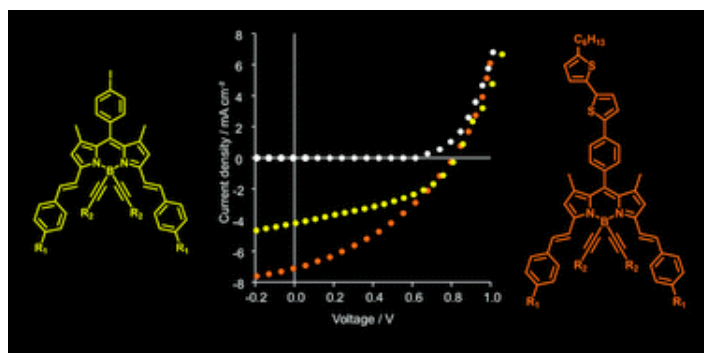
**A good egg:** A general and facile template strategy is presented for the fabrication of yolk-shell structures (see picture) with various types of movable cores, such as gold, SiO<sub>2</sub>, and magnetic Fe<sub>3</sub>O<sub>4</sub>. The vesicle template, formed of a fluorocarbon surfactant, is built up around the core.

- A tailored hybrid BODIPY–oligothiophene donor for molecular bulk heterojunction solar cells with improved performances

Rousseau, T.; Cravino, A.; Ripaud, E.; Leriche, P.; Rihn, S.; De Nicola, A.; Ziessel, R.; Roncali, J. *Chem. Commun.* **2010**, *46*, 5082–5084.

Abstract:



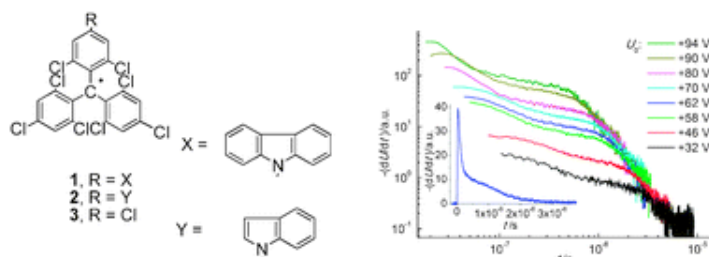


Fixation of a 5-hexyl-2,2-bithienyl unit on a conjugated BODIPY donor increases the conversion efficiency of the resulting molecular bulk heterojunction solar cells from 1.30 to 2.20%.

- Stable radical cores: a key for bipolar charge transport in glass forming carbazole and indole derivatives

Castellanos, S.; Gaidelis, V.; Jankauskas, V.; Grazulevicius, J. V.; Brillas, E.; López-Calahorra, F.; Juliá, L.; Velasco, D. *Chem. Commun.* **2010**, 46, 5130 – 5132.

Abstract:



Stable radical adducts of the TTM series bearing carbazolyl or indolyl fragments show bipolar transport properties with mobility values among the highest detected in glassy small molecules. Bipolarity is attributed to the radical character, while the heterocyclic ring confers the adducts the glassy morphological states and the non-dispersive regimes for charge transport.