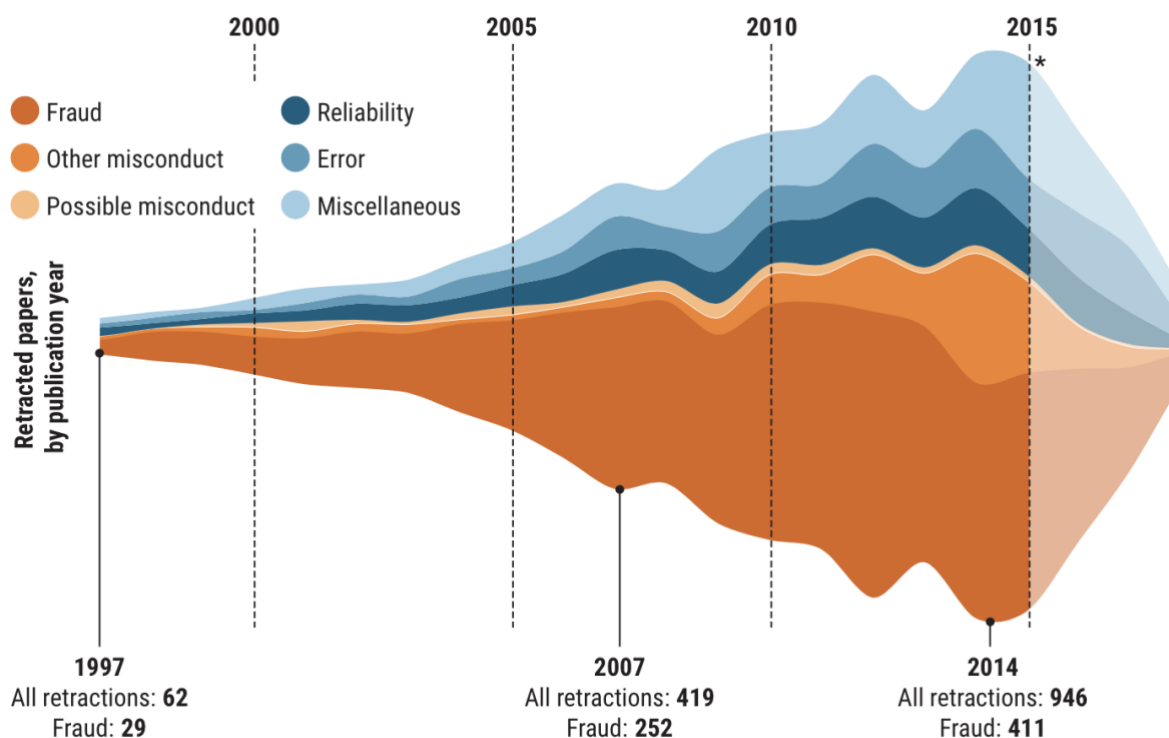


What a Massive Database of Retracted Papers Reveals About Science Publishing's 'Death Penalty'

Brainard, J.*; You, J.* *Science News & Views* 2018.



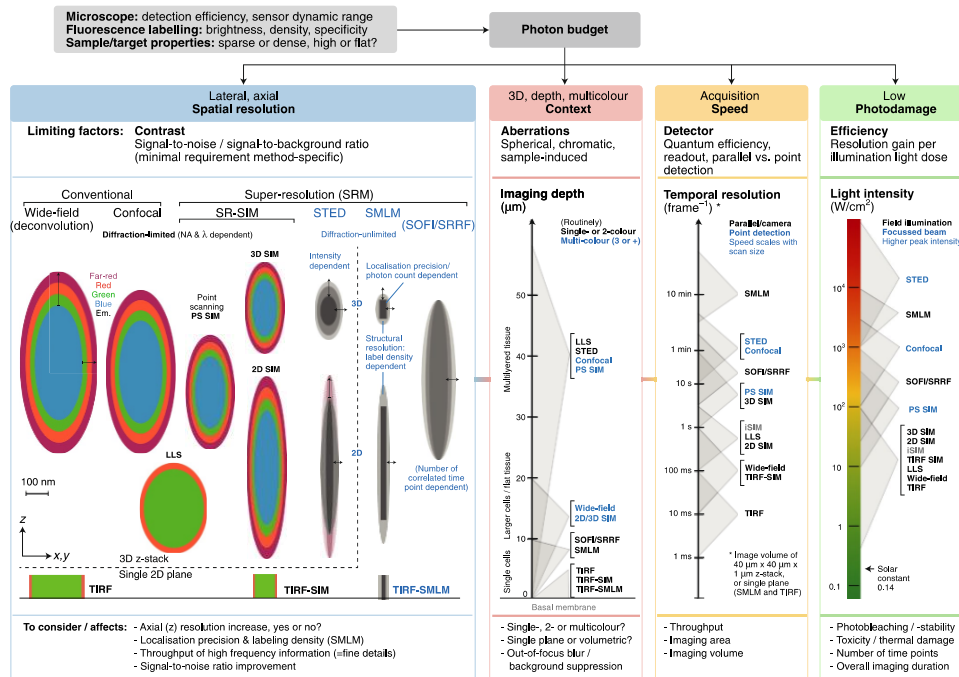
Nearly a decade ago, headlines highlighted a disturbing trend in science: **The number of articles retracted by journals had increased 10-fold during the previous 10 years. Fraud accounted for some 60% of those retractions**; one offender, anesthesiologist Joachim Boldt, had racked up almost 90 retractions after investigators concluded he had fabricated data and committed other ethical violations. Boldt may have even harmed patients by encouraging the adoption of an unproven surgical treatment. Science, it seemed, faced a mushrooming crisis.

The alarming news came with some caveats. Although statistics were sketchy, retractions appeared to be relatively rare, involving only about two of every 10,000 papers. Sometimes the reason for the withdrawal was honest error, not deliberate fraud. And whether suspect papers were becoming more common—or journals were just getting better at recognizing and reporting them—wasn't clear.

Comment: Not really a paper but a series of short articles that analyze trends behind paper retractions. It all has to do with a —recently made publicly available— **database of retracted papers** which you can find [here](#). It is interesting to have a read, notably if you think either that chemistry is based on fake science or if you believe that we are all fully committed to science. If anything, it should made you more aware of the reality of things. Unfortunately, it is science-wise and not chemistry specific. As far as I can tell, in (supramolecular) chemistry we rarely retract papers, even if they are wrong or, indeed, include various degrees of data manipulation (but I have no —real of fake— data to support my claim).

Super-Resolution Microscopy Demystified

Schermelleh, L.*; Ferrand, A.; Huser, T.; Eggeling, C.; Sauer, M.; Biehlmaier, O.; Drummen, G. P. C.* [*Nat. Cell Biol.* 2019, 21, 72.](#)

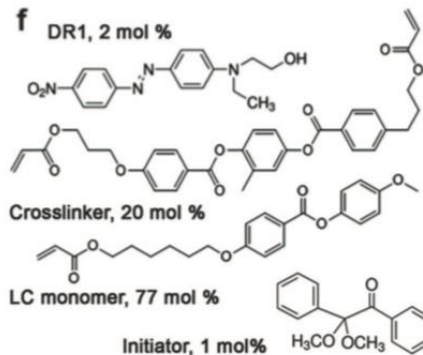


Super-resolution microscopy (SRM) bypasses the diffraction limit, a physical barrier that restricts the optical resolution to roughly 250 nm and was previously thought to be impenetrable. SRM techniques allow the visualization of subcellular organization with unprecedented detail, but also confront biologists with the challenge of selecting the best-suited approach for their particular research question. Here, **we provide guidance on how to use SRM techniques advantageously** for investigating cellular structures and dynamics to promote new discoveries.

Comment: If you have ANY interest in super-resolution microscopy, this is the review to read. Short, concise, clear, with nice pictures, and the best diagram to summarize it all (above) there is. Whereas you need to have some background for enjoying it so much I cannot tell, but I highly recommend it nevertheless.

Light-Driven, Caterpillar-Inspired Miniature Inching Robot

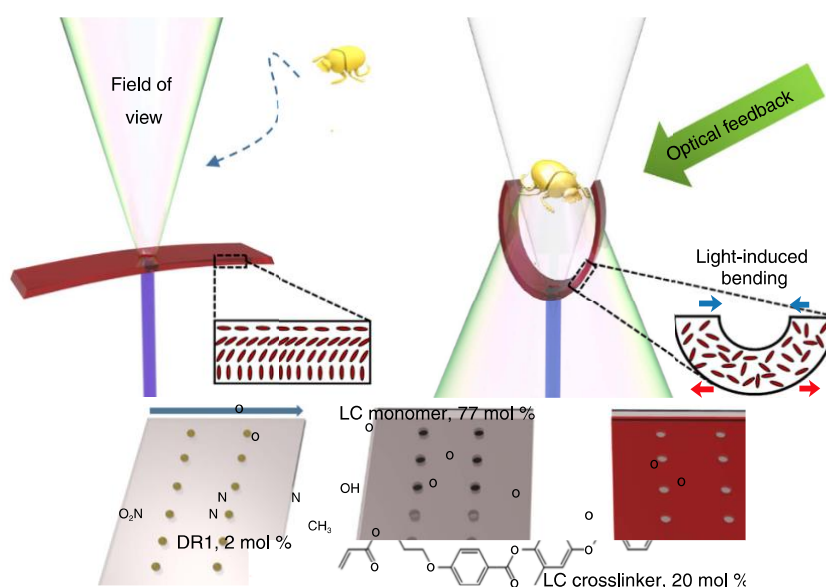
Zeng, H.; Wani, O. M.; Wasylczyk, P.; Priimagi, A.* [*Rapid Commun.* 2018, 39, 1700224](#)



Liquid crystal elastomers are among the best candidates for artificial muscles, and the materials of choice when constructing microscale robotic systems. Recently, significant efforts are dedicated to designing **stimuli-responsive actuators** that can reproduce the **shape-change** of soft bodies of animals by means of proper external energy source. However, transferring material deformation efficiently into autonomous robotic locomotion remains a challenge. This paper reports on a miniature inching robot fabricated from a **monolithic liquid crystal elastomer film**, which upon **visible-light excitation** is capable of mimicking caterpillar locomotion on different substrates like a blazed grating and a paper surface. The motion is driven by spatially uniform visible light with relatively low intensity, rendering the robot “human-friendly,” i.e., operational also on human skin. The design paves the way toward light-driven, soft, mobile microdevices capable of operating in various environments, including the close proximity of humans.

A Light-Driven Artificial Flytrap

Wani, O. M.; Zeng, H.; Priimagi, A.* [Nat. Commun. 2017, 8, 15546](#).

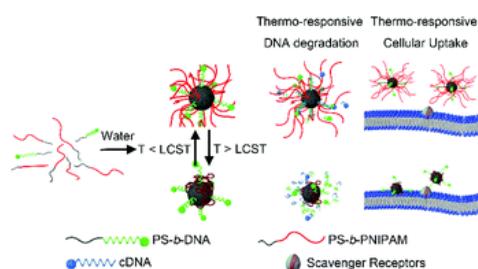


The sophistication, complexity and intelligence of biological systems is a continuous source of inspiration for mankind. Mimicking the natural intelligence to devise tiny systems that are capable of self-regulated, autonomous action to, for example, distinguish different targets, remains among the grand challenges in biomimetic micro-robotics. Herein, we demonstrate an **autonomous soft device**, a **light-driven flytrap**, that uses optical feedback to trigger photomechanical actuation. The design is based on **light-responsive liquid-crystal elastomer**, fabricated onto the tip of an **optical fibre**, which acts as a **power source** and serves as a **contactless probe** that senses the environment. Mimicking natural flytraps, this artificial flytrap is capable of autonomous closure and object recognition. It enables **self-regulated actuation** within the fibre-sized architecture, thus opening up avenues towards soft, autonomous small-scale devices.

Comment: I have to admit that these two articles caught my attention when I was looking for papers related to photoinduced motion in Liquid-Crystal systems. Obviously, those applications are quite worthless for the moment but they remain cleverly designed. I assume that more practical systems will be developed in the future.

A Dynamic DNA Nanostructure with Switchable and Size-Selective Molecular Recognition Properties

Kim, C.-J.; Jeong, E. H.; Lee, H.; Park, S.-J.* *Nanoscale* **2019**, *11*, 2501–2509.

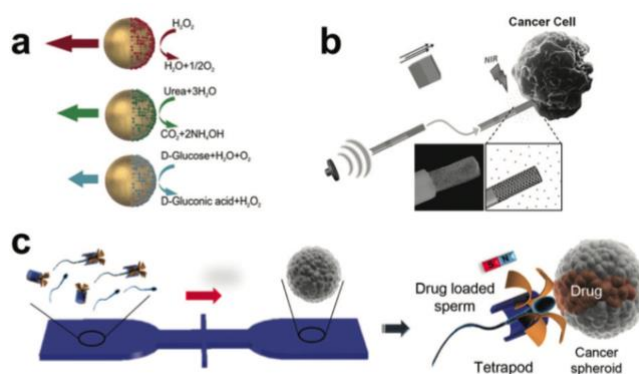


Herein, we report a dynamic DNA nanostructure exhibiting switchable and size-selective molecular recognition properties. A DNA block copolymer, polystyrene-*b*-DNA (PS-*b*-DNA), and a thermo-responsive block copolymer, PS-*b*-poly(*N*-isopropylacrylamide) (PS-*b*-PNIPAM), were simultaneously assembled to form hybrid micelles composed of a PS core and a DNA/PNIPAM corona. PNIPAM strands did not significantly hinder the binding of molecular DNA for a broad range of PNIPAM lengths. On the other hand, they exerted significant steric hindrance for interactions with nanoscale species, which can be reversibly turned off by increasing the temperature above the lower critical solution temperature (LCST) of PNIPAM. Owing to the switchable and size-selective steric hindrance, the hybrid DNA micelles showed thermally controllable enzymatic degradation and cellular uptake. These results demonstrate that the binary self-assembly of two different responsive block copolymers is a promising approach to prepare dynamic nanostructures with controllable biological recognition properties.

Comment: This paper shows that the molecular recognition properties of DNA in such hybrid micelles can be switched on and off exploiting the thermo-responsiveness of PNIPAM polymer. The interaction of the micelles with various system including molecular DNA, gold nanoparticles modified with DNA¹ and receptors on cell surface were studied in function of the length of the polymer and the temperature. The authors mention that such DNA nanostructures should be useful for developing smart delivery systems.

Micro/Nanomachines: What Is Needed for Them to Become a Real Force in Cancer Therapy?

Reinišová, L.; Hermanová, S.; Pumera, M.* *Nanoscale* **2019**, *15*, 81.

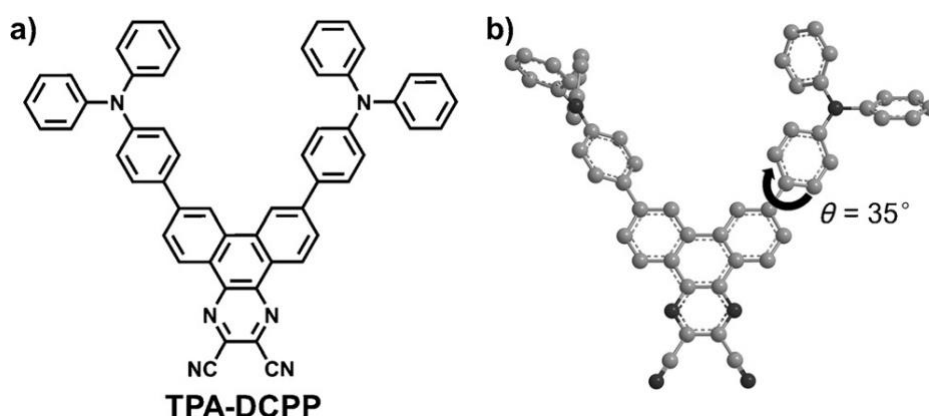


Conventional drug delivery systems face several issues in medical applications, such as cyto/genotoxicity and off-targeting. These issues are particularly significant for cancer therapeutics because many of the currently used systems are toxic in their free form. Self-propelled autonomous micro/nanomachines offer promising alternative drug delivery systems based on high cargo loading, fast autonomous movement, precise targeting and the on-demand release of therapeutics in vivo. With this unique set of properties, it is not surprising that they are receiving considerable research attention. However, much less is reported about the drawbacks that hinder their systemic in vivo application. In this review, a biomedical perspective is used to assess micro/nanomotor-based anticancer drug delivery systems reported to date. Advantages along with present issues are highlighted and recommendations which need to be considered to develop an effective biocompatible micro/nanomotor-based delivery system for cancer therapy are discussed.

Comment: A recent review discussing the highlights and issues of various micro/nanomotor-based delivery systems for cancer therapy.

Highly Efficient Near-Infrared Delayed Fluorescence Organic Light Emitting Diodes Using a Phenanthrene-Based Charge-Transfer Compound

Wang, S.; Yan, X.; Cheng, Z.; Zhang, H.; Liu, Y.; Wang, Y.* *Angew. Chem. Int. Ed.* **2015**, *54*, 13068–13072.

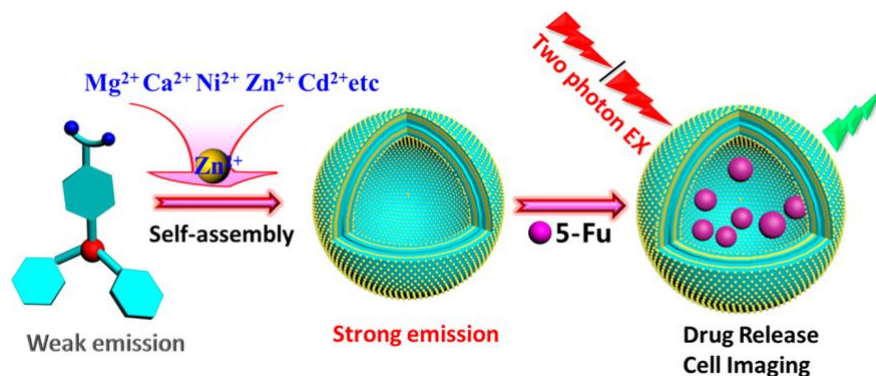


Significant efforts have been made to develop high efficiency organic light-emitting diodes (OLEDs) employing thermally activated delayed fluorescence (TADF) emitters with blue, green, yellow, and orange-red colors. However, efficient TADF materials with colors ranging from red, to deep-red, to near-infrared (NIR) have been rarely reported owing to the difficulty in molecular design. Herein, we report the first NIR TADF molecule TPA-DCPP (TPA=triphenylamine; DCPP=2,3-dicyanopyrazino phenanthrene) which has a small singlet-triplet splitting (DEST) of 0.13 eV. Its nondoped OLED device exhibits a maximum external quantum efficiency (EQE) of 2.1% with a Commission International de L'Éclairage (CIE) coordinate of (0.70, 0.29). Moreover, an extremely high EQE of nearly 10% with an emission band at $\lambda = 668$ nm has been achieved in the doped device, which is comparable to the most-efficient deep-red/NIR phosphorescent OLEDs with similar electroluminescent spectra.

Comment: The authors report the development of an OLED device employing TPA-DCPP as a non-doped emitter which exhibits a maximum EQE of 2.1% with CIE coordinates of (0.70, 0.29), which is among the highest values reported for non-doped NIR FOLEDs.

Multifunctional Metallo-Organic Vesicles Displaying Aggregation-Induced Emission: Two-Photon Cell-Imaging, Drug Delivery, and Specific Detection of Zinc Ion

Wei, Y.; Wang, L.; Huang, J.; Zhao, J.; Yan, Y.* *ACS Appl. Nano Mater.* **2018**, *1*, 1819-1827.

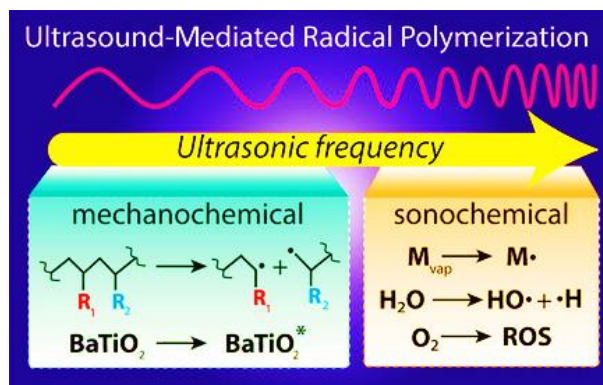


Molecules displaying aggregation-induced emission (AIE) property can hardly self-assemble into vesicles desired in design of theranostics. We report the formation of metallo-organic AIE vesicles with triarylamine carboxylate (TPA-1) and Zn^{2+} ions. TPA-1 shows a great binding affinity to Zn^{2+} as a fluorescence turn-on sensor. The vesicles exhibited high fluorescence-emission property under two-photon mode which endows them very good cell imaging ability. Drug-loading experiments suggest a loading capacity for the model anticancer drug 5-fluorouracil (5-Fu) can reach up to 53.4%, and sustained release of the drug is possible in biological environment. This is the first report of supramolecular coordination fluorescent vesicles based on AIE molecule. Further study reveals the fluorescence enhancement of TPA-1 can only be triggered by Zn^{2+} , suggesting the ability of specific detection of Zn^{2+} . This study indicates that the formation of metallo-organic vesicles can be a multiplatform for cell-imaging, drug carrier, and metal ions detection.

Comment: A nice example of a chemosensor obtained by taking advantage from the good self-assembly and AIE properties of triarylamine.

Ultrasound and Sonochemistry for Radical Polymerization: Sound Synthesis

McKenzie, T. G.; Karimi, F.; Ashokkumar, M.*; Qiao, G.* *Chem. Eur. J.* **2019**, *25*, 1–18

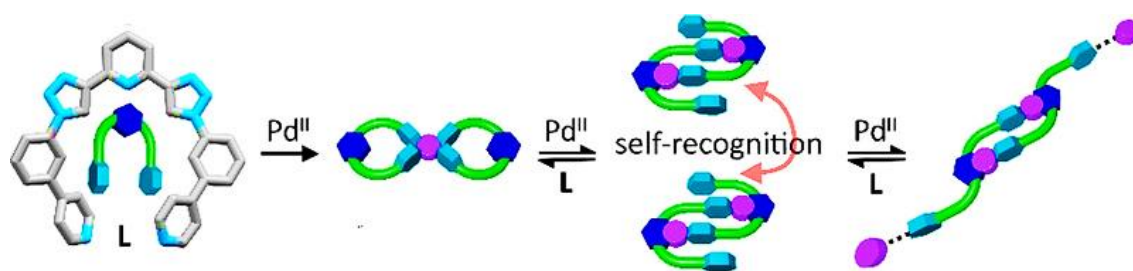


The use of ultrasound as an external stimulus for promoting polymerization reactions has received increasing attention in recent years. In this Review article, the fundamental processes that can lead to either the homolytic cleavage of polymer chains, or the sonolysis of solvent (or other) small molecules, under the application of ultrasound are described. **These reactions promote the production of reactive radicals, which can be utilized in chain-growth radical polymerizations under the right conditions.** A full historical overview of the development of ultrasound-assisted radical polymerization is provided, with special attention given to the recently described systems that are “controlled” by methods of reversible (radical) deactivation. Perspectives are shared on what challenges still remain in polymer sonochemistry, as well as new areas that are yet to be explored.

Comment: This review presents several examples of ultrasound-triggered radical polymerization showing the practicality of ultrasound as a synthetic tool. Also, they describe each of the phenomena that occur during ultrasound-induced radical polymerization.

Reversible Transformation between a $[\text{PdL}_2]^{2+}$ “Figure-of-Eight” Complex and a $[\text{Pd}_2\text{L}_2]^{4+}$ Dimer: Switching On and Off Self-Recognition

Preston, D.;* Kruger, P. E. *Chem. Eur. J.* **2019**, *25*,1781–1786

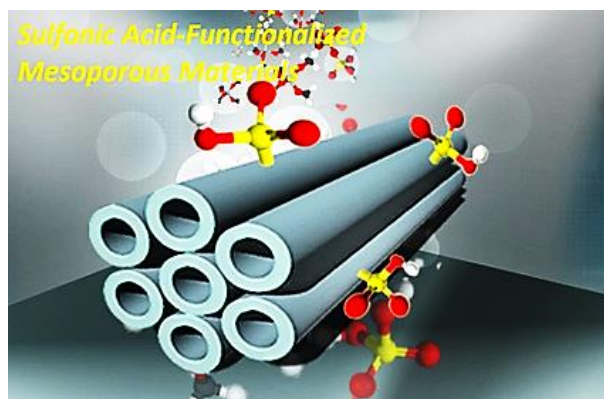


Structural changes to metallocupramolecular assemblies resulting in the release or uptake of guests are currently well established, whereas transformations turning on and off specific self-recognition are far less developed. We report a novel ligand (2,6-bis(1-(3-pyridin-4-yl)phenyl)-1*H*-1,2,3-triazol-4-yl)pyridine) possessing a tridentate central metal-binding site flanked by two pendant pyridyl arms. In a 2:1 ratio with Pd^{II} metal ions, a spiro-type $[\text{PdL}_2]^{2+}$ “Figure-of-eight” complex forms with the central tridentate binding pocket unoccupied. The introduction of an additional one equivalent of Pd^{II} metal ion results in the conversion to a dimeric $[\text{Pd}_2\text{L}_2]^{4+}$ molecule with the tridentate pocket occupied. There is site-specific self-recognition between dimers in solution with strong NOE peaks between adjacent molecules. The self-recognition between dimers can be turned off in two ways: firstly, adding another equivalent of Pd^{II} metal ion brings about binding to the previously uncoordinated pyridyl arms that are key to the self-recognition event, and; secondly, addition of sufficient ligand to return the stoichiometry to 2:1 regenerates the $[\text{PdL}_2]^{2+}$ complex. Hence, the self-recognition event can be turned on or off through simple variation of L: Pd^{II} stoichiometry.

Comment: This article shows the self-recognition between homo-structural components in a system by stoichiometrically-controlled architectural transformation. Despite the authors not being able to obtain suitable crystals for X-ray diffraction, they drew upon into other techniques like 2D NMR experiments and molecular modelling to support the self-recognition of different molecules of $[\text{Pd}_2\text{L}_2]^{4+}$.

Development of Sulfonic-Acid-Functionalized Mesoporous Materials: Synthesis and Catalytic Applications

Doustkhah, E.; Lin, J.; Rostamnia, S.*; Len, C.; Luque, R.*; Luo, X.; Bando, Y.; Wu, K. C-W.; Kim, J.; Yamauchi, Y.*; Ide, Y.* [*Chem. Eur. J.* **2019**, *25*,1614–1635](#)



Sulfonic Acid based MesoStructures (SAMs) have been developed in recent years and have important catalytic applications. **The primary applications of these materials are in various organic synthesis reactions, such as multicomponent reactions, carbon–carbon bond couplings, protection reactions, and Fries and Beckman rearrangements.** This review aims to provide an overview of the recent developments in the field of SAMs with a particular emphasis on the reaction scope and advantages of heterogeneous solid acid catalysts.

Comment: I think this review is interesting from the point of view of learning a bit about heterogeneous catalysts in organic synthesis. These sulfonic acid-based mesostructures that have promising applications as solid-state Bronsted-acid catalysts in several organic transformations, which is due to the sulfonic acid functionalities on the surface of the mesopores of these materials.

Bioinspired Microrobots

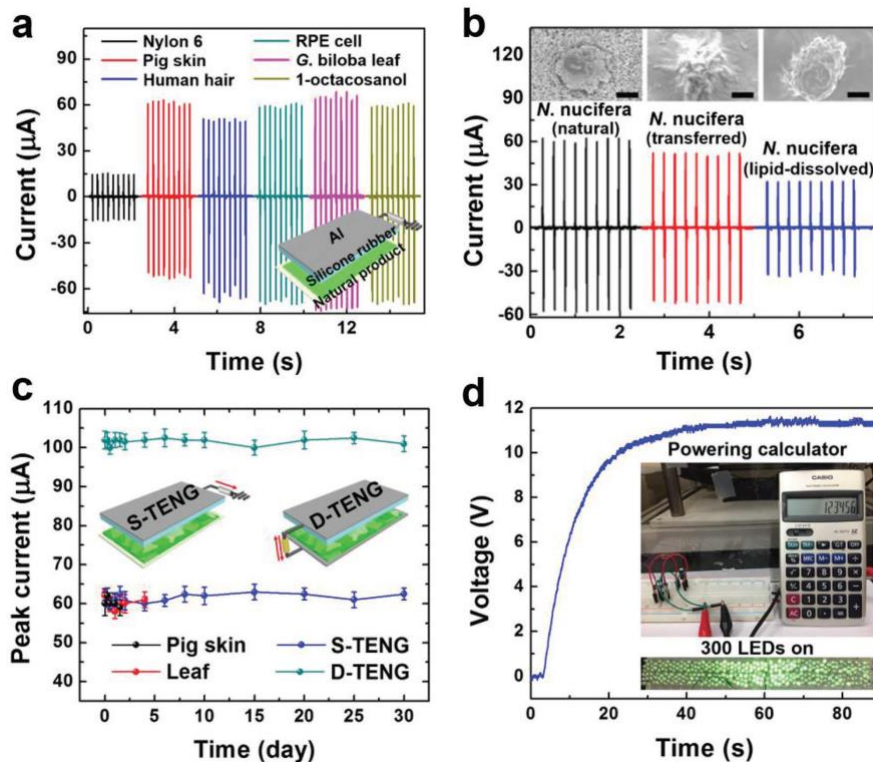
Palagi, S.*; Fischer, P.* [*Nat. Rev. Mater.* **2018**, *3*, 113–124.](#)

Microorganisms can move in complex media, respond to the environment and self-organize. The field of microrobotics strives to achieve these functions in mobile robotic systems of sub-millimetre size. However, miniaturization of traditional robots and their control systems to the microscale is not a viable approach. A promising alternative strategy in developing microrobots is to implement sensing, actuation and control directly in the materials, thereby mimicking biological matter. In this Review, we discuss **design principles** and **materials** for the **implementation of robotic functionalities in microrobots**. We examine different **biological locomotion strategies**, and we discuss how they can **be artificially recreated** in magnetic microrobots and how soft materials improve control and performance. We show that smart, stimuli-responsive materials can act as on-board sensors and actuators and that ‘active matter’ enables autonomous motion, navigation and collective behaviours. Finally, we provide a critical outlook for the field of microrobotics and highlight the challenges that need to be overcome to realize sophisticated microrobots, which one day might rival biological machines.

Comment: This small review is just another paper related to photoactivated Liquid-Crystals but not only, since a wide range of systems are presented. I know it is really different from what is done in our team, but I have always found these kind of applications quite intriguing.

Lipids: Source of Static Electricity of Regenerative Natural Substances and Nondestructive Energy Harvesting

Kim, D. W.; Kim, S. W.; Jeong U.* *Adv. Mater.* **2018**, *30*, 1804949

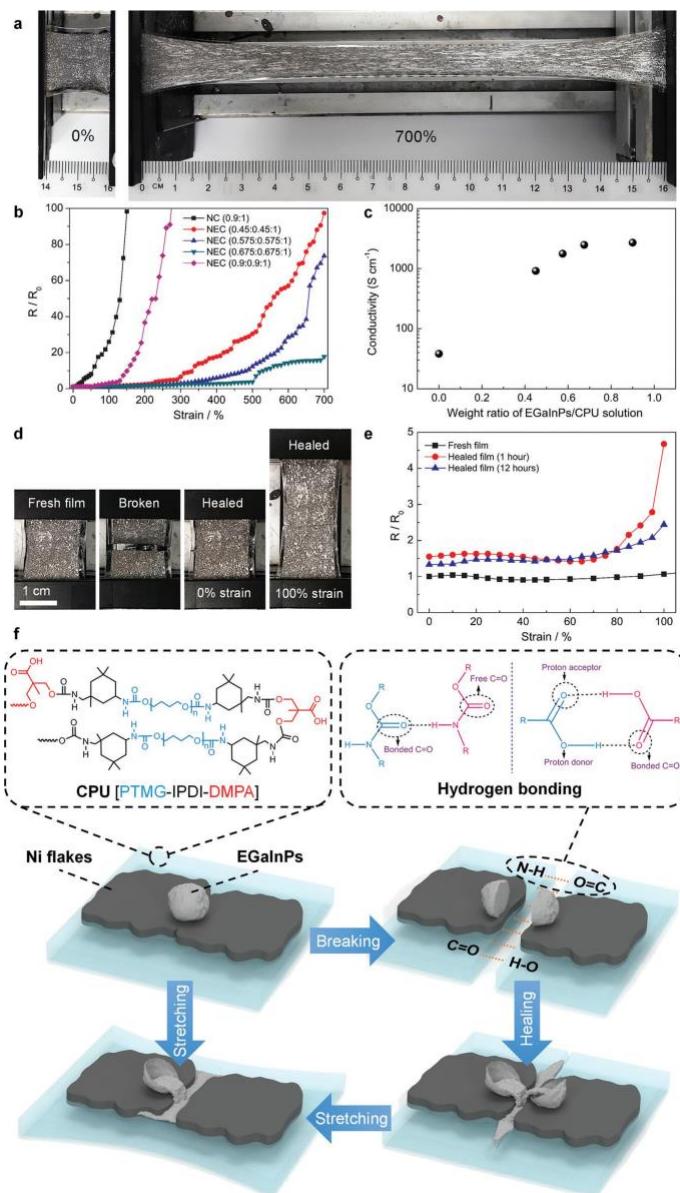


It is familiar to everyone that human skin and hair easily lose electrons and cause **static electricity** as they undergo friction with other materials. Such natural regenerative substances take a high ranking in the triboelectric series. Even though the static electricity of regenerative natural substances has been a long-term curiosity in human history, it is not yet clear which of their components causes the positive static charges. This study reveals that **lipid layers** on the surface of regenerative substances (skin, hair, leaves, cells) and even synthetic lipids are **responsible for this positive static electricity** and shows that it is possible to **manufacture lipid-based triboelectric nanogenerators (TENGs)**. Using the characteristic that lipids on leaves regenerate within a few hours, lipids from living tree leaves are collected, and lipid-based nondestructive TENGs are fabricated. The concept of energy-harvesting vines is also presented, which can generate electricity when they are wrapped loosely on living tree branches. This study suggests how to harvest electricity while preserving nature as it is.

Comment: Welcome to the Matrix! It is presented here an amazing way to produce electricity: harvest static electricity. Using leaves as positive plates of condensers one can collect electricity wrapping electrodes over tree branches and waiting for the wind to move the leaves...

A Stretchable and Self-Healing Energy Storage Device Based on Mechanically and Electrically Restorative Liquid-Metal Particles and Carboxylated Polyurethane Composites

Park, S.; Thangavel, G.; Parida, K.; Li, S.; Lee, P. S.* *Adv. Mater.* 2019, 31, 1805536



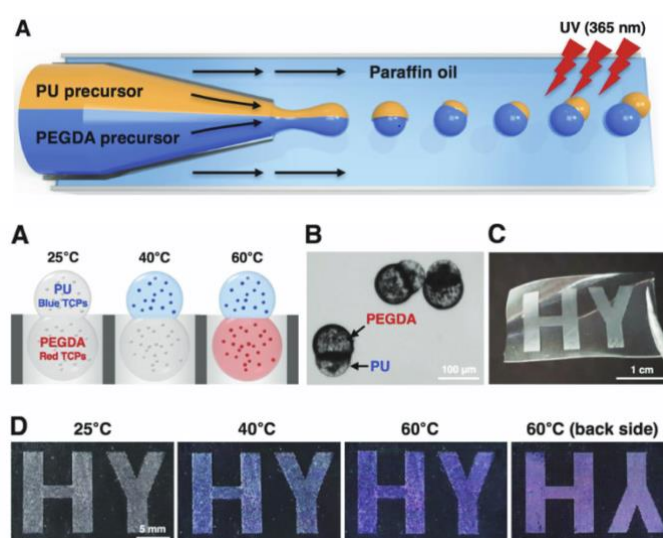
Stretchable and self-healing (SH) energy storage devices are indispensable elements in energy-autonomous electronic skin. However, the current collectors are not self-healable nor intrinsically stretchable, they mostly rely on strain-accommodating structures that require complex processing, are often limited in stretchability, and suffer from low device packing density and fragility. Here, an SH conductor comprising nickel flakes, eutectic gallium indium particles (EGaInPs), and carboxylated polyurethane (CPU) is presented. An energy storage device is constructed by the two SH electrodes assembled with graphene nanoplatelets sandwiching an ionic-liquid electrolyte. An excellent electrochemical healability (94% capacity retention upon restretching at 100% after healing from bifurcation) is unveiled, stemming from the complexation modulated redox behavior of EGaIn in the presence of the ligand bis(trifluoromethanesulfonyl)imide, which enhances the reversible Faradaic reaction of Ga. Self-healing can be achieved where the damaged regions are electrically restored by the flow of liquid metal and mechanically healing activated by the interfacial

hydrogen bonding of CPU with an efficiency of 97.5% can be achieved. The SH conductor has an initial conductivity of 2479 S cm^{-1} that attains a high stretchability with 700% strain, it restores 100% stretchability even after breaking/healing with the electrical healing efficiency of 75%.

Comment: The application field of self-healable materials is not limited to soft materials such as rubber. It is reported here an application of self-healing (SH) materials in composites for electronic devices and energy storage. The SH process relies on hydrogen bonds (PU) and the release of the content of a capsule that seal the edges. This process is similar to organic healing where the liquid metal is replaced by a polymer precursor.

Colloidal Pixel-Based Micropatterning Using Uniform Janus Microparticles with Tunable Anisotropic Particle Geometry

Han, S. W.; Choi, S. E.; Chang, D. H.; Lee, D.; Kim, B.; Yang, H.; Kim, J. W.* *Adv. Funct. Mater.* **2019**, *29*, 180539

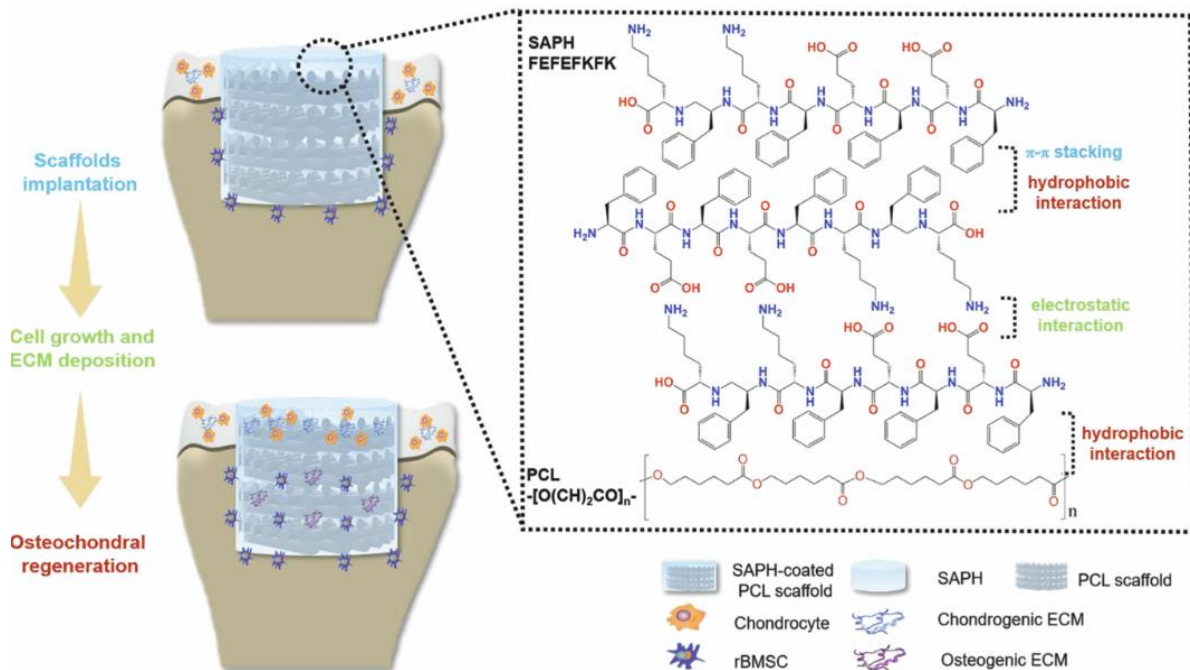


A new platform for designing 2D colloidal arrays by using **Janus microparticles (JMPs)** with tunable anisotropic particle geometry is introduced. The JMPs are synthesized by the **photopolymerization of biphasic emulsion droplets** produced by capillary-based microfluidics while adjusting the spreading coefficient between -4.4 and $-7.2 \text{ mN}^*\text{m}^{-1}$. The unidirectional rubbing of JMPs leads to their exact positioning in the stencil holes. The ratio of the hole diameter to the bigger bulb diameter of JMPs, ranging from 1.05–1.16, is critical for maximizing the positioning rate. When the anisotropic geometry factor is near zero, a standing particle configuration with a protrusion in the stencil hole is obtained more efficiently due mainly to the enhanced steric constraint. Finally, it is demonstrated that different types of JMPs with controlled sizes and geometries can be arrayed at specific hole sites of the stencil, thus enabling development of a colloidal pixel-based micropatterning technology.

Comment: After reading this paper, you will have obtained a lot of knowledge on material sciences.

3D Molecularly Functionalized Cell-Free Biomimetic Scaffolds for Osteochondral Regeneration

Li, L.; Li, J.; Guo, J.; Zhang, H.; Zhang, X.; Yin, C.; Wang, L.; Zhu, Y.; Yao, Q.* *Adv. Funct. Mater.* **2019**, *29*, 1807356



Clinically, cartilage damage is frequently accompanied with subchondral bone injuries caused by disease or trauma. However, the construction of biomimetic scaffolds to support both cartilage and subchondral bone regeneration remains a great challenge. Herein, a novel strategy is adopted to realize the **simultaneous repair of osteochondral defects** by employing a **self-assembling peptide hydrogel (SAPH) FEFEFKFK** (F, phenylalanine; E, glutamic acid; K, lysine) to coat onto 3D-printed polycaprolactone (PCL) scaffolds. Results show that the SAPH-coated PCL scaffolds exhibit highly improved hydrophilicity and biomimetic extracellular matrix (ECM) structures compared to PCL scaffolds. In vitro experiments demonstrate that the SAPH-coated PCL scaffolds promote the proliferation and osteogenic differentiation of rabbit bone mesenchymal stem cells (rBMSCs) and maintain the chondrocyte phenotypes. Furthermore, 3% SAPH-coated PCL scaffolds significantly induce simultaneous regeneration of cartilage and subchondral bone after 8- and 12-week implantation in vivo, respectively. Mechanistically, by virtue of the enhanced deposition of ECM in SAPH-coated PCL scaffolds, SAPH with increased stiffness facilitates and remodels the microenvironment around osteochondral defects, which may favor simultaneous dual tissue regeneration. These findings indicate that the **3% SAPH provides efficient and reliable modification on PCL scaffolds** and SAPH-coated PCL scaffolds appear to be a promising biomaterial for osteochondral defect repair.

Comment: This paper introduces a small peptide chain that promotes osteochondral regeneration and thus the advancement of biomimetic material.