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LE MOT DE LA PRÉSIDENTE

Chères adhérentes et chers adhérents,

Malgré une fin de printemps et un été caniculaires, ce premier semestre 2026 a été riche en événements scientifiques pour notre communauté. Fin mai, nous étions plus d'une centaine à Marseille pour les [journées de chimie supramoléculaire](#). Ce fut l'occasion pour de nombreux jeunes chercheurs, doctorants et post-doctorants de nous présenter les dernières avancées de leurs travaux de recherche. Lors de ce colloque, nous avons également annoncé les quatre lauréats des prix 2026 décernés par notre groupe thématique : Prof. Ivan Huc pour le prix André Collet, Prof. Alexandre Martinez pour le prix Henry Le Chatelier, Dr. Mathieu Raynal pour le prix Christiane Dietrich-Buchecker et Dr. Louis Hardoin pour le prix de thèse, soutenue en 2025 au laboratoire MOLTECH-Anjou sous la direction des Prof. David Canevet et Marc Sallé. Vous pourrez retrouver leur biographie dans cette gazette et aurez l'opportunité de découvrir plus précisément leurs travaux lors de notre congrès international Supr@Angers qui se tiendra du 25 au 28 mai 2027. Cette gazette est également l'occasion de faire le point sur deux colloques internationaux organisés cet été par des membres de notre groupe : [ISMSC-2026](#) à Bordeaux et [PEMM-2026](#) à Lyon.

Retrouvez également vos rubriques habituelles : « Un point sur... » où Clément Falaise, lauréat 2024 du prix Christiane Dietrich-Buchecker, nous propose un article synthétique sur l'effet chaotrope et « À la rencontre de... » qui dresse le portrait de Claire Kammerer, maître de conférences depuis 2012 à l'université de Toulouse dans le laboratoire CEMES. Et ne manquez pas « Notre sélection d'articles » publiés au cours des 6 derniers mois par nos sociétaires.

Je souhaitais enfin vous informer de la création de notre page [LinkedIn](#). N'hésitez pas à vous abonner pour suivre les dernières actualités du groupe.

Au nom des membres du bureau, je vous souhaite une bonne rentrée universitaire et une bonne lecture de notre gazette !

Bien cordialement,

Émilie Moulin, Présidente du Groupe Supr@SCF



ACTUALITÉS RÉCENTES

PEMM - 2026

4th International Symposium on Photonic and Electronic Molecular Machines

La quatrième édition du Symposium International sur les Machines Moléculaires Photoniques et Electroniques ([PEMM-2026](#)) s'est tenue à l'ENS de Lyon du 13 au 16 juillet 2026. Cet événement a rassemblé près de 110 personnes (participants, représentants institutionnels et accompagnateurs) en provenance de 26 pays (55% de France et 45% internationaux : Japon, Italie, Espagne, Pays-Bas, Allemagne, Belgique...). Le comité d'organisation était composé de sept membres du Laboratoire de Chimie (ENS de Lyon), trois membres de l'Institut Lumière Matière (Lyon 1 Université) et du directeur du GDR NEMO (CNRS). Le programme scientifique, réparti sur six demi-journées, était très riche avec deux conférences plénières, 13 conférences invitées, 29 communications orales, 8 communications flashes et 23 présentations par affiches.



Nous avons eu l'honneur d'accueillir deux conférenciers prestigieux lors de cette édition du PEMM : Harry ANDERSON (Université d'Oxford, Angleterre) qui a présenté des résultats impressionnants sur la synthèse et l'étude de plusieurs fils moléculaires linéaires et cycliques à base de porphyrines, en mettant l'accent sur la compréhension de la délocalisation électronique dans les chaînes plus longues et les cycles plus grands ; Alberto CREDI (Université de Bologne, Italie) qui a décrit le fonctionnement hors équilibre, piloté par la lumière, de pompes ou de moteurs moléculaires artificiels et notamment d'un moteur rotatif capable d'inverser le sens de rotation privilégié lorsque la couleur de la lumière change. Treize conférenciers invités ont également présenté leurs travaux pendant les quatre jours du symposium : Emily DRAPER (Université de Glasgow, Ecosse) ; Joanna JANKOWSKA (Université de Varsovie, Pologne) ; Shigeki KAWAI (NIMS Tsukuba, Japon) ; Tsuyoshi KAWAI (NAIST Nara, Japon) ; Kunal MALI (KU Leuven, Belgique) ; Kenji MATSUDA (Kyoto University, Japon) ; Emilie MOULIN (Université de Strasbourg, France) ; Christian NIJHUIS (Université de Twente, Pays-Bas) ; Gwénaél RAPENNE (Université de Toulouse, France/NAIST Nara, Japon) ; Latha VENKATARAMAN (Columbia University, USA/ISTA Vienne, Autriche) ; Guillaume VIVES (Sorbonne Université, France) ; Hiroko YAMADA (Kyoto University, Japon) ; Kazuma YASUHARA (NAIST Nara, Japon).



Par ailleurs, de nombreuses communications ont été réservées à de jeunes chercheurs pour leur donner l'opportunité de présenter leurs travaux à la communauté des machines moléculaires. En effet, plus de 50% des communications orales ont été présentées par des doctorants ou des post-doctorants et huit présentations flashes ont permis à des étudiants de mettre en avant leur poster présenté plus tard lors du symposium. Les discussions et le partage scientifique se sont poursuivis au cours du cocktail de bienvenue,

des différentes pauses café et pendant les deux sessions de posters organisées au fil des quatre jours du symposium.

Trois prix sponsorisés par ChemistryEurope, conjointement avec le PEPR LUMA, le GDR NEMO et le GDR NS-CPU, ont été remis à de jeunes chercheurs pour leur présentation par affiche lors du PEMM-2026 : le prix *ChemPhotoChem* a été décerné par le PEPR LUMA à Nico Groß (Friedrich-Alexander-Universität, Allemagne) ; le prix *ChemElectroChem* a été décerné par le GDR NEMO à Edoardo Bartolini (Université de Strasbourg, France) ; le prix *Chem. Eur. J.* a été décerné par le GDR NS-CPU à Claire Laury (ENS de Lyon, France).

Félicitations à tous !



L'un des points forts du PEMM-2026, salué par bon nombre de participants, a résidé dans la cohérence scientifique des différentes présentations proposées par les intervenants malgré la grande diversité thématique des sujets abordés incluant notamment les domaines suivants : moteurs moléculaires, rotors, engrenages, pinces : conception et propriétés ; molécules ou matériaux photochromes et électrochromes ; auto-assemblage réactif et architectures supramoléculaires ; électronique moléculaire : jonctions, mémoires et commutateurs ; électronique organique, optoélectronique et photonique : matériaux et dispositifs ; approches bio-inspirées et dispositifs biomimétiques ; matériaux 2D, nanotubes et nanofils ; microscopies en champ proche ; modélisation théorique.

Le dîner de gala du symposium s'est quant à lui tenu le 14 juillet 2026 de 19h30 à 23h30 au Théâtre L'île Ô, théâtre flottant amarré au quai du Rhône. A l'occasion de cette soirée, la compagnie des *Cieux Galvanisés* a présenté le spectacle « Cuivre et Caoutchouc ». S'en est suivi un cocktail dinatoire puis une fin de soirée sur le toit-terrasse offrant une vue privilégiée sur la basilique de Fourvière et le feu d'artifice du 14 juillet.



Le comité d'organisation tient à remercier chaleureusement les bénévoles qui ont contribué à l'organisation de PEMM-2026, les sponsors et les institutions académiques pour leur soutien financier ou logistique et enfin tous les participants pour ces moments d'échanges scientifiques et humains qui ont renforcé les liens entre des chercheurs de générations et d'origines diverses. Votre présence et votre enthousiasme ont clairement montré que les machines moléculaires représentent un domaine de recherche très dynamique et interdisciplinaire se situant à l'interface de la chimie, de la biologie, de la photophysique et de l'électronique.

Merci à tous pour vos contributions et pour avoir fait du PEMM-2026 un moment aussi convivial... Nous vous donnons rendez-vous pour la cinquième édition du Symposium International sur les Machines Moléculaires Photoniques et Électroniques qui se tiendra à Kyoto au Japon du 28 au 30 août 2028 !

Le comité d'organisation du PEMM-2026,

Denis FRATH (LCH, ENS de Lyon, CNRS) ; Pascal MARTIN (ITODYS, Université Paris Cité) ; Laure GUY (LCH, ENS de Lyon), Josene TOLDO (LCH, Lyon 1 Université), Alla LEMEUNE (LCH, ENS de Lyon, CNRS), Floris CHEVALLIER (LCH, ENS de Lyon), Maëlys MUNSCH (LCH, ENS de Lyon), Christophe BUCHER (LCH, ENS de Lyon, CNRS), Stéphan GUY (ILM, Lyon 1 Université), Bruno BAGUENARD (ILM, Lyon 1 Université), Amina BENSALAH-LEDOUX (ILM, Lyon 1 Université, CNRS)

Les Journées de Chimie Supramoléculaire (JCS) 2026

Les 28 et 29 mai 2026 s'est tenue la quatrième édition des « Journées de Chimie Supramoléculaire » à Marseille sur le site exceptionnel du jardin du Pharo à côté du Vieux-Port. Évènement important de la chimie supramoléculaire française, ce congrès national étalé sur 2 jours a permis de regrouper une centaine de participants issus de 33 laboratoires et de 9 pays pour échanger sur les dernières avancées du domaine.



A cette occasion, quatre invités prestigieux ont fait découvrir leurs derniers résultats par des conférences plénières : Michael Hardy (University of Leeds) sur la chimie des Cyclotrivratriylènes pour réaliser des supercages métal-ligand, Hennie Valkenier-van Dijk (Université Libre de Bruxelles) sur le transport supramoléculaire d'anions, Mihail Barboiu (Université de Montpellier, *récipiendaire du prix André Collet*), sur des aquaporines artificielles pour des membranes de dessalement de l'eau, et Nicolas Giuseppone (Université de Strasbourg, *récipiendaire du prix Henri le Chatelier*), pour ses avancées dans le domaine des machines moléculaires. Vivien Andrieux, vient compléter la liste des récipiendaires de prix par l'obtention du prix de thèse Supr@SCF, pour ses travaux sur des auto-assemblages de viologènes électro-stimulés.



Le programme a été complété par douze communications orales et quatorze flash comm', offrant aux chercheur(e)s expérimenté(e)s, jeunes permanent(e)s, postdoctorant(e)s et doctorant(e)s l'opportunité de présenter leurs activités de recherche couvrant tous les domaines de la chimie supramoléculaire : assemblages macro-architecturaux, organocatalyse énantiosélective, cages métal-ligands, transports photo-contrôlés, pièges sélectifs d'ions, optoélectronique auto-assemblée, gels électro-contrôlés ou encore encapsulation de catalyseurs).

La quatrième édition des Journées de Chimie

Supramoléculaire a été une occasion unique de rassembler les chercheurs de notre communauté et multiplier les discussions dans la salle des voûtes qui a accueilli les sessions posters et le cocktail dinatoire de la soirée du 28 mai.



Grâce à la générosité de ChemistryEurope, Louise Mitton (University of Jyväskylä) a été récompensée du prix de la meilleure communication orale pour son travail sur le contrôle d'assemblages triple hélice. Lucrezia Trevisan (Université de Rennes) a reçu le prix de la meilleure communication flash pour son étude de supra-polymères de tétrazine. Les prix des meilleurs posters ont été décernés à Marion Brobecker (Université de Strasbourg) et Jennifer Bou Zeid (Université de Caen).

Enfin Sébastien Goeb et David Canevet ont annoncé le congrès triennal de la SCF-Supra Supr@Angers en 2027 !

Un grand merci à tous les étudiants qui ont participé à l'organisation ainsi qu'à nos sponsors pour leur soutien financier et à tous les participants pour de beaux moments d'échanges autour de notre passion commune.

David Bardelang (au nom du comité d'organisation) : Anne-Doriane Manick, Maylis Orio, Cédric Colombar, Yoann Cotellet, Anthony Kermagoret, David Bardelang.

Merci encore à Sébastien Ulrich pour son aide et sa disponibilité.

ISMSC 2026

International Symposium on Macrocyclic and Supramolecular Chemistry

La 20e édition de l'International Symposium on Macrocyclic and Supramolecular Chemistry (ISMSC2026) s'est tenue à Bordeaux du 5 au 10 juillet 2026. Cet événement phare dans le domaine qui se tient alternativement en Europe, en Amérique du Nord et en Asie, est revenue cette année en France, pour la première fois depuis son édition de 2015 qui avait été organisée à Strasbourg.

Les 500 participants n'ont pas été refroidis par les températures caniculaires bordelaises ; des étudiants et des chercheurs confirmés venus de 35 pays ont pu assister à plus de 80 conférences de haut niveau données en séance plénière par des intervenant(e)s reconnu(e)s et des conférencier(e)s invité(e)s. Une large place était donnée à de jeunes chercheurs qui ont pu présenter des communications orales ou des posters. Plus de 350 posters étaient présentés au cours de ces journées. Outre les assemblages hôte-invité et non covalents, les systèmes dynamiques, les cages de coordination, les composés bioactifs et mimétiques, ainsi

que les machines moléculaires ont été largement abordés, à la fois dans leurs aspects très fondamentaux et leurs applications.

La conférence a bénéficié de l'aide précieuse du comité d'organisation local et de la participation des étudiant(e)s ; il faut également noter le soutien généreux de diverses revues et de partenaires industriels, ainsi que de la Région Nouvelle-Aquitaine, de la SCF-DCO et de nos sponsors, qui ont permis l'attribution de 14 prix de posters. Trois prix majeurs internationaux ont été décernés : le prix Izatt-Christensen (Frank Würtner), le prix Cram-Lehn-Pedersen (Liang Zhang) et le prix Sessler pour les jeunes chercheurs (Dawei Zhang).

Outre le programme scientifique principal, un atelier satellite consacré à la détermination des constantes d'association a été animé par Douglas Vander Griend, et une table ronde ouverte au grand public et animée par le groupe *Women and Inclusion in Supramolecular Chemistry* (WISC) a eu lieu.

Des échanges plus informels ont été possibles lors du dîner de gala organisé dans le cadre historique du Château Smith Haut-Lafitte, autour d'un verre de vin ou deux.



Rendez-vous en septembre 2027 à Birmingham, au Royaume-Uni, pour la prochaine édition...

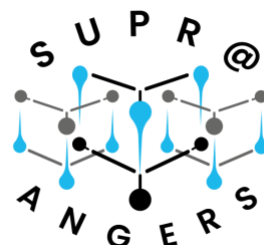
Nathan McClenaghan et Yann Ferrand
 (co-chairs de ISMSC2026)

À VOS AGENDAS

Supr@Angers 2027

Après Lyon (2018), Strasbourg (2021) et Paris (2024), la quatrième édition de **Supr@Ville**, congrès international dédié à la chimie supramoléculaire, aura lieu à Angers du **25 au 28 mai 2027**.

Nous aurons notamment le plaisir d'y accueillir les Professeurs Ben Feringa, Makoto Fujita, Tatjana Parac-Vogt, Sébastien Lecommandoux, Frank Würthner, Tanja Weil ou encore Ivan Huc, récent lauréat du prix André Collet de notre groupe thématique.



Les inscriptions à **Supr@Angers 2027** ouvriront dès le **2 novembre 2026**. Plusieurs événements étant organisés à Angers et dans ses environs à la fin du mois de mai 2027, nous vous recommandons de réserver votre hébergement avant la fin de l'année.

Toutes les informations concernant le congrès vous seront communiquées régulièrement sur notre site web, <https://supra-angers-2027.cnrs.fr/>, ainsi que sur les comptes Bluesky **@SupraAngers** et **@supraSCF**, ou encore sur LinkedIn (**Supra Angers**).

Nous vous attendons nombreuses et nombreux à Angers pour cette nouvelle édition de Supr@Ville et espérons partager avec vous un beau moment scientifique et convivial au cœur de l'Anjou !

Pour le comité d'organisation de Supr@Angers 2027,

David Canevet & Sébastien Goeb
 Laboratoire MOLTECH-Anjou, Université d'Angers, CNRS

PRIX DU GROUPE 2026

Prix André Collet

Prof. Dr. Ivan HUC



Ivan Huc est depuis 2017 professeur titulaire de la chaire de chimie biologique à la Faculté de Chimie et Pharmacie de l'Université Louis-et-Maximilien de Munich (Allemagne). Il étudie la chimie à l'École Normale Supérieure et obtient son doctorat en 1994 à l'Université Paris VI pour des travaux portant sur la catalyse supramoléculaire menés à la fois à l'ENS et au Massachusetts Institute of Technology. À partir de 1995, il rejoint l'Université de Strasbourg en tant que post-doctorant au laboratoire de chimie génétique puis en tant que chercheur au CNRS au laboratoire de chimie supramoléculaire. Il contribue alors à des travaux fondateurs en chimie combinatoire dynamique. En 1998, il fonde sa propre équipe à l'Institut Européen de Chimie et de

biologie, à l'Université de Bordeaux, où il est promu directeur de recherche au CNRS. Il y initie ses travaux centrés sur la compréhension et le contrôle de la forme des molécules par le biais du repliement et des interactions non covalentes, à l'instar des protéines et des acides nucléiques. Ses résultats démontrent notamment que la constitution d'oligomères de synthèse riches en unités aromatiques au sein de la chaîne principale – les foldamères aromatiques – conduit à l'émergence de nouveaux principes de repliement, de nouvelles formes moléculaires, et ouvre la voie à de nouvelles fonctions. Les applications pharmacologiques des foldamères constituent l'un de ses principaux sujets d'étude actuel.

Ivan Huc est co-auteur de plus de 230 publications. Son laboratoire est régulièrement financé par l'Union Européenne (Conseil Européen de la Recherche et Programme Marie Skłodowska-Curie). Ses travaux ont déjà été honorés notamment par la médaille d'argent du CNRS (2012), par le prix "Mme Victor Noury" de l'Académie des Sciences (2015), et par le prix international Izatt-Christensen de chimie macrocyclique et supramoléculaire (2021).

Prix Henry Le Chatelier

Prof. Alexandre MARTINEZ



Alexandre Martinez est professeur à l'École Centrale Méditerranée et mène ses recherches à l'Institut des Sciences Moléculaires de Marseille (iSm2), où il dirige l'équipe Chirosciences. Il a soutenu sa thèse en 2004 au Laboratoire de Chimie de Coordination de Toulouse sous la direction des Drs Bernard Meunier et Catherine Hemmert. Après un stage postdoctoral dans l'équipe du Pr Jérôme Lacour à l'Université de Genève, il a rejoint l'équipe du Dr Jean-Pierre Dutasta à l'ENS de Lyon. Nommé professeur à Centrale Méditerranée en 2014, il en assure la direction de la recherche depuis 2023.

Ses travaux ont donné lieu à plus de 130 publications scientifiques et portent principalement sur la chimie des hémicryptophanes, des molécules-cages chirales associant une unité cyclotrivératrylène à une seconde unité de symétrie C_3 . Il développe et étudie ces architectures supramoléculaires pour des applications en reconnaissance moléculaire et en catalyse en milieu confiné, aussi bien en catalyse métallique qu'en organocatalyse.

Prix Christiane Dietrich-Buchecker

Dr. Matthieu RAYNAL



Matthieu Raynal est Directeur de Recherches CNRS dans l'Équipe Chimie des Polymères de l'Institut Parisien de Chimie Moléculaire de Sorbonne Université (Paris), équipe qu'il a rejointe en 2012. Il a obtenu son doctorat en chimie de coordination et catalyse homogène sous la direction de P. Braunstein (Université de Strasbourg) en 2009. Après des expériences postdoctorales en chimie et catalyse supramoléculaire à Paris (UPMC) et Tarragone (P.W.N.M. van Leeuwen, ICIQ), il a initié avec L. Bouteiller un projet de recherche visant à utiliser des polymères supramoléculaires hélicoïdaux comme plateforme pour des réactions de catalyse asymétrique ; travaux pour lesquels il a obtenu

la médaille de Bronze du CNRS en 2017. L'association de petites molécules organiques via des liaisons hydrogène et des interactions aromatiques fournit un polymère supramoléculaire dont l'hélicité sert d'environnement chiral discriminant pour des réactions catalysées au Rh ou au Cu. Des concepts originaux ont ainsi pu être mis au point comme la possibilité d'utiliser une quantité minimale d'inducteur chiral ou le développement d'un catalyseur asymétrique commutable. La mise en œuvre de ces concepts s'appuie sur une compréhension fine de la structure et des propriétés des assemblages supramoléculaires chiraux. Les défis actuels de l'équipe consistent à démontrer les possibilités nombreuses offertes par les catalyseurs hélicoïdaux comme le développement de nouveaux catalyseurs coopératifs ou la découverte de nouvelles réactions stéréosélectives.

PRIX DE THÈSE Supr@SCF 2026

Le prix de thèse Supr@SCF 2026 a été décerné au **Dr Louis Hardoin**.



Louis Hardoin a effectué son doctorat au laboratoire MOLTECH-Anjou de l'Université d'Angers, sous la supervision des professeurs David Canevet et Marc Sallé. Ses travaux de thèse ont porté sur l'étude de la chimie supramoléculaire de foldamères π -conjugués fonctionnels, ainsi que sur le contrôle de l'équilibre impliquant hélices simples et multiples.

Au cours de sa thèse, Louis a exploré l'influence de l'hybridation de foldamères en doubles hélices sur leurs propriétés luminescentes, chiroptiques et électroniques. Il a notamment développé différentes stratégies permettant de moduler ces propriétés de manière sélective et réversible, en exploitant aussi bien des interactions supramoléculaires entre motifs donneurs et accepteurs que le mouvement contrôlé de moteurs moléculaires photoactifs. Ces travaux l'ont conduit à effectuer un séjour de recherche dans le groupe du Pr Ben Feringa à l'Université de Groningen. Il y a travaillé sur la synthèse de moteurs moléculaires dont l'émission circulairement polarisée peut être photocontrôlée à l'échelle moléculaire. Louis s'intéresse actuellement à des polymères photo-actifs en tant que postdoctorant à l'Université technologique d'Eindhoven, sous la direction du Pr. Rint Sijbesma et du Dr. Ghislaine Vantomme.

Découvrez les anciens lauréats sur notre site :

<https://new.societechimiquedefrance.fr/groupe/chimie-supramoleculaire/prix-et-laureats-chimie-supramoleculaire/>

UN POINT SUR... L'EFFET CHAOTROPE

Dans le paysage de la chimie supramoléculaire, certaines forces sont devenues des piliers incontournables : l'effet hydrophobe, les liaisons hydrogène, les forces électrostatiques ou encore les empilements π - π . Pourtant, à côté de ces interactions bien établies, des phénomènes plus discrets suscitent aujourd'hui un intérêt croissant. Parmi eux, l'effet *chaotrope* occupe une place singulière et, depuis une dizaine d'années, il remet en question notre compréhension du comportement des nano-anions inorganiques en milieu aqueux. Bien que ce champ de recherche soit encore très jeune, marqué par l'absence de consensus sur les définitions et par des débats ouverts concernant l'origine de cet effet, il offre déjà un certain nombre d'applications potentielles en sciences des matériaux, en chimie médicinale, mais aussi en catalyse.

L'apparition du terme « *chaotrope* » dans la littérature remonte à 1962, dans un article de Hamaguchi et Geiduschek examinant l'effet des anions sur la stabilité de l'ADN hélicoïdal.^[1] Les auteurs y concluent que la dénaturation de l'ADN par des anions de faible densité de charge, tels que le thiocyanate ou le perchlorate, résulte de leur capacité à perturber les « liaisons hydrophobes », agissant ainsi, au moins en partie, par l'intermédiaire de leur influence sur la structure de l'eau. Sur la base de cette étude, une large partie de la communauté scientifique a ensuite adopté l'idée que les anions pouvaient « construire » ou « détruire » la structure de l'eau. En conséquence, les termes « *chaotrope* » et « *kosmotrope* » se sont progressivement trouvés associés à ces effets supposés sur l'eau, alors même que, dans l'article original de Hamaguchi et Geiduschek, ils servaient avant tout à décrire un effet portant sur la structure de l'ADN.

Les termes « *chaotrope* » et « *kosmotrope* » sont aujourd'hui indissociables de la série d'Hofmeister (Figure 1), qui tire son nom des observations réalisées il y a près de 140 ans par Franz Hofmeister sur l'influence des ions sur la solubilité des protéines. Cette série, généralisable à de nombreux phénomènes (tels que la solubilité de petites molécules ou la tension superficielle à l'interface air/eau), repose notamment sur la densité de charge des anions comme principal critère de différenciation. Les anions *kosmotropes*, fortement chargés et fortement hydratés, favorisent généralement le repliement et la précipitation des protéines. À l'inverse, les anions *chaotropes*, présentant une densité de charge plus faible et une hydratation plus labile, ont tendance à interagir préférentiellement avec les régions hydrophobes des protéines, ce qui augmente leur solubilité en solution aqueuse voire parfois les dénature. Cette vision a longtemps conduit à considérer les ions *chaotropes* comme des espèces défavorables aux processus d'auto-assemblage.

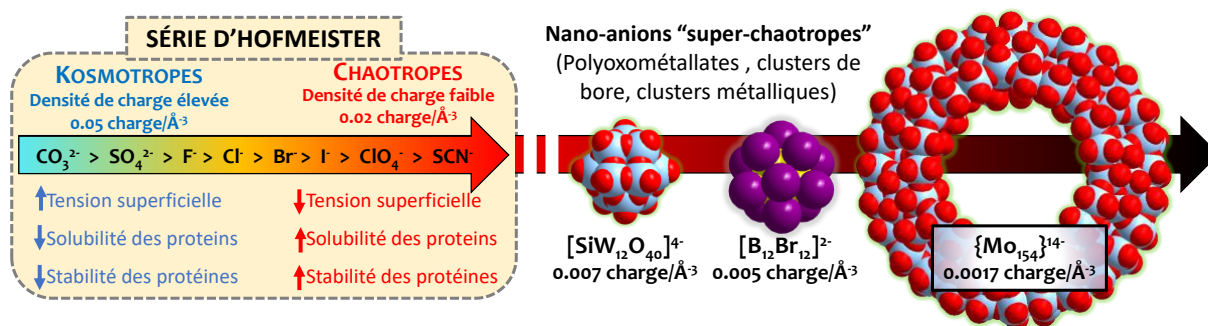


Figure 1. La série de Hofmeister classe les anions selon leur capacité à influencer la solubilité des protéines dans l'eau. Par extension, les nano-anions, qui regroupent un large ensemble d'espèces inorganiques aux tailles, formes, compositions et fonctionnalités extrêmement variées, se situent bien au-delà de cette série. Leur comportement en solution aqueuse dépasse celui des ions classiques, ce qui leur vaut l'appellation d'espèces « super-chaotropes ».

Si l'on prolonge la série de Hofmeister en y incluant les nano-anions inorganiques (Figure 1), notamment les polyoxométallates, les clusters de bore et certains clusters métalliques, on observe qu'ils se situent bien au-delà des anions *chaotropes* classiques, présentant notamment des densités de charge jusqu'à un ordre de grandeur plus faibles. Sur la base de cette observation, il est raisonnable d'envisager que ces nano-anions puissent interagir fortement avec les protéines et, plus généralement, avec des substances organiques non-ioniques, ce qui en fait des objets particulièrement attractifs en chimie supramoléculaire.

Et pourtant, ce rapprochement n'a été établi que tardivement, malgré une première mention du caractère chaotrope des nano-anions dès 1978.^[2] Il a véritablement émergé en 2015 à travers deux études complémentaires. D'une part, les travaux de Werner Nau ont mis en évidence la formation de complexes hôte-invité particulièrement robustes entre la gamma-cyclodextrine et des clusters de bore ([B₁₂X₁₂]²⁻ avec X = Cl, Br ou I).^[3] D'autre part, Pierre Bauduin et ses collaborateurs ont démontré la propension des polyoxométallates à s'adsorber à la surface de micelles.^[4] Ces observations peuvent sembler, à première vue, contre-intuitives : les nano-anions considérés sont en effet extrêmement solubles dans l'eau (jusqu'à 1 kg·L⁻¹ pour certains nano-anions), et leur interaction avec des environnements hydrophobes, tels que la cavité des cyclodextrines, apparaît *a priori* défavorable. Il est ainsi remarquable que leurs affinités avec la cavité des cyclodextrines natives puissent dépasser celles de molécules hydrophobes telles que l'adamantane, le diamantane ou le triamantane. D'un point de vue mécanistique, le transfert de nano-anions chaotropes vers des poches hydrophobes repose sur une restauration partielle de la structure de l'eau initialement perturbée autour des nano-anions. Ce réarrangement s'accompagne d'une perte entropique liée à la structuration du solvant, ainsi que d'un gain enthalpique résultant de la reformation des liaisons hydrogène.

En une décennie à peine, des progrès considérables ont été réalisés, tant dans la compréhension de cet effet que dans son exploitation. Parmi les avancées les plus marquantes, certaines présentent déjà un fort potentiel applicatif. Les propriétés chaotropes des nano-ions ont ainsi été mises à profit pour le transport de substances actives à travers les membranes cytoplasmiques,^[5] le développement d'agents stabilisants de mousses, ainsi que l'élaboration de nouvelles méthodes d'extraction par flottation. Par ailleurs, l'exploitation de l'effet chaotrope a récemment élargi le champ de la chimie supramoléculaire, en permettant l'accès, à l'échelle du gramme, à des cyclodextrines de grande taille (δ et au-delà) grâce à l'utilisation de nano-anions comme templates.^[6] Au sein de cette dynamique, notre équipe, spécialisée en chimie inorganique, a contribué au développement de systèmes hôte-invité stimulables par des processus rédox, de systèmes multicomposants capables de piéger des anions au sein d'autres anions, ainsi que d'architectures hybrides analogues aux Metal-Organic Frameworks.^[7,8] Plus récemment, nous avons également exploré des architectures bio-inspirées, tout en exploitant l'effet chaotrope pour contrôler la réactivité des nano-ions et en faciliter la synthèse.^[9,10]

Il convient toutefois de souligner que la notion de nano-anions chaotropes reste en partie débattue, même si des travaux récents, tant expérimentaux que théoriques, mettent en évidence une distinction claire avec les nano-anions hydrophobes (tels que le tétraphénylborate).^[11] Les nano-anions hydrophobes présentent

une dynamique d'hydratation réduite, souvent décrite par le modèle classique de « l'iceberg » associé à l'effet hydrophobe, tandis que les nano-anions chaotropes se caractérisent au contraire par une dynamique d'hydratation très élevée et une structuration locale de l'eau plus labile. Par ailleurs, plusieurs exemples de la littérature montrent que la classification des nano-ions sur la seule base de la densité de charge n'est pas suffisante pour prédire leur comportement dans un système donné. Des facteurs tels que la taille, la forme, la protonation de surface, la polarisabilité ou encore la nature des contre-ions en solution peuvent en effet moduler de manière significative les effets observés.

En définitive, en montrant que le désordre peut devenir un vecteur d'organisation, l'effet chaotrope invite les chimistes à dépasser certaines intuitions simplificatrices et à intégrer ce concept dans leur boîte à outils, ouvrant ainsi la voie à des architectures inédites aux fonctions encore insoupçonnées.

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- [4] B. Naskar et al. *J. Phys. Chem. C* **2015**, *119*, 20985–20992.
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- [6] K. H. Hansen et al. *J. Am. Chem. Soc.* **2025**, *147*, 13851–13858.
- [7] C. Falaise et al. *Angew. Chem. Int. Ed.* **2021**, *60*, 14146–14153.
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- [9] C. Falaise et al. *J. Am. Chem. Soc.* **2024**, *146*, 1501–1511.
- [10] M. Segado-Centellas et al. *Chem. Sci.* **2024**, *15*, 15849–15857.
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À LA RENCONTRE DE... CLAIRE KAMMERER

Carrière :

- 2012- Maître de conférences, Université de Toulouse, CEMES-CNRS (Groupe NanoSciences).
- 2009-2012 Post-doctorat à la Technische Universität München, Munich, Allemagne (Prof. Thorsten Bach).

Formation :

- 2021 Habilitation, Université Toulouse III – Paul Sabatier, Toulouse.
- 2005-2009 Doctorat en chimie organique, Université Pierre et Marie Curie, Paris (Prof. Giovanni Poli et Prof. Guillaume Prestat)
- 2005 Master Chimie organique et bio-organique, Université Pierre et Marie Curie, Paris.
- 2002-2006 École Normale Supérieure, Paris.



L'aspect principal de ma personnalité est l'optimisme, qui est à mon sens une qualité nécessaire tant en recherche qu'en enseignement.

Ma première expérience en laboratoire a constitué un vrai déclic dans mon parcours d'étudiante, en développant mon goût pour la synthèse organique et en me permettant de me projeter dans le métier de chercheur. Je recommande d'ailleurs vivement à mes étudiants de Licence de faire des stages en laboratoire !

En regardant ma carrière, je ressens beaucoup de gratitude envers les personnes qui ont jalonné mon parcours et qui m'ont guidée et soutenue lors de chaque étape-clé.

Mes réactions préférées sont les réactions domino, surtout quand elles permettent d'augmenter de manière importante la complexité structurale au cours d'une seule opération synthétique.

Si je n'avais pas fait carrière dans la chimie, je serais sans doute médecin ou professeur de SVT.

La chose la plus excitante dans mes recherches est de pouvoir « voir » des molécules uniques grâce à la microscopie en champ proche. Je ne m'en lasse pas !

Mes molécules préférées sont celles qui travaillent !

Ma devise est « Essayez de laisser ce monde un peu meilleur qu'il ne l'était quand vous y êtes venus »

Mon plat préféré est le « schiffala » accompagné de « roïgebragelti », dégusté dans une ferme auberge avec vue sur la plaine d'Alsace.

Intérêts scientifiques :

Nanosciences ; Conception et synthèse de machines moléculaires, étudiées sur surface à l'échelle de la molécule unique par microscopie en champ proche ; Synthèse sur surfaces ; Méthodologie en synthèse organique.

Cinq références significatives :

K. O. Au Yeung, T. Kühne, F. Eisenhut, M. Kleinwächter, Y. Gisbert, R. Robles, N. Lorente, G. Cuniberti, C. Joachim, G. Rapenne, C. Kammerer, F. Moresco. Transmitting stepwise rotation among three molecule gears on the Au(111) surface. *J. Phys. Chem. Lett.* **2020**, *11*, 6892-6899.

S. Abid, Y. Gisbert, M. Kojima, N. Saffon-Merceron, J. Cuny, C. Kammerer, G. Rapenne. Desymmetrised pentaporphyrinic gears mounted on metallo-organic anchors. *Chem. Sci.* **2021**, *12*, 4709-4721.

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M. Hankache, V. Magné, E. Geagea, P. Simón Marqués, S. Clair, L. Giovanelli, C. Loppacher, S. Mallet-Ladeira, E. Maerten, C. Kammerer, D. Madec, L. Nony. Photoinduced modulation of the oxidation state of dibenzothiophene S-oxide molecules on an insulating substrate. *Nat. Commun.* **2025**, *16*, 4841.

X. Li, Y. Gisbert, M. Ledent, D. Sluysmans, G. Rapenne, C. Kammerer, A.-S. Duwez. Probing the free rotary oscillations around a single ruthenium atom in an organometallic complex. *Chem* **2026**, *12*, 102691.

NOTRE SÉLECTION D'ARTICLES

Le bureau du Groupe Supr@SCF met en avant chaque semestre une sélection d'articles dont les auteur.rice.s sont membres de notre groupe thématique.

Vous trouverez ici un choix d'articles publiés sur la période janvier 2026 - juillet 2026 dans les journaux suivants : *Nature*, *Chem*, *Nat. Comm.*, *J. Am. Chem. Soc.*, *Angew. Chem. Int. Ed.*, *Chem. Sci.*, *Chem. Comm.*, *Chemistry Europe*, *Chem. Eur. J.*

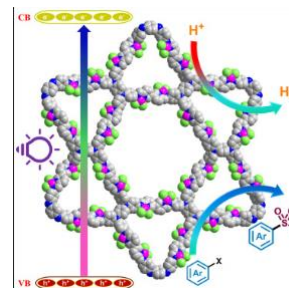
Cette sélection est évidemment non exhaustive, et nous invitons les membres du groupe à nous faire part de leurs récentes publications.

Nickel-Embedded Covalent Organic Frameworks for Dual Photocatalytic Hydrogen Evolution and Cross-Coupling Catalysis

Jindal, S.; Pal, K.; Zeama, M.; Maity, P.; Jin, T.; Bonneau, M.; Kancherla, R.; Mohammed, O. F.; Shekhah, O.; Rueping, M.; Eddaoudi, M.

Chem **2026**, *12*, 102751

DOI: [10.1016/j.chempr.2025.102751](https://doi.org/10.1016/j.chempr.2025.102751)



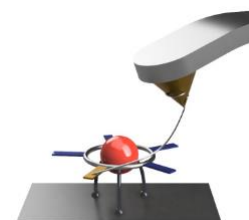
Abstract: This work reports the design and synthesis of a novel imine-linked 2D covalent organic framework (COF), TPDA-BiPy-COF, constructed from [3,3'-bipyridine]-6,6'-dicarboxaldehyde (3,3'-BiPy) as an electron acceptor and tetrakis(4-aminophenyl)-1,4-phenylenediamine (TPDA) as a donor. The COF features pyridyl-imine linkages, i.e., Imine-Ni-Nbipyridine, with active nitrogen sites that facilitate proton reduction to hydrogen. To improve photocatalytic hydrogen evolution performance, Ni(II) centers were introduced via post-synthetic metalation, forming TPDA-BiPy@NiX₂ COF (X = Cl, Br). The coordination of Ni(II) with the imine and bipyridine nitrogen atoms enhanced framework planarity and conjugation, thereby boosting photocatalytic activity. Notably, TPDA-BiPy@Ni(II) COF achieved an excellent hydrogen evolution rate of 34.13 mmol g⁻¹ h⁻¹ under visible light, without requiring a cocatalyst. Furthermore, the metallaphotoredox activity of TPDA-BiPy@Ni(II) displayed its promise for photocatalyzed C-S cross-coupling reaction. This dual-functional catalyst highlights the advantage of incorporating nickel into COFs, offering a cost-effective and sustainable alternative to noble-metal-based systems for photocatalysis and synthetic transformations.

Probing the free rotary oscillations around a single ruthenium atom in an organometallic complex

Li, X.; Gisbert, Y.; Ledent, M.; Sluysmans, D.; Rapenne, G.; Kammerer, C.; Duwez, A.-S.

Chem **2026**, *12*, 102691

DOI: [10.1016/j.chempr.2025.102691](https://doi.org/10.1016/j.chempr.2025.102691)



Abstract: A variety of rotary molecular machine prototypes powered by light, chemical energy, or electrons have been synthesized and their operation in solution, gels, or on surfaces has been demonstrated. However, little data regarding their performances have been disclosed. Here, we report on the synthesis of molecules incorporating a five-arm rotor and the direct measurement of the work required to block the rotation around the central atom. We used single-molecule force spectroscopy (SMFS) to detect the free rotary oscillations and measure the work performed by the molecules against the mechanical load. We show that the chemical nature of the arms influences the energy barrier, causing differences in the work that the molecules can generate. Our results illustrate that SMFS, which is now widely used to probe linear displacements at a few tens of nanometer scale in macromolecules, can detect rotary motions around a single atom in a tiny synthetic molecule.

Targeted photodynamic therapy for pancreatic cancer: recent innovations from fundamentals to in vivo and clinical applications (2020-2025)

Sarr, S.; Godard, J.; Valzer, E.; Czuba, E.; Acherar, S.; Barberi-Heyob, M.; Blanchard-Desce, M.; Boleslawski, E.; Brégier, F.; Bulin, A.-L.; Burckel, H.; Daouk, J.; da Silva, A.; Daniel, J.; Delhem, N.; Dewalle, A.-S.; Frochot, C.; Gasser, G.; Heitz, V.; Jonckheere, N.; Lemerrier, G.; Mordon, S.; Noël, G.; Novell, A.; Ravanat, J.-L.; Roth, G.; Sol, V.

Chem. Commun. **2026**, *62*, 3662–3701

DOI: [10.1039/d5cc05629b](https://doi.org/10.1039/d5cc05629b)



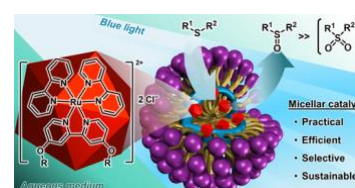
Abstract: Photodynamic therapy (PDT) is a clinically-approved medical modality to treat different types of localised conditions such as cancer, infections or skin conditions. Pancreatic cancer (PC) is a deadly cancer displaying a dramatic overall prognosis that has barely improved in decades as the majority of PC patients are diagnosed at a locally advanced or metastatic stage and cannot benefit of surgical resection which is the only curative treatment, the overall 5-year survival rate remains extremely low. Thus, finding new therapies for non-metastatic PC to improve local control as a bridge to surgical resection and improve survival outcomes remains a huge challenge. In this context, PDT could be an interesting option. This review will focus on the use of PDT with targeted photosensitisers or nanoparticles to treat PC in recent studies (2020-2025) from in vitro to in vivo experiments and clinical applications.

Micellar Ru(II)-bipyridine photocatalysts for selective oxidation of thioethers to sulfoxides in water

Michon, L.; Porcher, A.; Cintrat, J.-C.; Doris, E.; Gravel, E.

Chem. Commun. **2026**, *62*, 13527–13531

DOI: [10.1039/d6cc01994c](https://doi.org/10.1039/d6cc01994c)



Abstract: A supramolecular photocatalytic system was engineered by encapsulating a modified ruthenium(II)-bipyridine complex in stabilized polydiacetylene micelles. The colloidal nanohybrid catalyst enables selective oxidation of thioethers to sulfoxides in pure water, and can be easily recycled.

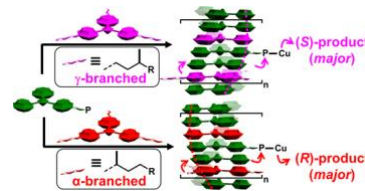
Opposite enantioselectivities displayed by supramolecular helical catalysts with non-enantiomeric "sergeants"

Perennes, A.; Muller, A.; Ikai, T.; Yashima, E.; Vantomme, G.; Bouteiller, L.; Raynal, M.

Chem. Commun. **2026**, 62, 6608–6612

DOI: [10.1039/d6cc00409a](https://doi.org/10.1039/d6cc00409a)

Abstract: Triarylamine trisamide (TATA) coassemblies composed of one achiral phosphine-based monomer and one chiral monomer, as the "soldier" and "sergeant" respectively, were found to adopt opposite handednesses and favour enantiomers of a catalytic product with "sergeants" bearing (S) stereogenic centres placed either in alpha or in gamma positions on their side chains.



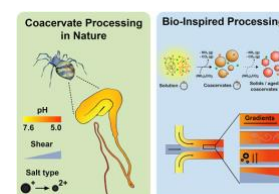
Coacervates as bio-inspired intermediates for materials processing

Graafsma, C.; Jaber, M. R.; Monreal Santiago, G.; Kamperman, M.

Chem. Commun. **2026**

DOI: [10.1039/d6cc03055f](https://doi.org/10.1039/d6cc03055f)

Abstract: Nature routinely fabricates fibers and composites with combinations of toughness, strength, gradients, and multifunctionality that remain challenging for synthetic materials. A growing body of evidence indicates that many of these materials are not processed from dilute solutions or polymer melts, but instead via concentrated, liquid-like macromolecular phases known as coacervates. In this Feature Article, we review how coacervation enables aqueous, highly controlled processing of fibers and related materials. We place recent work from our groups in the broader context of natural and synthetic coacervate research, discuss established and emerging processing strategies, and outline a perspective in which gradual, stimulus-driven changes in solubility and intermolecular interactions are exploited to guide structure formation and material properties.



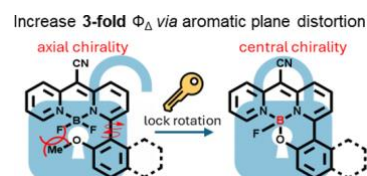
Design of heavy-atom-free dipyrromethene boron complexes for singlet oxygen emission with induced chirality

Figliola, C.; Cheriaux, C.; Oppe, N.; Estaque, L.; Retailleau, P.; Vanthuyne, N.; Pieters, G.; Jacquemin, D.; Ulrich, G.

Chem. Commun. **2026**, 62, 1919–1922

DOI: [10.1039/d5cc06879g](https://doi.org/10.1039/d5cc06879g)

Abstract: The straightforward synthesis of the first difluoro dipyrromethene boron complexes as heavy-atom-free photosensitizers is described. These molecules show good singlet oxygen generation ($\Phi_{\Delta} = 10$ to 47%) and significant nonplanar arrangement, inducing axial and boron-centered chirality.



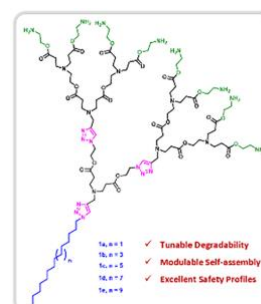
Amphiphilic poly(aminoester) dendrimers: click reaction-enabled synthesis, structure-governed self-assembly and degradation

Ma, Y.; Zheng, J.; Zhu, D.; Lin, X.; Yang, D.; Mei, A.; Ma, C.; Dong, H.; Peng, L.; Liu, X.

Chem. Commun. **2026**, 62, 8657–8660

DOI: [10.1039/d6cc00300a](https://doi.org/10.1039/d6cc00300a)

Abstract: Poly(aminoester) (PAE) dendrimers are attractive materials for biomedical applications owing to their biodegradability and precise structure, effective synthesis and favourable safety profile. We report here a click chemistry-enabled divergent-convergent strategy for the efficient synthesis of amphiphilic PAE dendrimers. These dendrimers exhibit negligible cytotoxicity, generation-dependent degradation behaviour, and tunable self-assembly controlled by the hydrophobic chain length. This study offers an accessible synthesis of PAE dendrimers, advancing their use in future biomedical applications.



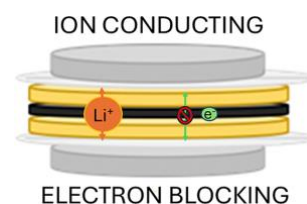
Measuring ionic conductivity in electrodes prepared by solvent-free melt extrusion

Sorel, C.; Nicolle, P.; Foran, G.; Prebe, A.; Dolle, M.

Chem. Commun. **2026**, 62, 11896–11900

DOI: [10.1039/d6cc02190e](https://doi.org/10.1039/d6cc02190e)

Abstract: Battery electrodes must simultaneously conduct electrons and ions to enable charge transfer to take place. Conductivity is conferred using a combination of ion-conducting polymeric binder material and electronically conductive carbon. This work presents a reproducible technique for measuring the ionic conductivity of electrodes made from formulations containing thermoplastic vulcanizates.



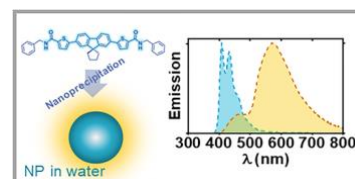
One spiro to shift them all: tuning fluorescent organic nanoparticles emission via steric design

Kurek, E.; Dal Pra, O.; Skrzypczak, A.; Massip, S.; Daniel, J.; Blanchard-Desce, M.; Gazon, C.

Chem. Commun. **2026**, 62, 5271–5274

DOI: [10.1039/d5cc06995e](https://doi.org/10.1039/d5cc06995e)

Abstract: Three quadrupolar fluorene-based dyes differing only by non-conjugated substituents form fluorescent organic nanoparticles (dFONs) with tunable emission from blue to yellow. A spirocyclic central substituent induces a marked red-shift via altered packing. When internalized into cells, dFONs evolve showing a characteristic blue-shift, enabling fluorescence-based monitoring of nanoparticle integrity and bioimaging performance.



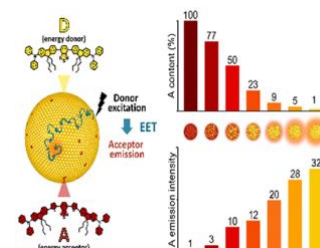
Cooperative organic alloy nanoparticles built from a matching pair of quadrupolar dyes showing unusual fluorescence behaviour

Kurek, E.; Mancini, P.; Verlhac, J.-B.; Carlotti, B.; Blanchard-Desce, M.

Chem. Commun. **2026**, 62, 4570–4574

DOI: [10.1039/d5cc06701d](https://doi.org/10.1039/d5cc06701d)

Abstract: Binary dye-based fluorescent organic nanoparticles, composed of varying proportions of A and D - two structurally related quadrupolar dyes - exhibit ultrafast and remarkably efficient excitation energy transfer, which in addition promotes fluorescence tuning and quantum yield enhancement as the acceptor content decreases.



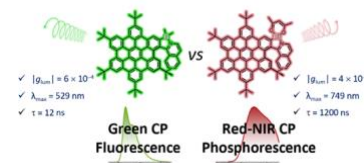
Merging platinahelicene and nanographene: a strategy for circularly polarized phosphorescence in the near-infrared (NIR)

Cui, W.; Zhou, H.; Roisnel, T.; Vanthuyne, N.; Shen, C.; Grzybowski, J.; Williams, J. A. G.; Srebro-Hooper, M.; Gisbert, Y.; Crassous, J.

Chem. Commun. **2026**, 62, 8027–8031

DOI: [10.1039/d6cc00576d](https://doi.org/10.1039/d6cc00576d)

Abstract: We present the first integration of a platinahelicene within a nanographene (NG), giving access to near-infrared circularly polarized phosphorescence with dissymmetry factors g_{lum} reaching 4×10^{-3} . For comparison, a novel NG featuring a borahelicene displayed a blue-green circularly polarized fluorescence with $g_{lum} = 6 \times 10^{-4}$.



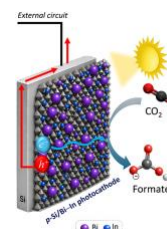
Bimetallic Bi-In interfaces on micropyramidal silicon for efficient solar-driven CO₂-to-formate conversion

Machrecki, M.; Blot, M.; Vacher, A.; Lamy, S.; Fabre, B.

Chem. Commun. **2026**, 62, 14006–14009

DOI: [10.1039/d6cc02769e](https://doi.org/10.1039/d6cc02769e)

Abstract: Micropyramidal silicon decorated with bismuth-indium catalysts enables selective CO₂ photoelectroreduction to formate. Bimetallic interface engineering enhances charge transfer, improving photocurrent and formate production relative to monometallic systems. This simple strategy advances efficient solar-driven CO₂ conversion.



The non-covalent stereocontrol of disulfide bonds

Chetot, T.; Forot, A.; Dumont, E.; Perret, F.; Vial, L.; Leclaire, J.

Chem. Commun. **2026**, 62, 12723–12735

DOI: [10.1039/d6cc00821f](https://doi.org/10.1039/d6cc00821f)

Abstract: Disulfide bonds are pivotal in shaping the structure and function of both natural proteins and synthetic architectures, yet the stereochemical control of their axial chirality has only very recently garnered focused attention. In this review, we have (re)-examined the published structures of natural and synthetic disulfide-containing compounds to uncover the non-covalent interactions that can bias the chirality of the S-S bond toward specific P or M conformations. Building on these insights, we provide here a conceptual toolbox that could inspire various communities, from molecular biologists exploring the role of disulfide bridges in transmitting stereochemical information within protein structures to organic chemists designing disulfide-based architectures of increased complexity.



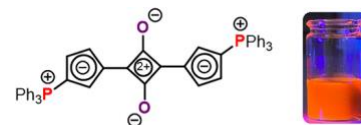
Make the ylides shine: synthesis and structure-property relationships of phospho-squaraines

Khantong, A.; Chemin, A.; Galangau, O.; Le Guennic, B.; Jacquemin, D.; Bouit, P.-A.

Chem. Commun. **2026**, 62, 6563–6566

DOI: [10.1039/d6cc00100a](https://doi.org/10.1039/d6cc00100a)

Abstract: We report the synthesis and full characterization of a family of four phospho-squaraine dyes, obtained in a single step from squaric acid derivatives. Their structure-property relationships are investigated through a joint experimental/theoretical approach. All of these exotic ylides display strong absorption and emission in the red region of the spectrum, a rare feature for phosphorus ylides. Furthermore, they exhibit enhanced photostability compared to a standard squaraine reference.



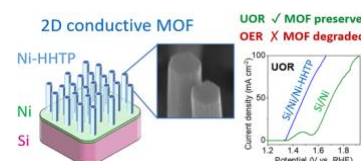
Silicon-supported 2D conductive metal-organic framework nanorod arrays for alkaline water and urea electrooxidation

Somsri, S.; Boun, P.; Tai, L.-T.; Bonhommeau, S.; Talaga, D.; Lapeyre, V.; Goudeau, B.; Loget, G.; Jeon, I.-R.

Chem. Commun. **2026**, 62, 13800–13804

DOI: [10.1039/d6cc02372j](https://doi.org/10.1039/d6cc02372j)

Abstract: We report the efficient growth of 2D conductive metal-organic framework (MOF) nanorod arrays on silicon, tested for the electrocatalytic O₂ evolution reaction (OER) and the urea oxidation reaction (UOR). In situ and post-electrolysis analyses demonstrate superior activity and stability for UOR, opening perspectives for sustainable energy and environmental applications.



Protonation-Triggered Fluorescence Switching in COF Membranes for the Selective and Rapid Detection of New Psychoactive Substances

Luo, Y.; Liu, L.; Wu, Q.; Li, H.; Wen, R.; Yang, J.; Yang, C.; Shao, Y.; Peng, L.-Y.; Ding, L.; Fang, Y.

Angew. Chem. Int. Ed. **2026**, 65, e5244392

DOI: [10.1002/anie.5244392](https://doi.org/10.1002/anie.5244392)

Abstract: New psychoactive substances (NPS) typically exhibit low saturated vapor concentrations and are susceptible to interference such as water vapor and carbon dioxide, making the realization of high-performance gas-phase detection a challenge in both scientific research and public safety. Herein, we presented a self-standing covalent organic framework (COF) membrane formed between 1,3,5-tris-(4-aminophenyl)triazine (TPPA) and 4,4',4''-nitritoltribenzaldehyde (TFPA), TPPA-TFPA COF, which was fabricated via a two-step synthesis involving interface-confined polymerization followed by post-processing. The sensor used the ozone-treated COF membrane as the sensing layer exhibited rapid, highly selective, and visually observable fluorescence response toward the NPS simulant (S)-N,α-dimethylbenzylamine (DMBA), achieving a fast response time of less than 1 min and an ultra-low detection limit of 2.1 ppb. Moreover, the sensor successfully discriminates seven structurally analogous NPS reference standards through kinetic response profiling. The infrared and XPS spectra, along with theoretical calculations, further reveal the sensing mechanism is driven by hydrogen bond interaction between the ozone-treated COF membrane and the DMBA. These findings offer valuable insights for developing portable, real-time chemical monitoring devices, providing an innovative solution for on-site trace-level NPS detection. This holds promising potential for addressing serious threats to human health, family harmony, and social stability.



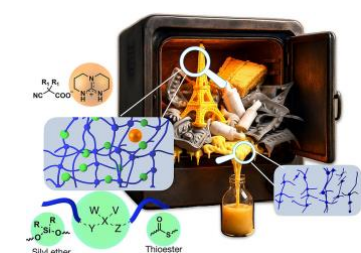
On-Demand Deconstructable Thermosets Through Cleavable Comonomer and Thermolabile Base Synergy

Kouider, S.; Buchon, L.; Choulot, L.; Greuet, P.; Bratananu, J.; Desiree, P.; Mauriello, J.; Maarek, E.; Clement, J.-L.; Charles, L.; Gastaldi, E.; Montarnal, D.; Soppera, O.; Gigmes, D.; Lefay, C.; Guillauneuf, Y.

Angew. Chem. Int. Ed. **2026**, 65, e6855232

DOI: [10.1002/anie.6855232](https://doi.org/10.1002/anie.6855232)

Abstract: Thermosets provide superior chemical and mechanical properties critical for high-performance applications, but their permanent crosslinked networks severely limit recyclability and end-of-life (EOL) management. Traditional approaches relying on cleavable comonomers enable degradation only through slow diffusion of acidic or basic solutions, hindering practical implementation. Here, on-demand deconstructable thermosets are developed by incorporating stimuli-responsive thermolabile bases alongside cleavable comonomers prior to polymerization. These latent species remain inert during thermal or photoinitiated curing, including vat photopolymerization 3D printing, preserving classical thermoset performance. Upon near-infrared photothermal or thermal activation (>100 degrees C), rapid network deconstruction yields soluble branched oligomers, enabling efficient chemical recycling without aggressive solvents during service life. This strategy is demonstrated using thermolabile 1,5,7-triazabicyclo[4.4.0]dec-5-ene derivatives with radical copolymerization of dibenzo[c,e]oxepine-5-thione with styrene/acrylic monomers, as well as ring-opening metathesis polymerization of dicyclopentadiene with silyl ether-containing cyclic olefins. The approach offers programmable degradation for sustainable high-performance thermosets.

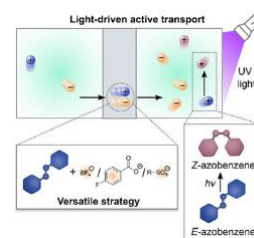


A Versatile Strategy for Light-Driven Active Transport of Ions

Yahaya, S.; Amano, S.; Nicoli, F.; Ragazzon, G.

Angew. Chem. Int. Ed. **2026**, 65, e202520638

DOI: [10.1002/anie.202520638](https://doi.org/10.1002/anie.202520638)



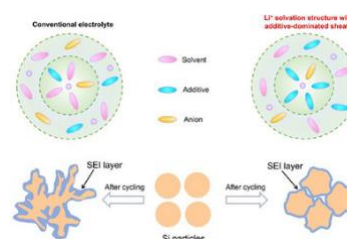
Abstract: Transport across compartments is essential for biology to drive its vital processes. Chemists have developed synthetic transport systems, focusing mainly on passive transport, where cargo species move along a concentration gradient. However, active transport—moving substances against a concentration gradient—remains a challenge. Light is a promising energy source for driving active transport due to its precise spatiotemporal control, high selectivity, and operation without waste accumulation. Yet only a few examples of light-driven active transport have been reported: these systems rely on specific host-guest interactions, which enable the transport of one particular species in each case. Here, we present a general, robust strategy for light-driven active transport of charged cargoes, based on light-controlled membrane permeability and charge complementarity. Positively charged azobenzene derivatives act as light-responsive carriers, and their photoisomerization is coupled to transport across a liquid membrane by a molecular ratchet mechanism. Notably, their transport drives active transport of negatively charged cargoes by forming ion pairs. This system can transport various anions, which are simply added as salt, and it functions even in buffered solutions. This approach utilizing charge complementarity is compatible with active transport driven by other energy sources and holds potential for biomedical applications and smart materials.

Solvation-Shell Engineering Enables Additive-Dominated Coordination for Stable Silicon Anodes Under Minimal Salt Conditions

Liu, Z.; Zhang, Y.; Wang, S.; Xiong, J.; Gao, T.; Yu, R.; Xu, Z.; Chen, X.; Li, J.; Lin, Z.; Zheng, M.; Xia, Y.; He, P.

Angew. Chem. Int. Ed. **2026**, 65, e202518092

DOI: [10.1002/anie.202518092](https://doi.org/10.1002/anie.202518092)



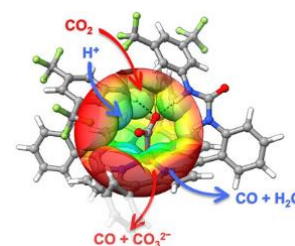
Abstract: Constructing a stable solid electrolyte interphase (SEI) is essential for enabling high-capacity alloying anodes in next-generation lithium-ion batteries (LIBs). However, conventional strategies based on high salt concentrations or expensive additives are limited by high cost, viscosity, and poor compatibility. Herein, we develop a solvation engineering strategy to increase the coordination number of additive molecules in the Li⁺ solvation shell by minimizing anion participation. A low-salt electrolyte composed of 0.2 M LiFSI (LiPF₆) in DMM/THF/FEC (4:3:3 by vol%) enables additive-dominated coordination and facilitates the formation of a uniform, fluorine-rich SEI. Characterizations including molecular dynamics simulations, spectroscopy, and 3D electrode reconstruction confirm this tailored solvation environment stabilizes the Si interface and mitigates volume-induced degradation. As a result, silicon anode exhibits a specific capacity of similar to 2000 mAh g⁻¹ over 200 cycles, while graphite anodes retain 96% capacity after 500 cycles. Stable cycling performances can also be achieved in different pouch cells. This work underscores the critical importance of additive coordination control in electrolyte design and provides a broadly applicable, cost-effective strategy for advancing alloy-type anodes in practical LIB systems.

Directional Second Sphere Effect on CO₂ Activation and Reduction by Iron Porphyrin in Aprotic and Protic Media

Vishwakarma, A.; Essid, S.; Bouery, S.; Guillot, R.; Boitrel, B.; Gotico, P.; Sircoglou, M.; Halime, Z.

Angew. Chem. Int. Ed. **2026**, 65, e1490828

DOI: [10.1002/anie.1490828](https://doi.org/10.1002/anie.1490828)



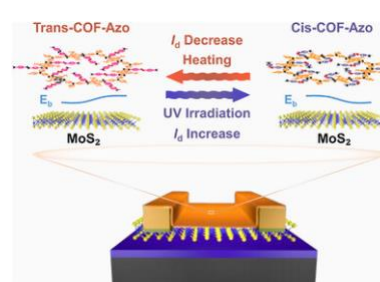
Abstract: The topological directionality of functional groups in the secondary coordination sphere (SCS) plays a decisive role in enzymatic small-molecule activation but remains underexplored in synthetic systems. Here, we investigate how symmetry remodeling of a urea-based SCS modulates electrocatalytic CO₂-to-CO reduction using two atropisomeric iron porphyrins, alpha beta alpha beta-UrFe and alpha 2 beta 2-UrFe, which differ solely in the spatial arrangement of identical hydrogen-bond donor groups. Switching from a face-to-face to an adjacent urea-arms configuration enables unprecedented CO₂-to-CO conversion under strictly aprotic conditions, in the absence of Brønsted or Lewis acids. Combined electrochemical, spectroscopic, kinetic, and DFT studies reveal that the adjacent positioning of the urea arms weakens the stabilization of the initial [Fe-CO₂] intermediate but creates a more open and dynamically reorganizable SCS that permits insertion of a second CO₂ molecule as an oxygen-atom acceptor, to yield CO and CO₃²⁻. Under protic conditions, this improved active-site accessibility, combined with a dissymmetrization of the activated CO₂ molecule, accelerates proton transfer, with CO₂-to-CO reduction reaching turnover frequency of up to 2.72 × 10⁷ s⁻¹, among the highest reported for homogeneous catalysis. These results establish directional interactions within the SCS as powerful design strategy for boosting molecular catalysis.

Wet Transfer of In Situ Grown Azo-Containing Two-Dimensional Conjugated Covalent Organic Framework Films for Photoswitchable Electronic Devices

Wang, K.; Han, B.; Qiu, F.; Jeong, Y.; Chen, Y.; Fu, Y.; Gatsios, C.; Nardi, M. V.; Timpel, M.; Hou, Y.; Xu, S.-Q.; Samori, P.

Angew. Chem. Int. Ed. **2026**, 65, e2260268

DOI: [10.1002/anie.2260268](https://doi.org/10.1002/anie.2260268)



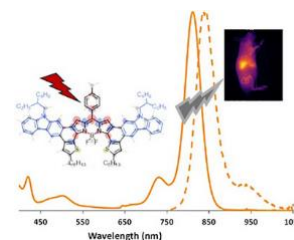
Abstract: Two-dimensional pi-conjugated covalent organic frameworks (2D pi-COFs) combine in-plane pi-delocalization with periodic open channels, making them versatile platforms for integrating functional groups into optoelectronic and neuromorphic systems. However, their predominant powder form has fundamentally constrained device integration and interfacial engineering. Herein, we demonstrate a general strategy for constructing high-quality transition-metal chalcogenide@2D pi-COF van der Waals heterostructures (vdWHs). Large-area, atomically flat 2D pi-COF films are first grown on SiO₂ substrates via a liquid-solid interfacial reaction and subsequently transferred onto monolayer MoS₂ through a mild in situ wet-transfer process. The resulting COF films exhibit atomic-scale flatness and form clean interfaces, promoting efficient interfacial charge transfer in COF@MoS₂ heterojunctions. As a model system, we employ a robust imidazole-linked 2D pi-COF (COF-Azo) functionalized with azobenzene moieties, whose reversible trans-cis photoisomerization dynamically modulates the heterojunction's electronic structure. The COF-Azo@MoS₂ devices display pronounced and reversible photoswitching behavior, achieving a carrier density modulation of similar to $6.7 \times 10^{11} \text{ cm}^{-2}$ and an on-state current variation of similar to 43.7%. Importantly, optical control over the isomerization fraction enables non-volatile memory behavior within the vdWHs. This work establishes a scalable route to atomically flat 2D pi-COF films as viable building blocks for vdW heterostructures and introduces a robust platform for optically reconfigurable optoelectronics and memory devices.

Extended Fused Carbazole-BODIPY, High Brightness NIR Organic Dyes

Ceugniet, F.; Ott, V.; Retailleau, P.; Bretonniere, Y.; Maury, O.; Bousquet, M. H. E.; Sancey, L.; Leclerc, N.; Jacquemin, D.; Ulrich, G.

Angew. Chem. Int. Ed. **2026**, 65, e202526011

DOI: [10.1002/anie.202526011](https://doi.org/10.1002/anie.202526011)



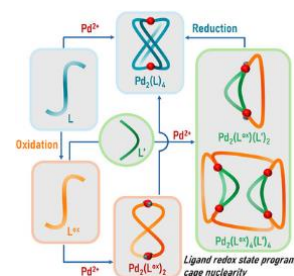
Abstract: Fluorescence-based bioimaging enables noninvasive visualization of molecular and cellular processes with high sensitivity and without ionizing radiation. However, conventional fluorophores emitting in the visible or near-red infrared I (NIR-I) (650-800 nm) regions suffer from limited tissue penetration and scattering. Extending fluorescence emission into the deeper NIR region represents a promising strategy to overcome these drawbacks, yet achieving high brightness and stability in organic dyes remains a major challenge. We report an original family of hetero-substituted-fused boron-dipyrromethene (BODIPY) dyes bearing carbazole and thienyl donors that exhibit record brightness and emission maxima up to 852 nm in toluene. The synthetic route combines successive Stille couplings from a 2,6-dibromo-3,5-diiodo-BODIPY precursor and an unprecedented silver(I)-mediated oxidative cyclization, affording high yields and suppressing undesired chlorination. The resulting dyes display intense absorption ($\epsilon = 1.8\text{--}2.5 \times 10^5 \text{ M}^{-1} \text{ cm}^{-1}$) and exceptional fluorescence quantum yields (Φ up to 0.73). Encapsulation in silica nanoparticles (NPs) preserves their photophysical properties and enables efficient NIR-II *in vivo* imaging in mice, allowing tumor detection at doses as low as 0.2 nmol with tumor-to-muscle ratio > 4 . These fused BODIPY derivatives rank among the brightest NIR fluorophores reported to date and open new avenues for high-contrast deep-tissue imaging and image-guided surgery.

Programming Palladium Cage Geometry through Ligand Redox Modulation

Zeid, J. B.; Nicolas, J.; Dekhtiarenko, M.; Canevet, D.; Allain, M.; Carre, V.; Aubriet, F.; Neukirch, L.; Benchimol, E.; Salle, M.; Clever, G. H.; Goeb, S.

Angew. Chem. Int. Ed. **2026**, 65, e5709785

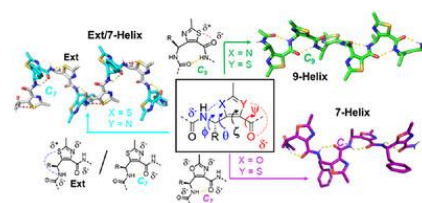
DOI: [10.1002/anie.5709785](https://doi.org/10.1002/anie.5709785)



Abstract: Incorporating redox active ligands into coordination cages offers a direct way to reach architectures whose structure or composition can be modulated in response to changes in the oxidation state. An exTTF-based ditopic ligand **L** affords a M2L4 cage in presence of a palladium(II) salt (**M**). The resulting M2L4 cavity exhibits selective binding properties for medium length alpha,omega-dinitrile alkanes. Modifying the coordination geometry of the ligand by oxidation to its Lox state redirects the self-assembly process toward a M2Lox 2 structure. The oxidized ligand can also be combined with a dibenzothiophene linker (**L'**) to afford a heteroleptic M2LoxL' 2 structure whose vacant coordination sites enable subsequent dimerization into an unprecedented M4L4L' 4 architecture. Key intermediates and products were structurally authenticated by single-crystal x-ray diffraction. Notably, these processes are reversible. Reduction converts the M2LoxL' 2 assembly back to the homoleptic M2L4 cage. This sequence illustrates how changes of oxidation state can reshape nuclearity and composition in metal organic assemblies.

Azole γ -Peptides Helix Switching via Heterocycle Substitutions

Chaise, S.; Didierjean, C.; Gacogne, A.; Fillaudeau, M.; Kang, Y. K.; Lebrun, A.; Bantignies, J.-L.; Housset, D.; Amblard, M.; Maillard, L. T.; Legrand, B.

Angew. Chem. Int. Ed. **2026**, 65, e9299244DOI: [10.1002/anie.9299244](https://doi.org/10.1002/anie.9299244)

Abstract: Precise control of peptide backbone folding through non-covalent interactions remains a major challenge in foldamer design. In this work, we demonstrate that heteroatom substitutions program conformational switching in azole gamma-peptides by tuning intrinsic stereoelectronic effects within heterocyclic gamma-amino acids. Conformationally constrained thiazole- and oxazole-based gamma-amino acids were designed to adopt conformations driven by either a C 9 or a C 7 intramolecular H-bond depending on key 1,4-X & centerdot; & centerdot; & centerdot; O interactions (X = S or N). We previously showed that thiazole-based oligomers form a well-characterized canonical 9-Helix. Here, permutation of the sulfur and nitrogen atoms within the heterocycle induces a stretched helical structure with alternating C 7-turns and residues in extended conformations. This unusual topology arises from competition between seven-membered intra-residue H-bonds and attractive S & centerdot; & centerdot; & centerdot; N electrostatic-chalcogen interactions. Reversing this effect through an S -> O substitution affords oxazole-derived oligomers that adopt a stable 7-Helix stabilized by a continuous seven-membered H-bond network in solution. These findings show that simple heteroatom permutation or substitution allows control over heterocyclic gamma-peptide folding, thereby expanding opportunities for foldamer design in molecular recognition, catalysis, and biomedical applications.

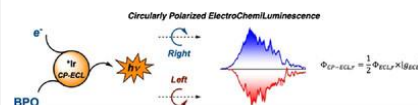
Bright Circularly Polarized Electrochemiluminescence from Heterobinuclear Ir(III)-Au(I) Enantiomers

Ballerini, L.; Liu, M.; Arrico, L.; Voci, S.; Gourlaouen, C.; Daniel, C.; Cesar, V.; Bellemine-lapontaz, S.; Zinna, F.; Bouffier, L.; Polo, F.; Di Bari, L.; Sojic, N.; Mauro, M.

Angew. Chem. Int. Ed. **2026**, 65, e202510787

DOI: [10.1002/anie.202510787](https://doi.org/10.1002/anie.202510787)

Abstract: The development of efficient circularly polarized electrochemiluminescence (CP-ECL) probes is still at its infancy and examples are still very limited. Yet, their achievement would enable gathering a readout that carries privileged information on the probe's chiral environment by monitoring luminescence polarization bias with high signal-to-noise ratio. Notwithstanding, this is a highly challenging task and requires judicious chemical engineering of chiral ECL-active emitters. Herein, we aim at expanding the palette of CP-ECL luminophores by presenting a novel class of enantiopure heterobinuclear Ir(III)-Au(I) complexes, which are investigated thoroughly by means of chemical, structural, and (chiro-)optical techniques. The ground and excited state properties are also elucidated by using density functional theory (DFT) approaches including spin-orbital coupling (SOC) perturbation. The chiral-at-metal complexes display luminescence with a polarization bias of the emitted light that is function of the helical arrangement of the coordination sphere around the Ir(III) center. Overall, the photo- and electro-active complexes unraveled in this work combine unparallelly high photoluminescence quantum yield in the orange region, excellent circularly polarized luminescence (CPL) brightness up to 4.5 M⁻¹ cm⁻¹ with a notable ECL activity. Finally, these features provide emitters with CP-ECL efficiency that encompass remarkably by a factor 3.5 that of the well-known benchmark tris-(2,2'-bipyridyl)ruthenium(II).



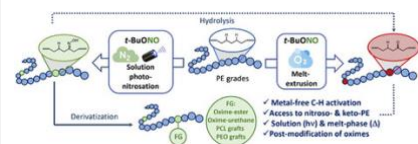
Selective, Oxygen-Tunable, and Metal-Free Functionalization of Polyethylene Through Dual-Mode Nitrosation and Carbonylation

Cluzeau, L.; Robert, F.; Bassani, D. M.; Landais, Y.; Taton, D.

Angew. Chem. Int. Ed. **2026**, 65, e202520646

DOI: [10.1002/anie.202520646](https://doi.org/10.1002/anie.202520646)

Abstract: Polyethylene (PE), the world's most produced synthetic polymer, is highly durable but resistant to chemical modification due to its inert carbon-carbon backbone. This work presents a metal-free, nitrosation process for direct CH functionalization of PE, enabling selective formation of oxime- or carbonyl-functionalized polymers. The method operates under mild visible-light conditions in solution and through thermally driven reactive extrusion, making it suitable for both laboratory and industrial applications. The key reagent, tert-butyl nitrite (t-BuONO), produces an alkoxy radical (t-BuONO center dot) for CH activation and a persistent nitrosyl radical (NO center dot) that installs ketoxime functionalities. Mechanistic studies using quantum yield determination and time-resolved transient absorption spectroscopy confirm the energy-transfer activation of t-BuONO and hydrogen atom transfer pathways. Unlike previous strategies, this approach yields pure oxime or keto-functionalized PE's without metals or pre-functionalization. Moreover, oxime groups serve as intermediates convertible into esters, ethers, or urethanes, allowing control over polymer polarity and thermomechanical properties. Together, this strategy transforms a venerable small-molecule transformation into a scalable, selective, and tunable route for the upcycling of PE, and enables a selective and sustainable route to valorize one of the world's most ubiquitous, but most recalcitrant plastics.



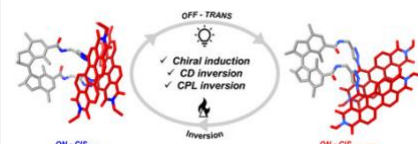
Light- and Heat-Induced Reversal of Circularly Polarized Luminescence in a Single Molecule

Hardoin, L.; Sidler, E.; de Boer, J. Y.; Delhay, G.; Loumagne, M.; Allain, M.; Goeb, S.; Ryabchun, A.; Salle, M.; Jacquemin, D.; Feringa, B. L.; Canevet, D.

Angew. Chem. Int. Ed. **2026**, 65, e202522699

DOI: [10.1002/anie.202522699](https://doi.org/10.1002/anie.202522699)

Abstract: Switching the handedness of circularly polarized luminescence (CPL) at the molecular level remains a challenge in the development of responsive chiral materials. We report a light-driven molecular motor covalently linked to two perylenediimide (PDI) chromophores, enabling reversible and directional modulation of CPL. The different motor states, which are accessible in a unidirectional fashion via light-irradiation and thermal helix inversion steps, respectively, display significantly distinct chiroptical properties. In addition, our system allows switching of the chiral induction process and hence, the observation of a CPL signal. The present work discloses the first example of reversible CPL sign inversion triggered by light irradiation at the single molecular level, offering a new starting point for designing emitters with light-responsive chirality modulation.



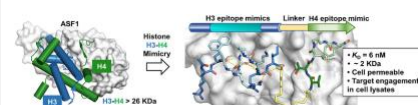
Downsizing the Histone H3-H4 Quaternary Structure Into Foldamer Mimetics Yields High-Affinity and Cell-Permeable Ligands of ASF1

Li, B.; Perrin, M. E.; Maillard, E.; Vitard, A.; Moal, G.; Mbianda, J.; Andre, C.; Teixeira Nunes, M.; Vandamme, M.; Pinna, G.; Douat, C.; Thion, E.; Guerois, R.; Legrand, P.; Guichard, G.; Ochsenbein, F.

Angew. Chem. Int. Ed. **2026**, 65, e4112426

DOI: [10.1002/anie.4112426](https://doi.org/10.1002/anie.4112426)

Abstract: Mimicking complex protein-protein interfaces with small, well-defined molecular scaffolds remains a major challenge in chemical biology. Here, we report a foldamer-based downsizing strategy that compresses the quaternary architecture of the histone H3-H4 dimer into compact peptide-oligourea hybrids acting as high-affinity ligands of the histone chaperone Anti-Silencing Function 1 (ASF1). Guided by multiple high-resolution co-crystal structures, we designed a series of foldamer mimetics that accurately reproduce both the H3 alpha-helix and the H4 beta-strand epitopes. Systematic optimization of linker geometry, beta-strand mimicry, formal charge, and selective backbone N-methylation yielded highly stable ligands with nanomolar affinities, enhanced proteolytic resistance, and robust cytosolic penetration. Notably, the optimized



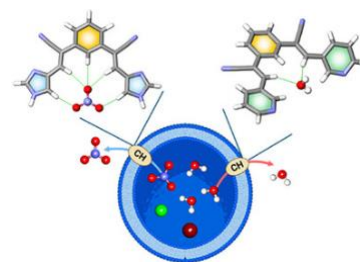
constructs and their N-methylated analogues recapitulate the binding mode of the native H3-H4 dimer on ASF1 with high fidelity and engage endogenous ASF1 in cell extracts, demonstrating effective intracellular target recognition. Together, these results show that peptide-oligoure foldamers can reproduce the structural features of a protein quaternary structure surface, combining high affinity, high stability and cell permeability.

Selective Nitrate Transmembrane Transport Through Adaptive Weak C—H Bonding Cyanostilbene Water Channels

Stroia, I.; Su, D.-D.; Li, Y.; Hadade, N.; Grosu, I.; van der Lee, A.; Barboiu, M.

Angew. Chem. Int. Ed. **2026**, 65, e4918548

DOI: [10.1002/anie.4918548](https://doi.org/10.1002/anie.4918548)



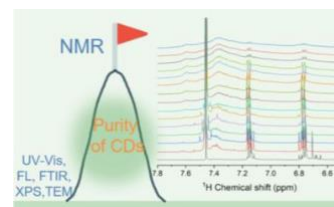
Abstract: Transmembrane water transport strongly depends on how dynamic, translocating water clusters are stabilized within hydrogen-bonding (HB) channels. Both structural order and short-lived disorder of transient channels play important roles in ion and water translocation. Strong HB can result in tight water binding and reduced mobility. We hypothesize that weaker HB binding sites reduce water friction, thereby enhancing water permeation while suppressing ion transport due to their unmet dehydration requirements within membrane. Herein, we show that weak HB CH donor cyanostilbenes promote water transport through adaptive, less-ordered water channels within the lipid bilayer, with water translocation efficiency depending in part, on the strength of the CH donor sites. Fine-tuning both CH donor strength and binding geometry enables modulation of anion transport selectivity, ranging from moderate NO₃⁻ over Cl⁻ selectivity to highly NO₃⁻ selective transport and ultimately to exclusive water transport. For instance, we achieved over 200-fold selectivity for NO₃⁻ over Cl⁻ and similar to 100-fold selectivity for NO₃⁻ over Br⁻, while some systems showed no detectable Cl⁻ or Br⁻ transport yet retaining strong NO₃⁻ transport activity. This work represents a step toward adaptive transmembrane water channels and highlights the potential of HB CH donor channels for water translocation and for increased NO₃⁻/Cl⁻ selectivity.

Decoding Carbon Dot Purity by Nuclear Magnetic Resonance

Hu, Y.; Bianco, A.

Angew. Chem. Int. Ed. **2026**, 65, e6610061

DOI: [10.1002/anie.6610061](https://doi.org/10.1002/anie.6610061)



Abstract: Carbon dots (CDs) have attracted increasing attention in recent years and have been widely explored in many fields. However, several challenges still limit their further development, particularly the unclear atomic structure and fluorescent mechanisms. Addressing these issues requires a thorough purification of crude CD products followed by reliable purity assessment. In this work, we combine dialysis and NMR analysis to evaluate the effectiveness of purification and consequent purity of CDs. Two representative CDs, citric acid-ethylenediamine-derived CDs and citric acid-p-phenylenediamine-derived CDs were synthesized via hydrothermal treatments. The crude products were first filtered and aliquoted for dialysis. Collected retentates were characterized by microscopy and spectroscopy techniques. With increasing dialysis time, the mass of retentates gradually decreased reaching a steady state. In the NMR spectra, sharp peaks gradually attenuated and eventually disappeared, indicating progressive removal of impurities. Meanwhile, the ratio of integrated broad peaks to sharp peaks increased and reached a plateau with prolonged dialysis. A linear correlation was observed between CD purity and the integrated peak ratios. This work establishes a standardized and (semi-)quantitative NMR-based methodology for CD purity assessment, enabling a systematic differentiation and relative quantification of CDs and coexisting small molecular species, thereby addressing a key limitation of previous analyzes.

Synergistic Action of Crystallophore and Imaging-Crystallophore Enhances the Production and Imaging of Protein Crystals

Roux, M.; Roux, A.; Boukeke-Ispulier, T.; Riobe, F.; Chapelle, C.; Foos, N.; Dumont, E.; Girard, E.; Gillet, N.; Maury, O.

Angew. Chem. Int. Ed. **2026**, 65, e202525011

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Abstract: The synthesis and photophysical characterization of a new family of terbium(III) complexes called Imaging-crystallophore, substituted by pi-conjugated antennas, is reported. Previous crystallophore variants (such as Tb-Xo4) have shown very interesting nucleating properties to obtain high-quality protein crystals. In addition, the Imaging-crystallophore emits in the green and accumulates in the protein crystals, enabling very easy crystal detection using fluorescence microscopy under one-photon but also under two-photon excitations. X-ray diffraction crystallography and molecular dynamics simulations demonstrate that the binding site of the Imaging-crystallophore in hen-egg white lysozyme (HEWL) is similar to that of the Tb-Xo4 but present additional hydrophobic interactions with the conjugated antennas. However, its nucleating properties are not as effective as those of Tb-Xo4. Finally, we emphasize the synergy between the two generations of crystallophore by preparing and analyzing the properties of the mix (10/0.2) corresponding to a mixture of Tb-Xo4 and Imaging-crystallophore. By combining the best of nucleating and imaging properties, we can easily obtain and detect high-quality protein crystals

Water-Dispersible Ruthenium Nanocatalyst for Carbonyl Reduction With D₂ or T₂ in Aqueous Media

Martinelli, E.; Rioboo Jimenez, R.; Weck, R.; Feuillastre, S.; Martinez-Prieto, L. M.; Pieters, G.; Derdau, V.

Angew. Chem. Int. Ed. **2026**, 65, e8356049

DOI: [10.1002/anie.8356049](https://doi.org/10.1002/anie.8356049)



Abstract: The growing development of biologics as therapeutic agents urges the development of efficient catalytic methods enabling the direct incorporation of hydrogen isotopes from readily available and easy-to-handle isotopic sources in aqueous media. In this context, we report the synthesis and characterization of water-dispersible ruthenium nanoparticles stabilized by the commercially available phosphine ligand sSPhos, and their application as catalysts for carbonyl reduction reactions under low-pressure deuterium and tritium atmospheres. Using this nanocatalyst, a broad range of functionalized deuterated alcohols was successfully obtained in high isotopic enrichment from diverse aldehyde precursors, including a large cyclic peptide derivative (acetyl-cyclosporin A). Mechanistic investigations revealed that in some cases, deuterium incorporation proceeds through both hydrogen isotope exchange on the aldehyde starting material and the reductive deuteration pathway. To demonstrate the synthetic utility of this methodology for the regioselective labeling of complex molecules, a two-step sequence consisting of Bobbitt's salt-mediated oxidation of the alcohol followed by its reductive deuteration was successfully applied to the active pharmaceutical ingredient losartan and a peptide-derived cathepsin-cleavable linker widely used in antibody-drug conjugates. Together with the successful tritiation experiment, these results highlight the broad method potential for the challenging hydrogen isotope labeling of complex polar molecules and biologics.

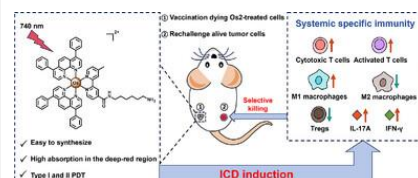
A Deep-Red-Absorbing Osmium(II) Complex as a Photosensitizer for Photodynamic Therapy Inducing Immunogenic Cell Death

Zhang, Y.; Mesdom, P.; Izquierdo-Garcia, E.; Antonio, J. P. M.; Gao, R.; Saubamea, B.; Seguin, J.; Moinard, M.; Arnoux, P.; Frochot, C.; Cariou, K.; Doan, B.-T.; Gasser, G.

Angew. Chem. Int. Ed. **2026**, 65, e8677989

DOI: [10.1002/anie.8677989](https://doi.org/10.1002/anie.8677989)

Abstract: Immunogenic cell death (ICD), which converts tumor cells into their own vaccine, plays a pivotal role in the development of novel anticancer therapies. Here, a small series of osmium(II) polypyridyl complexes was synthesized, and their biological activity in the dark and upon light irradiation against various cancer cell lines was studied. The compound Os2 (bearing two 4,7-diphenyl-1,10-phenanthrolines and one substituted bipyridine ligand) was discovered to be the most effective photosensitizer (PS) for photodynamic therapy (PDT) of this series through the photogeneration of 1O_2 and center dot OH. In addition, Os2 was found to exhibit promising toxicity upon deep-red irradiation under both normoxia and hypoxia. These observations indicate that this PS is working through a mixture of Type-I and Type-II mechanisms. More interestingly, upon 740 nm irradiation, Os2 can stimulate a strong ICD response on CT26 and MCA205 cells both in vitro and in vivo. A comprehensive immune analysis showed that mice vaccinated with Os2-treated CT26-luc cells boosted the systemic specific adaptive immune responses, including the activation of CD8⁺ T cells and reprogramming of macrophages, leading to effective inhibition of tumor growth. Os2 is, to the best of our knowledge, the first photoactive osmium-based complex inducing ICD.



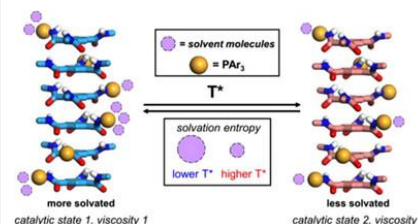
Solvation Entropy as a Lever for Steering the Macroscopic Properties of a Functional Supramolecular Helical Polymer

Kong, H.; Martinez-aguirre, M. A.; Li, Y.; Ikai, T.; Yashima, E.; Velpula, G.; De Feyter, S.; Albouy, P.-A.; Akpo, K.; Brocorens, P.; Lazzaroni, R.; Bouteiller, L.; Raynal, M.

Angew. Chem. Int. Ed. **2026**, 65, e202521365

DOI: [10.1002/anie.202521365](https://doi.org/10.1002/anie.202521365)

Abstract: Solvent-solute interactions are utterly important in supramolecular polymers (SPs), yet the high responsivity of SPs to solvent polarity makes it challenging to play on other solvation effects to tune their macroscopic properties in a rational manner. Herein, we report the characterization at various scales of the assembly properties of a C₂-symmetric benzene-1,3,5-tricarboxamide monomer with two (1S)-methylheptyl moieties and one diphenylphosphino group as lateral chains. Our investigation reveals a highly cooperative structural transition between two SP states, which can exquisitely be tuned by solvents of similar polarities, leading to variation of the transition temperature (T^*) over a range of 85 K. The structural transition was detected in 4 pure solvents and 13 toluene/cosolvent mixtures; a fair relationship is determined between T^* and the solvent molar volume. The transition is only weakly favored by enthalpy (by ca. 2 kJ.mol⁻¹ at 286 K). However, minimization of the entropic cost leads to a notable increase in the T^* . This allows a fine tuning of the thermothickening and catalytic properties of the resulting SPs auguring that solvation, and notably solvation entropy, may constitute an important lever for steering SPs structure and properties.



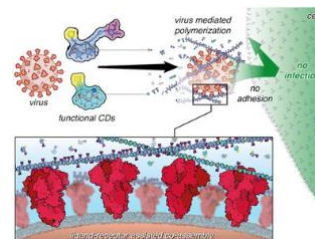
Virus-Mediated Self-Assembly of Functional Cyclodextrins for Antiviral Inhibition

Hernando, P. J.; Boulo, L.; Lavnech, L.; Teyssou, E.; Marot, S.; Gothland, A.; Guigner, J.-M.; Marcelin, A.-G.; Menand, M.; Calvez, V.; Sollogoub, M.

Angew. Chem. Int. Ed. **2026**, 65, e3935543

DOI: [10.1002/anie.3935543](https://doi.org/10.1002/anie.3935543)

Abstract: We report a virus-mediated supramolecular assembly as an adaptive inhibitor of viral infection. Building on cyclodextrin (CD) host-guest self-assembly, we designed a monomer bearing an adamantyl unit to promote inclusion-mediated polymerization, a bridge across the CD cavity to prevent self-inclusion, and a sialic acid (SA) ligand to engage spike glycan-recognition sites. A series of SA-functionalized self-assembling CDs was synthesized, together with nonassembling and nonbinding controls. In cellular infection assays, the SA-functionalized self-assembling CD inhibited SARS-CoV-2-induced cytopathic effect (CPE) without detectable cytotoxicity, whereas controls were inactive, indicating that both self-assembly and ligand recognition are required for antiviral activity. NMR and cryo-electron microscopy studies of the active SA-functionalized self-assembling CD show that the viral surface mediates supramolecular polymer growth by nucleating cooperative supramolecular polymerization through ligand-receptor recognition. Inhibition was maintained across multiple SARS-CoV-2 variants, consistent with adaptive assembly. Coassembly with an unfunctionalized self-assembling CD preserved strong inhibition at low ligand fractions, supporting heteropolymer formation with optimized ligand spacing. These findings establish virus-mediated supramolecular polymerization of functional CDs as a modular antiviral platform.

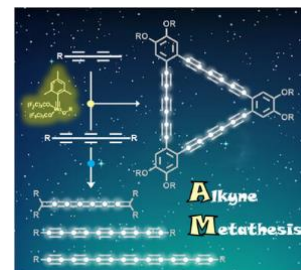


Synthesis of Conjugated Linear and Cyclic Polyynes by Selective Alkyne Metathesis

Escudero, J.; Long, J.; Bouetard, D.; Morvan, J.; Koohgard, M.; Neitzel, A.; Bockfeld, D.; Nwachukwu, S.; Roisnel, T.; Tykwinski, R. R.; Tamm, M.; Mauduit, M.; Trolez, Y.

Angew. Chem. Int. Ed. **2026**, 65, e202523344

DOI: [10.1002/anie.202523344](https://doi.org/10.1002/anie.202523344)



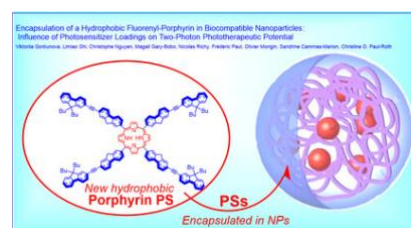
Abstract: The formation of polyynes with an odd number of conjugated triple bonds is synthetically demanding, particularly for complex architectures, since most established methods rely on irreversible C-C bond-forming reactions and operate under kinetic control. To address this problem, we have developed the synthesis of triynes via molybdenum-catalyzed alkyne metathesis of diynes, which allows thermodynamic control through reversible cleavage and formation of carbon-carbon triple bonds. We demonstrate the potential of this method through the synthesis of challenging, more complex products, including triyne precursors to [7]cumulenes, a pentayne, a heptayne, and dehydrobenzannulene macrocycles containing triynes. The key to the success of the proposed methodology is achieving a balance between the selectivity and reactivity of the molybdenum catalyst with the diyne precursors.

Encapsulation of a Hydrophobic Fluorenyl-Porphyrin in Biocompatible Nanoparticles: Influence of Photosensitizer Loadings on Two-Photon Phototherapeutic Potential

Gorbunova, V.; Shi, L.; Nguyen, C.; Gary-Bobo, M.; Richy, N.; Paul, F.; Mongin, O.; Cammas-Marion, S.; Paul-Roth, C. O.

ChemistryEurope **2026**, 4, e202500256

DOI: [10.1002/ceur.202500256](https://doi.org/10.1002/ceur.202500256)



Abstract: The synthesis of a new star-shaped hydrophobic porphyrin photosensitizer (PS), decorated with four strong two-photon absorbing antennae is reported. This compound, acting as a powerful fluorescent two-photon PS in organic solvents, is encapsulated at various loadings into biocompatible poly(benzyl malate)-based polymeric nanoparticles (NPs). The resulting formulations are characterized in terms of NPs size and dispersity. Herein, it is shown that stable monodisperse formulations can be obtained up to 25 wt% loadings (relative to polymer mass). Given that the highest loading are desirable in therapy, the influence of porphyrin loading on the one- and two-photon photophysical properties of the NPs in water is subsequently investigated. While fluorescence is not significantly affected by increasing loadings, the singlet oxygen quantum yield decreases at higher loadings together with the two-photon absorption (2 PA) cross-section (σ_2) values. However, the 2 PA capacity of PS at 25 wt% loading remained competitive, keeping the same order of magnitude than at lower loadings. Finally, to evaluate how loading affects two-photon phototherapy and fluorescence imaging, the performances of the NPs are evaluated through in vitro studies on MCF-7 breast cancer cells. Despite the strong confinement experienced in situ by the PS, the better results were obtained with the most highly loaded NPs (25 wt%) validating a posteriori the potential of these nanoobjects for theranostic applications.

Acid/Base-Triggered (Chir)Optical Switching and Efficient Singlet Oxygen Generation from a Pyrene-Extended Azahelicene

Sarkar, S.; Decarli, N. O.; Jardel, D.; Merlet, E.; Jonusauskas, G.; Mori, T.; Kauffmann, B.; Ferrand, Y.; McClenaghan, N.; Olivier, C.

ChemistryEurope **2026**, 4, e70278

DOI: [10.1002/ceur.70278](https://doi.org/10.1002/ceur.70278)



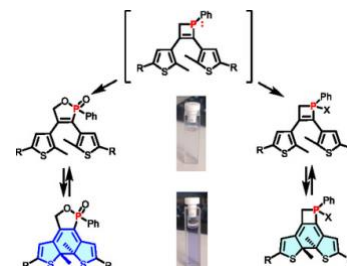
Abstract: A pyrene-extended azahelicene comprising 14 fused aromatic rings has been synthesized, featuring reversible protonation in solution that enables tunable optoelectronic and chiroptical responses. Protonation induces a marked redshift of the absorption into the near-infrared region and quenches the fluorescence of the neutral form. Enantiomeric resolution allowed acid/base-triggered switching of chiroptical signals, i.e., circular dichroism (CD) and circularly polarized luminescence (CPL). The neutral species also displays efficient singlet-to-triplet intersystem crossing (66%), leading to significant singlet oxygen generation ($\Phi_{\Delta} = 0.62$). These findings establish pi-extended azahelicenes as promising proton-responsive photofunctional materials.

Leveraging P-Reactivity and Ring Strain to Generate Molecular Diversity in Dithienylethenes-Based Photochromes

Chemin, A.; Fekete, C.; Cordier, M.; Duan, Z.; Boixel, J.; Benko, Z.; Bouit, P.-A.; Hissler, M.

ChemistryEurope **2026**, 4, e202600004

DOI: [10.1002/ceur.202600004](https://doi.org/10.1002/ceur.202600004)



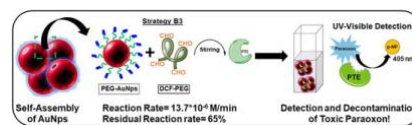
Abstract: We synthesized and studied phosphatene-bridged dithienylethenes (DTEs), featuring 4-membered P-rings, exploring their P-chemistry and ring strain reactivity that allowed us to isolate 5-membered oxophospholones. Experimental and density functional theory (DFT) studies revealed how these modifications influence photochromic properties, with an impact of the P-environment on the photokinetic metrics, demonstrating the value of 4-membered strained P-rings for tunable photoresponse. These systems exhibit good fatigue resistance including in the solid-state. This work highlights phosphorus-based molecular engineering as a powerful strategy for designing advanced photochromic materials.

Gold Nanoparticles-Dynamic Constitutional Frameworks as Adaptive Hybrid Conjugates for Enzyme Immobilization

Daakour, S.; Mazzei, R.; Bazzarelli, F.; Vitola, G.; Giorno, L.; Barboiu, M.

ChemistryEurope **2026**, 4, e202500252

DOI: [10.1002/ceur.202500252](https://doi.org/10.1002/ceur.202500252)



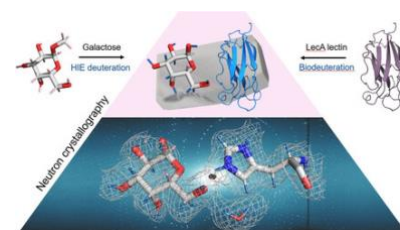
Abstract: Dynamic constitutional frameworks (DCFs), connecting monomers via reversible covalent bonds, can initiate the assembly of gold nanoparticles (AuNps) with distinctive optoelectronic and surface chemical properties. A previous study indicated that these nanomaterials are particularly valuable for carbonic anhydrase immobilization and stabilization, with potential applications in biocatalysis and biosensing. However, further studies with different enzymes are needed to prove their universality. Therefore, this research focuses on immobilizing phosphotriesterase (PTE), an effective degrader of toxic organophosphates, on AuNp-DCF conjugates. PTE is integrated with citrate- and PEG-stabilized AuNps or imine-based DCFs resulting in stable, homogeneous PTE-AuNp-DCF assemblies. The conjugates exhibit high bonding affinity and changes in the PTE's secondary structure, which did not deactivate the enzyme. The catalytic performance of immobilized PTE is evaluated by measuring the p-nitrophenol (p-NP) production in a similar way as sense the paraoxon during its enzymatic hydrolysis, used as a model organophosphate. PTE immobilized to PEG2000-AuNps assembled with DCF-PEG1500 shows the highest reaction rate ($13.7 \times 10^{-6} \pm 0.82 \text{ M min}^{-1}$), outperforming that immobilized to citrate-stabilized AuNps ($3.71 \times 10^{-6} \pm 0.21 \text{ M min}^{-1}$). Furthermore, these PTE-PEG-AuNp-DCF conjugates at a 1/25 molar ratio display a residual reaction rate, 3.6 times higher than that of all other conjugates. Free amino groups exposed on the surface of AuNps facilitate optimal assembly with DCF-PEG through aldehyde/amino exchange reactions, preserving PTE activity. These results highlight the potential of PTE-DCF-AuNp conjugates to intercept and transform small molecules like paraoxon.

Neutron Crystallography Study of Host-Pathogen Recognition Enhanced by Hydrogen/Deuterium Exchange on Carbohydrates

Arnaud, T.; Tatol, C.; Devos, J. M.; Gajdos, L.; Vidal, S.; Korsak, M.; Varrot, A.; Wimmerova, M.; Feuillastre, S.; Blakeley, M. P.; Imberty, A.

ChemistryEurope **2026**, 4, e202500424

DOI: [10.1002/ceur.202500424](https://doi.org/10.1002/ceur.202500424)



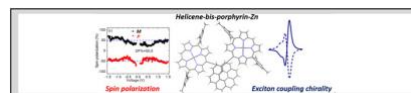
Abstract: Neutron macromolecular crystallography (NMx) is a unique tool for location of hydrogen atoms. Its application is greatly enhanced by the use of deuterium-labeled molecules. Human glycans are the targets of virulence factors from pathogens, such as the soluble lectins from the opportunistic bacterium *Pseudomonas aeruginosa*. Deuterated galactose was obtained by hydrogen isotope exchange and cocrystallized with a fully deuterated bacterial receptor, LecA, a lectin involved in *P. aeruginosa* tissue adhesion and biofilm formation. The structure of the complex determined using neutron diffraction reveals the positions of all hydrogen atoms, as deuterium, highlighting the important role of a charged histidine in the binding site, the bridging by a buried water molecule and the influence of the coordinating calcium ion on the adjacent hydrogen bonds. LecA is a target for pathoblockers and these structural details can assist in the design of glycomimetics for fighting multidrug resistant infections.

Helicene-Bis-Porphyrin Conjugates: Exciton Coupling Chirality and Chiral-Induced Spin Selectivity

Matozzo, P.; Santra, K.; Kumar, A.; Parmar, S.; Morgante, P.; Dhbaibi, K.; Rajendran, R.; Vanthuyne, N.; Naaman, R.; Autschbach, J.; Crassous, J.

ChemistryEurope **2026**, 4, e202500314

DOI: [10.1002/ceur.202500314](https://doi.org/10.1002/ceur.202500314)



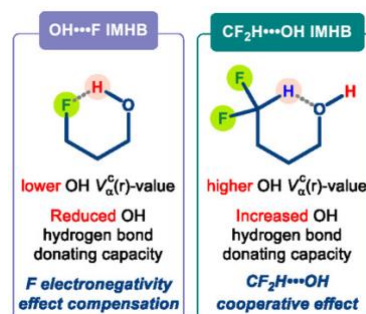
Abstract: Following previous work on helicene-porphyrin conjugates in which carbo[6]helicene are connected to zinc-porphyrin via phenyl-bis-ethynyl bridges (Por(Zn)-H[6] 1, series 1), and displaying clear exciton coupling (EC) chirality, novel carbo[6]helicenes derivatives substituted at their 2,15 positions by zinc-porphyrin units are prepared, either through a triple bond (Por(Zn)-H[6] 2, series 2), or through an alkynyl-phenyl bridge (Por(Zn)-H[6] 3, series 3). Series 2 is also synthesized with free porphyrins or different metals [Ni(II) and Pd(II)]. Their photophysical and chiroptical properties (electronic circular dichroism and circularly polarized luminescence) are characterized, and it is examined how i) the distance between the porphyrin units and ii) the metal type impacted these properties. Experimental and theoretical analyses highlight strong responses originating from EC chirality in combination with the typical helicene-centered optical activity. The Por(Zn)-H[6] 2 system displaying strong absorption dissymmetry factors is then selected to experimentally examine the chiral-induced spin selectivity effect by magnetic conductive atomic force microscopy; a spin polarization of 50% is measured.

The Conformational Electrostatic Potential as Predictor for the Influence of Fluorination on Alcohol Hydrogen Bonding: Identification of a CF₂H-Mediated Cooperative Effect

Wang, Z.; Compain, G.; Naskar, M.; Goupille, A.; Mtashobya, L.; Murgia, I.; Graton, J.; Le Questel, J.-Y.; Linclau, B.

ChemistryEurope **2026**, 4, e202500203

DOI: [10.1002/ceur.202500203](https://doi.org/10.1002/ceur.202500203)



Abstract: Hydrogen bonding is the most important noncovalent interaction involved in molecular binding events. Herein, how gamma-fluorination alters the hydrogen bond (HB)-donating capacities of aliphatic alcohol groups is described. Herein, it is shown that the increase in HB-donating

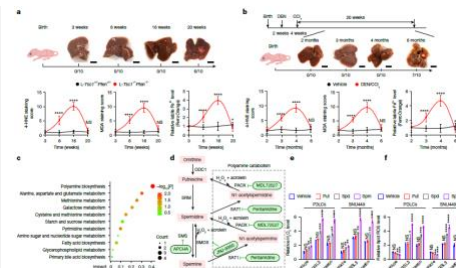
capacity due to the fluorine electronegativity can be significantly attenuated by 6-membered F center dot center dot center dot HO intramolecular HB (IMHB), to the point where even in acyclic structures a decrease in alcohol HB-donating capacity is observed. The correlation of experimental HB-donating capacities (pK AHY-scale) with an easily computed descriptor, the Kenny molecular electrostatic potential $V_{\alpha}(r)$, is discussed. It is shown that F center dot center dot center dot HO IMHB leads to a $V_{\alpha}(r)$ reduction which, in the case of highly populated IMHB conformers, leads to an underestimation of HB-donating capacities. The use of conformational electrostatic potentials, however, was found to be very useful to describe OH center dot center dot center dot F IMHB, as well as to explain variations in experimental alcohol HB-donating capacities. Notably, $V_{\alpha}(r)$ -analysis allowed the identification of the importance of conformational equilibria in explaining HB-donating capacity variations of identical fluorohydrin motifs, and notably it also reveals a cooperative effect involving a difluoromethyl group ($-CF_2H$) on alcohol HB-donating capacity.

Spermine is an endogenous iron chelator that inhibits ferroptosis

Li, M.; Yu, X.; Ouyang, S.; Chen, X.; Yu, H.; Liu, Y.; Li, Z.; Yu, C.; Kang, R.; Gaillet, C.; Colombeau, L.; Rodriguez, R.; Song, L.; Kroemer, G.; Tang, D.; Li, J.

Nature 2026, 655, 240–250

DOI: [10.1038/s41586-026-10597-2](https://doi.org/10.1038/s41586-026-10597-2)



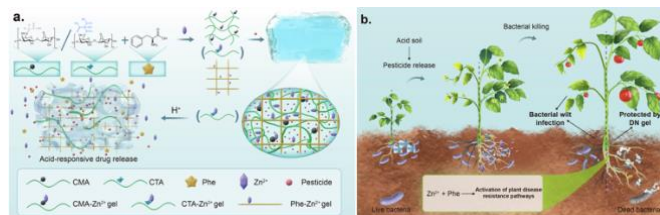
Abstract: Ferroptosis is an iron-dependent form of cell death driven by lipid peroxidation¹. Here we identify spermine—a polyamine derived from spermidine²—as an endogenous iron chelator that directly suppresses ferroptosis. Integrating metabolomics, stable isotope tracing and biophysical studies of the interaction between spermine and Fe^{2+} ions, we demonstrate that aldehyde dehydrogenase 18 family member A1 (ALDH18A1) promotes an alternative glutamine-dependent pathway for de novo spermine synthesis. This process limits iron availability and lipid peroxidation in hepatocellular carcinoma. Genetic or pharmacological inhibition of ALDH18A1—through knockout, short hairpin RNA delivered using adeno-associated virus (AAV), or the small molecule inhibitor YG1702—triggers ferroptosis and impairs both spontaneous and chemically induced hepatocarcinogenesis. Conversely, supplementation of spermine protects against ferroptosis-associated ischaemia–reperfusion injury across multiple tissues, including the liver, intestine and kidneys. These findings uncover a pathophysiologically relevant metabolic circuit in which spermine-mediated iron chelation suppresses ferroptosis.

A pH-responsive double network hydrogel for control of tomato bacterial wilt

Xiang, S.; Chen, M.; Tian, S.; Peng, H.; Sun, H.; Cao, M.; Ménard-Moyon, C.; Sun, X.; Bianco, A.

Nat. Comm. 2026, 17, 5219

DOI: [10.1038/s41467-026-73922-3](https://doi.org/10.1038/s41467-026-73922-3)



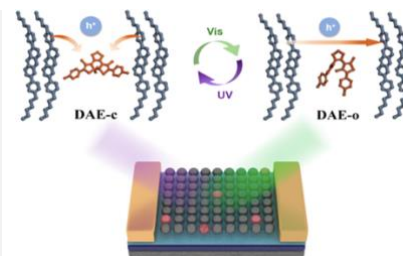
Abstract: *Ralstonia solanacearum* is a major plant pathogen causing bacterial wilt, whose unpredictable onset hinders timely detection and effective control. Here, we report the design, preparation and field use of a dual pH-responsive multifunctional double network (DN) hydrogel for the efficient and sustainable control of bacterial wilt. The primary network of carboxylated agarose chelates Zn^{2+} and loosens under acidic conditions ($pH \leq 5$) to release a pesticide (zhongshengmycin) and Zn^{2+} , while the secondary L-phenylalanine (Phe)/ Zn^{2+} network disassembles to provide additional bioactive components (Phe and Zn^{2+}). This dual-triggered release achieves a combined antibacterial effect, enhances plant growth, and activates plant disease resistance pathways. A simple root application protects plants for up to 14 days, and field experiments demonstrate disease control for up to 30 days, significantly preserving tomato yield. Here, we present a sustainable, effective system for managing bacterial wilt and highlight the potential of smart hydrogels in crop protection.

Precise Optical Modulation of Charge Transport in 2D Organic Molecular Crystals through Tailor-Designed Photoswitchable Guest–Host Architectures

Zhang, C.; Wang, C.; Li, F.; Han, B.; Zhou, B.; Liu, J.; Han, H.; Zhang, H.; Ding, R.; Xu, B.; Feng, J.; Liu, Z.; Tian, W.; Samori, P.

J. Am. Chem. Soc. 2026, 148, 8917–8926

DOI: [10.1021/jacs.5c21844](https://doi.org/10.1021/jacs.5c21844)



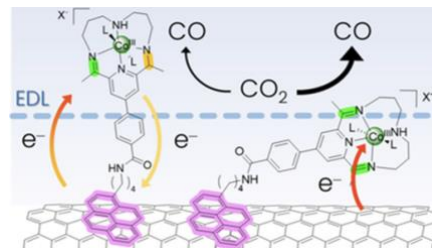
Abstract: Two-dimensional organic molecular crystals (2DOMCs) have emerged as promising candidates for next-generation ultrathin electronics. However, precisely and reversibly modulating their charge-transport characteristics remains a significant challenge. Herein, we report a molecular engineering strategy to create light-programmable field-effect transistors (FETs) based on a monolayer thick 2DOMCs, which is achieved by dispersing photochromic diarylethene (DAE) guests into a crystal host matrix of 2,6-bis-(4-hexylphenyl) anthracene (C6-DPA). By systematically functionalizing the DAE periphery with substituents of varying electron-donating and -withdrawing strengths, we precisely tune the HOMO energy levels of the guest molecules. We identify DAE-OCH₃ as the optimal dopant, which enables a 54% modulation of the FET current within just 5 s of UV light “writing” process. Notably, the optimized C6-DPA/DAE-OCH₃ (15%) guest–host system exhibits approximately 85 distinct and stable current levels, corresponding to a storage capacity exceeding 6 bits, with excellent retention over 16 days. This performance represents a significant advancement in ultrathin multilevel memories based on high-mobility organic semiconductors. Our approach establishes a general platform for developing stimuli-responsive 2D organic materials with programmable (opto)-electronic properties, opening new avenues for high-density data storage and future generation intelligent (opto)-electronics.

Investigating the Intrinsic Activity, Nature, and Deactivation Pathway of a Carbon-Nanotube-Confined Molecular Co Catalyst for CO₂ Reduction

Haake, M.; Caumes, C.; Bjornsson, R.; Saint-Pierre, C.; Gasparutto, D.; Veronesi, G.; Tapia, A. A.; Artero, V.; Reuillard, B.

J. Am. Chem. Soc. **2026**, *148*, 13973–13984

DOI: [10.1021/jacs.5c22597](https://doi.org/10.1021/jacs.5c22597)



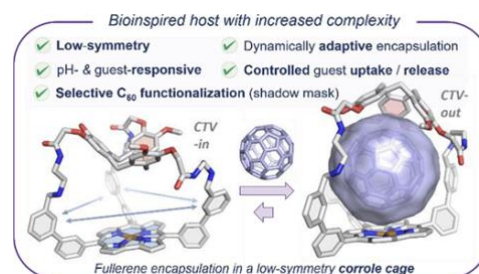
Abstract: Cathodes functionalized using molecular catalysts represent a promising approach for the efficient conversion of CO₂ into valuable products, with the potential to meet the performance metrics relevant to industrial applications. However, assessing the intrinsic activity of the metal center while maintaining the structure of the catalyst's molecular scaffold during electrolysis still remains a challenge. This work focuses on the in-depth characterization of a tetraaza-macrocyclic cobalt complex-based molecular cathode, from gaining a more accurate description of the catalyst's performance metrics to the investigation of its probable deactivation pathway during electrocatalytic CO₂ reduction (CO₂RR). Importantly, our findings confirm that lowering the surface concentration of the catalyst allows reaching a catalytic regime where the activity is not anymore limited by mass transport within the porous multiwalled carbon nanotube film but by the intrinsic activity of the immobilized catalyst, therefore allowing us to determine its TOF_{max} value of 4.9 s⁻¹. We propose that at least two populations of catalysts are present at the electrode surface, with variable contributions to the electrocatalytic process. Post operando studies provide key insights on the deactivation process of the immobilized catalyst via hydrogenation of both imine functions followed by demetallation.

A pH-Responsive Cu-Corrole-Based Cage That Reversibly Encapsulates Fullerene in a Shapeshifting Low-Symmetry Cavity

Baidiuk, A.; Pelachs, T.; Julliard, P.-G.; Szaloki, G.; Vedrenne, M.; Ribas, X.; Orio, M.; Martinez, A.; Canard, G.; Colombar, C.

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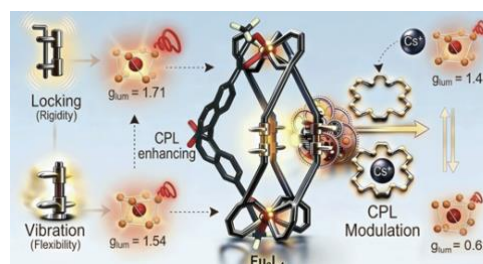
Abstract: Artificial hosts combining chemical functionalities (recognition sites and stimuli-responsive behavior) in a low-symmetrical and guest-adaptive environment are of major interest to better understand and mimic protein receptors. However, molecular cages are generally restricted to symmetrical cavities built from rigid subunits. For instance, porphyrin building blocks have a time-honored role in the preparation of receptors and confined catalysts. Here, we introduce a new design for molecular cages based on corroles, the low-symmetry analogue of porphyrins, breathing life into desymmetrized cavities. A (CuIII)-corrole complex was equipped with a shapeshifting cyclotrimeratrylene (CTV) roof via pH-responsive side arms. The latter enables the first metallocorrole-based cage CuIII(Hm-Cor) to reversibly bind fullerenes in a unique low-symmetry, conformationally adaptive, and pH-responsive cavity. Experimental and computational studies evidence flipping of the CTV roof upon fullerene binding, enabling structural reconfiguration of the host to adapt its size and shape to selectively accommodate the guest. Such conformational change also responds to the protonation of the cage's side arms. This pH-responsive cavity allows fullerene release and reuse of the host. Beyond establishing a key precedent for preparation of caged metallocorroles, the present study provides a unique approach for the on-demand fullerene encapsulation in a low-symmetry environment, enabling precise positioning of the guest and control over its functionalization.

Rigid Eu(III) Helicates Exhibit Remarkable Circularly Polarized Luminescence Activity and Naked-Eye Recognition toward Tizanidine

Huang, W.; Yao, Z.; Yin, S.; Gao, T.; Crassous, J.; Zhou, Y.; Li, H.

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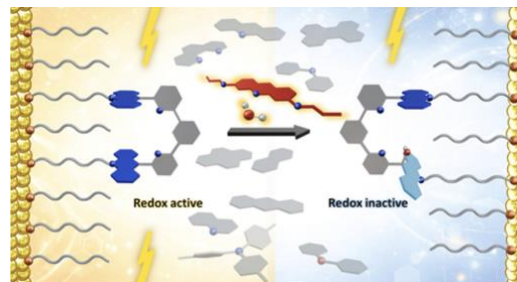
Abstract: The development of circularly polarized luminescence (CPL) emitters with a luminescence dissymmetry factor ($|g_{lum}|$) approaching the theoretical limit of 2 remains a central challenge in chiral photonics. Herein, considerable g_{lum} values (1.48–1.65) were achieved in helicates (NMe₄)₂[Eu₂(R/S-L1–4)] ($\Delta\Delta/\Lambda\Lambda$ -1–4) with different structural rigidity, as well as in crown ether-modified (NMe₄)₂[Eu₂(R/S-L5)] ($\Delta\Delta/\Lambda\Lambda$ -5) that exhibits adjustable coordination geometry symmetry. Notably, encapsulating bulkier [NMe₄]⁺ instead of a [NMe₄]⁺ counterion within the inner cavity of $\Delta\Delta/\Lambda\Lambda$ -2 further elevates $|g_{lum}|$ to an unprecedented 1.71, the highest value for any chiral molecular emitter. While the NMe₄- $\Delta\Delta/\Lambda\Lambda$ -3 achieves an ultrahigh CPL brightness (BCPL = 3625 M⁻¹ cm⁻¹), resulting from its large g_{lum} value (1.63) and high quantum yield (Φ_{PL} = 32%). Structural and spectroscopic analyses demonstrate that the high CPL activity originates from a conformationally rigidified square antiprismatic (SAP) geometry around the Eu-(III) center. This structure and property relationship is vividly demonstrated by the crown-ether-functionalized $\Delta\Delta$ -5, where gradual binding of Cs⁺ ions triggers a pronounced g_{lum} fluctuation (1.48 $\rightarrow$ 0.62 $\rightarrow$ 1.41) through a perturbation and subsequent restoration of the SAP environment. Furthermore, the multicrown-ether binding sites in $\Delta\Delta$ -5 enable cooperative guest binding, facilitating the first naked-eye CPL recognition of the antispasmodic drug tizanidine. This work establishes rigidifying SAP configuration as a general design principle for maximizing the CPL activity of lanthanide complexes and opening avenues for advanced CPL applications.

Tandem Guest–Host Switching for Chemical-to-Electrochemical Signal Transduction

Lefrançois, L.; Gauthier, E. S.; Chapuis, S.; Shen, X.; Namoro, M. E.; Gurlaouen, C.; Chaumont, A.; Heitz, V.; Ruhlmann, L.; Frascioni, M.; Hromádová, M.; Jacquot de Rouville, H.-P.

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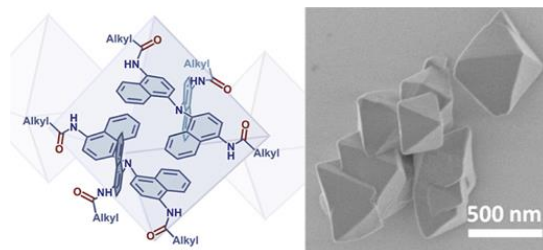
Abstract: A chemical-to-electrochemical signal transduction is reported based on the tandem switching of a bis-acridinium macrocycle and a proflavine derivative. Molecular recognition triggers a simultaneous guest–host transformation converting the acridinium units into their redox-inactive acridane counterparts. This unusual switching mechanism arises from the multiresponsive nature of the acridinium receptor, complementary acid–base properties of the host and guest, and stabilization of a water-assisted transition state within the macrocyclic cavity. Coined as tandem guest host switching (TANGHOS), this mechanism was elucidated through a combination of ¹H NMR, UV/vis spectroscopic, computational analyses (DFT, molecular dynamics simulations), and a microkinetic model. When grafted onto a gold surface, the bis-acridinium macrocycle enables the selective electrochemical detection of proflavine from a complex mixture with ten polycyclic aromatic hydrocarbons. Finally, a low coverage ratio still led to amplified electrochemical responses by surface confinement and reaction-coupled recognition.

Synthesis of Soft Octahedral Nanoparticles through Supramolecular Self-Assembly of C3-Symmetric Trinaphthylamine Trisamides

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DOI: [10.1021/jacs.6c04987](https://doi.org/10.1021/jacs.6c04987)



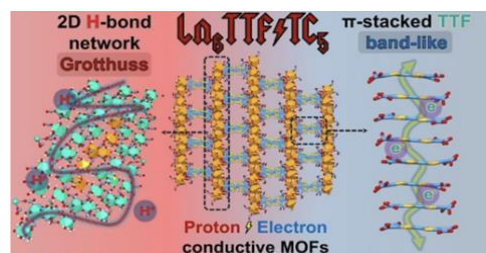
Abstract: Self-assembly of C3-symmetric triarylamine trisamide monomers has been recently studied in the literature, consistently leading to supramolecular polymers and materials with remarkable optical and electronic properties. As observed with other families of C3-symmetric monomers, their nucleation and growth mechanisms mainly rely on their one-dimensional stacking through highly directional hydrogen bonding. Now, we report the possibility of shifting their directing noncovalent interactions from hydrogen bonding to π – π and van der Waals interactions and, consequently, of shifting their self-assembly from one-dimensional fibrils toward two-dimensional smectic layers that further organize in purely organic octahedral nanoparticles. This dramatic structural change is simply achieved by extension of the aromatic core from phenyl to naphthyl units. Interestingly, the size of these soft supramolecular octahedra can be controlled between 200 nm and 50 μ m by choosing the cooling rate used during the self-assembly process. By employing a comprehensive combination of experimental and theoretical tools, we fully elucidate the hierarchical mechanisms at work in the octahedrons' formation. These results highlight the potential tunability of C3-symmetric H-bonded monomers to generate original 3D supramolecular systems and materials.

Structurally Encoded Mixed Proton–Electron Transport in Tetrathiafulvalene-Based Lanthanide MOFs

Manna, F.; Yang, Z.; Oggianu, M.; Auban-Senzier, P.; Novitchi, G.; Dinca, M.; Alemany, P.; Canadell, E.; Mercuri, M. L.; Avarvari, N.

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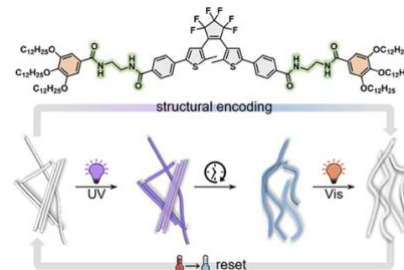
Abstract: A family of 2D tetrathiafulvalene tetracarboxylate (TTFTC)-based lanthanide (LnIII = Dy III, Er III, and Yb III) metal–organic frameworks (MOFs) is reported as a robust platform for mixed proton–electron conduction. Electronic transport arises from partially oxidized, π -stacked TTFTC columns with a fixed hole population imposed by framework stoichiometry, leading to narrow-band semiconducting behavior. The charge distribution within the π -stacks is preserved over a wide humidity range, resulting in only minor, compound-dependent variations in electronic conductivity. In parallel, proton transport is promoted by dense hydrogen-bond networks formed by coordinated water molecules anchored to rigid Ln6 cluster walls, enabling an efficient proton conduction that remains operative across a broad range of humidity and temperature conditions ($E_a < 0.4$ eV at RH 80%), consistent with a dominant Grothuss-type mechanism. Among the series, Er6TTFTC5 displays the highest room-temperature single-crystal electronic conductivity reported to date for a TTF-based MOF (1.0×10^{-2} S cm^{−1}, 4-probe), together with a proton conductivity of 3.7×10^{-3} S cm^{−1} under humid conditions (80 °C, 80% RH). To enable direct comparison, both electronic and proton conductivities were evaluated under identical conditions, and an effective ambipolar conductivity (σ_{amb}) was derived from the independently measured contributions. The resulting values rank among the highest reported for structurally defined proton–electron mixed conductors (2.3×10^{-3} , 7.2×10^{-4} , and 5.9×10^{-4} S cm^{−1} at 80% RH and 80 °C for Er6TTFTC5, Yb6TTFTC5, and Dy6TTFTC5). Subtle variations across the lanthanide series are attributed to differences in framework rigidity and intermolecular interactions, which modulate transport properties without altering the underlying, structurally encoded conduction pathways.

Photoregulated Structural Memory in Supramolecular Polymers

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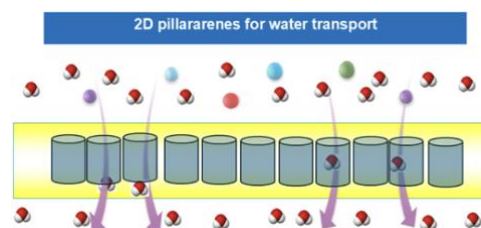
Abstract: Memory is a central principle underlying adaptive behavior in biological systems and an important source of inspiration for the design of functional artificial materials. While memory effects have been widely realized in macroscopic materials and devices, whether comparable behavior can arise from dynamic molecular organization remains largely unexplored. In supramolecular polymers (SPs), memory has thus far been demonstrated primarily in the form of chiral memory, while other types of memory, such as structural memory—where supramolecular organization is retained despite changes at the molecular level—remain largely unexplored. Here, we demonstrate structural memory in SPs through light-driven control over self-assembly pathways. We introduce a photoswitchable dithienylethene-based molecular building block capable of reversible interconversion between open- and closed-ring isomers both in the monomeric and assembled state. Although both isomers undergo supramolecular polymerization into elongated one-dimensional fibers in methylcyclohexane, they differ markedly in their aggregation propensity and resulting morphology (rigid, bundled fibers for the open form vs flexible, individual fibers for the closed form). By controlling the sequence of photoirradiation and supramolecular polymerization, we obtain pathway-dependent supramolecular architectures that retain features of their formation history despite changes at the molecular level. These results establish a route toward SPs capable of storing pathway information and advance the design of history-dependent adaptive soft matter.

Trimethylammonium-Substituted Amphiphilic Pillar[n]arene Channels for Selective Water Permeation

Su, D.-D.; Shi, T.-H.; Ogoshi, T.; Barboiu, M.

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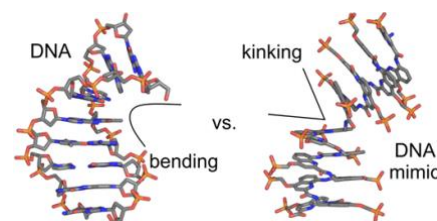
Abstract: Artificial water channels (AWCs) are synthetic systems biomimicking natural aquaporins (AQPs) that selectively transport water while rejecting ions. Amphiphilic rim-differentiated pillar[5]arenes and pillar[6]arenes, featuring cationic methylammonium and alkyl substituents on opposite rims, spontaneously assemble into two-dimensional channels with tunable pore sizes and channel lengths. Herein, we considered the alkyl chains (butyl-C4 and decetyl-C10) of these channels in relation to membrane partitioning and investigated the potential structure–activity relationships within the lipid bilayer. A synergistic effect of a large pore and favorable lipophilicity led to the highest water permeation ($\sim 1 \times 10^8$ water molecules per channel per second) for AP-P6A-C10, as well as ion rejection. The present channels may be regarded as a rare biomimetic example of artificial channels that preferentially transport water while presenting low proton or ion transport activity.

Structural dynamics of DNA mimic foldamers

Loos, M.; Thurecht, L.; Wu, J.; Corvaglia, V.; Liu, Z.; Pophristic, V.; Zacharias, M.; Huc, I.

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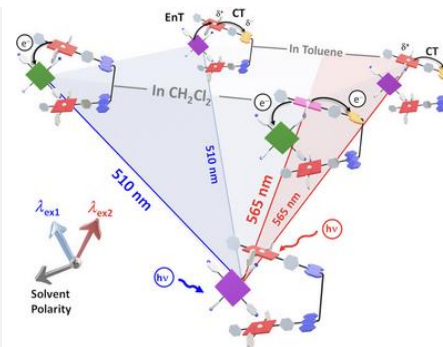
Abstract: DNA mimic foldamers are helically folded aromatic oligoamides bearing negatively charged side chains that mimic the shape and charge distribution of double-stranded B-DNA. They have been shown to bind to some DNA-binding proteins better than DNA itself and thus have potential to interfere with DNA-protein interactions. Their structure has been previously characterized in detail by X-ray crystallography. We have now investigated their structural dynamics both computationally and experimentally. The force field parameters of the building blocks required for DNA mimicry were optimized and implemented in AMBER to perform molecular dynamics simulations of the foldamer helices. The position of the negatively charged side chains on the helix, the charge state of the side chains, and the presence of salt were systematically varied. The simulations revealed that the global flexibility parameters for twisting and bending of the foldamer helices are of similar magnitude to those of B-DNA, though distinct kinking events and motions are involved. A range of sequences were then prepared for experimental investigations using ^1H NMR, UV-vis absorption and circular dichroism spectroscopies. Measurements revealed that the foldamer helices are stable over a broad range of temperature, pH and salt conditions in aqueous solutions, but that they nevertheless undergo structural changes when conditions are modified. An assay was developed to quantitatively assess foldamer helix stability through the measurement of the rate of interconversion between right-handed and left-handed diastereomeric conformers. Unexpectedly, suppressing some negatively charged side chains had a destabilizing effect on the helix, suggesting a more complex role of the side chains than electrostatic repulsions.

Path Selective Photoinduced Energy and Electron Transfer in a Bis(acridinium-Zn(II) Porphyrin)-tetrapyrrolyl Porphyrin Host-Guest Complex

Ruani, F.; Veclani, D.; Sanchez-Resa, D.; Edo-Osagie, A.; Creste, G.; Barbieri, A.; Heitz, V.; Jacquot de Rouville, H.-P.; Armaroli, N.; Ventura, B.

Chem. Eur. J. **2026**, 32, e02604

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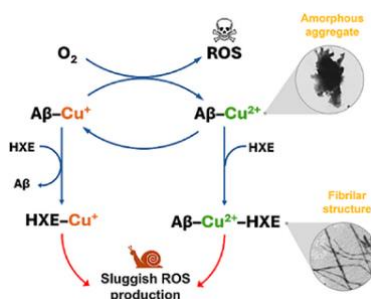
Abstract: The 1:1 complex of a bis(acridinium-Zn(II)porphyrin) host and a tetrapyrrolyl free-base porphyrin guest shows a remarkable interplay of energy and electron transfer (eT) processes, finely tuned by the solvent polarity or the selection of the photoexcited component. A more polar environment (CH₂Cl₂) favors uncommon parallel intramolecular and intermolecular eT processes, while in an apolar solvent (toluene) the intermolecular eT process is hampered. Notably, the apolar environment also enables a rare energy transfer process from the porphyrin guest toward the charge-transfer emissive state of the tweezer host. In total, no less than four different excited states were probed, which can be sketched by an inverted pyramid diagram highlighting directional path selection.

Evaluation of a New Methylimidazole-Containing Thiosemicarbazone as a Cu⁺/Cu²⁺-Targeting Ligand in the Context of Alzheimer's Disease

Barbosa, B. M.; Esmieu, C.; Galvács, A.; Costa, M. V.; Brison, A.; Ladeira, S. M.; de Oliveira, J.; Kállay, C.; Hureau, C.; Rey, N. A.

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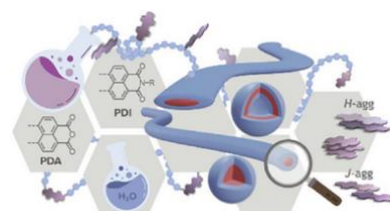
Abstract: The binding of copper ions to amyloid- β (A β) peptide leads to reactive oxygen species (ROS) formation and toxic soluble oligomers, contributing to oxidative stress in Alzheimer's disease (AD). Thus, studying compounds with moderate copper affinity is a promising strategy to prevent its interaction with A β and reduce toxicity. Here, we evaluated a new tri-coordinating thiosemicarbazone (HXE) with chelating properties to regulate cuprotoxicity in AD. The ligand was nontoxic against HT-22 hippocampal neuronal cells and bound Cu⁺ and Cu²⁺ at pH 7.4, with affinity constants (log K_{cond}) of 8.7 and 12.3, respectively, showing high selectivity over Zn²⁺ (log K_{app} = 5.0). In the presence of A β and Cu²⁺, HXE formed stable ternary complexes at physiological pH. Ascorbate consumption and coumarin-3-carboxylic acid fluorescence assays showed that the ligand significantly reduces Cu(A β 16)-mediated ROS production. It also prevented Cu²⁺-induced modulation of A β 40 self-assembly and restored the typical fibrillar structure of apo-A β 40 aggregates. Overall, HXE effectively modulates metal-associated A β toxicity and emerges as a promising candidate for AD bioinorganic management.

Synthesis and Self-Assembly of Perylene Imide-Containing Hydrophilic Polymers in Water

Berruée, S.; Rieger, J.; Vargas, L. S.

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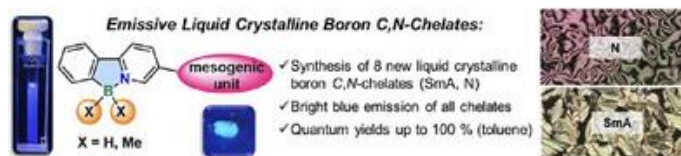
Abstract: New advances in synthetic strategies have greatly expanded the structural diversity of perylene imides (PIs), increasing the tunability of their molecular properties and assemblies in organic solvents. More recent studies also show molecular assemblies in aqueous media when the hydrophobic perylene core is functionalized with hydrophilic groups, allowing their use not only in optoelectronics or catalysis, but also in biological applications. However, PIs are usually too hydrophobic to be used in water, and their molecular assemblies usually result in ill-defined nanostructures with a significant loss of their emissive properties. Therefore, a powerful and promising strategy to enhance PI solubility in water is to incorporate them into hydrophilic polymer chains. Compared to small hydrophilic groups, the length and architecture of the polymer can be controlled and adapted to modulate the nanostructure morphology while preserving the perylene's properties in water. This review summarizes the current literature on the self-assembly in water of PI-based hydrophilic polymers, with a focus on their synthesis and the different parameters that influence the self-assembly and properties of the materials.

Emissive Liquid Crystalline Boron C,N-Chelates: Synthesis, Self-assembly, and Photophysical Properties

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Abstract: A library of novel phenylpyridine-based boron C,N-chelates bearing a mesogenic unit was synthesized and investigated to clarify how the chain type, length, and number, as well as the boron substitution (BH₂ vs. BMe₂) influence the mesomorphic and photophysical

behavior. All BH2 derivatives exhibited SmA or N phases even with short alkyl chains, whereas BMe2 analogues remained nonmesomorphic unless a semi-perfluorinated chain was introduced, demonstrating the strong influence of boron substitution on mesophase formation. All compounds displayed intense blue emission in solution, with spectral properties primarily determined by the boron C,N core and only minor shifts induced by variation in the mesogenic unit in agreement with complementary DFT calculations. Quantum yields reached up to 100% in solution. These results demonstrate that mesomorphic behavior can be introduced and tuned while preserving the excellent photophysical performance of the boron-C,N-chelate system.

Cationic Permethylated Cyclodextrins Capable of Self-Assembling Into Linear Nanostructures in Water

Kolb, M.; Benjaffel, M.; Faller, P.; Raibaut, L.; Armspach, D.

Chem. Eur. J. **2026**, 32, e71029

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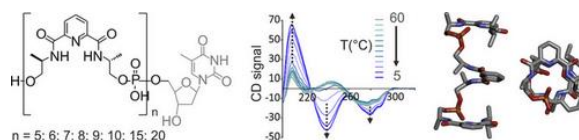
Abstract: A highly diastereoselective synthesis of cationic permethylated α - and β -cyclodextrins (α -CDs and β -CDs), incorporating a quaternary ammonium unit bridging two adjacent glucose units, has been developed. This novel methodology provides access to amphipathic α -CDs equipped with an outward-facing alkyl chain, which self-assemble in water to form linear, head-to-tail supramolecular oligomers (DP up to five CD units) when the alkyl chain is sufficiently short (C8 and C12), and larger nano-objects with a longer C16 chain. Alternatively, permethylated β -CD analogs bearing an alkyl chain terminated by an adamantyl unit have also been prepared and shown to form similar linear oligomeric material. As a result of the fixed stereochemistry of the quaternary ammonium nitrogen and the blocked narrow opening of the CD, these amphiphilic cationic host molecules are prevented from undergoing self-inclusion or forming head-to-head dimers in water.

Helical Folding of Abiotic Chiral Poly(phosphodiester)s

Barman, R.; Kauffmann, B.; Lutz, J.-F.; Maurizot, V.

Chem. Eur. J. **2026**, e71189

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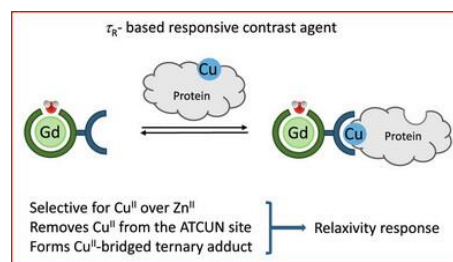
Abstract: Functions of biomolecules are intimately linked to their structures which result from the folding of a linear sequence of building blocks, amino-acids for proteins and nucleotides for DNA. In the quest to achieve functions with similar efficiency and selectivity that of biomolecules, several synthetic mimics of secondary structures of proteins have been developed but, on the other hand, only scarce examples of de novo design of DNA mimics are available. Most of described DNA inspired molecular systems are based on modifications of either the sugar/phosphate backbone or nucleobases. Here are presented the design, the synthesis and the structural characterization of a new class of synthetic phosphodiester oligomers, composed of an aromatic chiral building block, that fold into single helical architectures. Folding pattern diverge from its natural counterpart (DNA) but through intramolecular H-bonds and aromatic stacking these oligomers show similar cooperative temperature dependence stability.

Thiosemicarbazone-Based Responsive MRI Contrast Agents Activated Through a Change in CuII Binding Site on Albumin

Zimmerer, K.; Sanadar, M.; Vilenov, B.; Faller, P.; Bonnet, C. S.; Sour, A.

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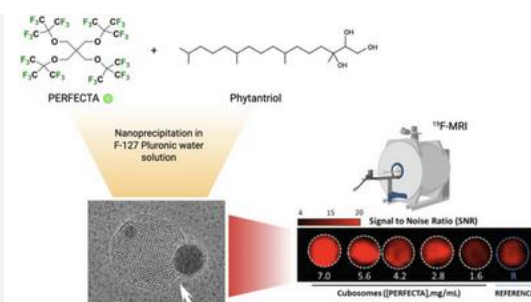
Abstract: The development of copper-responsive magnetic resonance imaging (MRI) probes remains limited by the scarcity of robust strategies capable of operating under physiological conditions and within complex biological environments. Here we report CuII-responsive MRI contrast agents (CAs) which are able to extract CuII from human serum albumin (HSA) and subsequently form ternary adducts. The CAs combine a GdIII-DO3A-monoamide complex linked to α -pyridyl thiosemicarbazone (pyrTSC) ligands, introduced here as innovative CuII binding units. The TSC units display strong CuII affinity and form ternary TSC-CuII-HSA adducts at a site distinct from the canonical ATCUN motif. Using UV-visible and EPR spectroscopies, we show that the CuII extraction and ternary adduct formation remain possible even in the presence of the Gd-binding moiety. The formation of ternary complexes enhances the rotational correlation time (τ_R), leading to measurable increases in relaxivity for the various complexes. This work introduces a new strategy in which CuII-triggered protein binding is exploited to activate responsive MRI CAs, thereby broadening their chemical space.

PERFECTA Loaded Lipid Cubosomes for ^{19}F -MRI: Physico-Chemical Characterization

Milesi, P.; Bona, B. L.; Chirizzi, C.; Campanile, M.; Del Vecchio, P.; Schmutz, M.; Sartor, V.; Berti, D.; Metrangolo, P.; Bombelli, F. B.; Lonetti, B.

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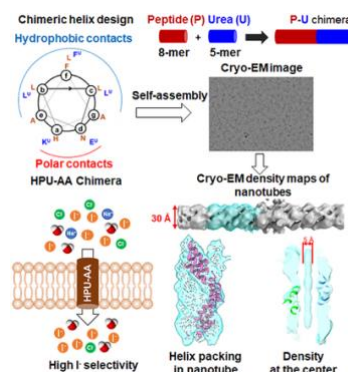
Abstract: Liquid crystalline nanoparticles (LCNPs), such as cubosomes, are promising platforms for drug delivery and bioimaging due to their unique internal structures and biocompatibility. Here, we developed phytantriol-based cubosomes stabilized with Pluronic F-127 and loaded with PERFECTA, a fluorinated probe with 36 magnetically equivalent fluorine atoms, for use as ^{19}F -MRI nanoprobes. PERFECTA loaded cubosomes were synthesized via solvent evaporation and characterized using DLS, SAXS, Cryo-TEM, DSC, ^{19}F -NMR, and ^{19}F -MRI. Results show that PERFECTA-loaded cubosomes retain the Pn3m cubic phase, achieving encapsulation efficiencies over 70% across PERFECTA concentrations (1–10 mg/mL). Cryo-TEM revealed PERFECTA segregation into spherical domains, either embedded within cubosomes or as isolated nanoparticles. SAXS and DSC analyses suggested a partial PERFECTA integration into the phytantriol bilayer, affecting the internal liquid-crystalline order. PERFECTA loaded cubosomes demonstrated excellent colloidal stability in biologically relevant media, maintaining structural integrity and fluorine content within 24 h in cell culture medium with fetal bovine serum. Thanks to their favorable relaxometric properties ($T_1 = 497 \pm 50$ ms, $T_2 = 281 \pm 4$ ms) and robust ^{19}F MRI signals, these cubosomes hold significant potential as stable, efficient nanotheranostic platforms for biomedical imaging and drug delivery.

Anion-Selective Channels Formed by Synthetic 13-Mer Chimeric α -Peptide-Oligourea Foldamers

Dutta, C.; Su, D.; Krishnamurthy, P.; Li, Z.; Li, J.; Pasco, M.; Luo, M.; Barboiu, M.; Guichard, G.; Kini, R. M.; Kumar, P.

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Abstract: Attempts to design transmembrane channels with selective transport properties using advanced chemistry and computational tools have had limited success. Previously, we characterized 15-mer α -peptide-oligourea chimeric foldamers that form anion channels with high Cl^- selectivity. Here, we report the design and synthesis of four 13-mer α -peptide-oligourea chimeric foldamers (HPU-EK, HPU-QQ, HPU-AA, and HPU-RH) as part of our attempts to generate new foldamers with distinct hydrophobic and hydrophilic surfaces in their helices. They consist of an 8-mer peptide with varied sequences at the N-terminal of a shorter oligourea segment (5-mer). They self-assemble into supramolecular channels. A 6.5 Å cryo-EM structure of HPU-AA revealed nanofibers with distinct dimensions and diverse modes of molecular assembly. Functional assays of the four chimeras demonstrated varying anion transport activities across lipid bilayer membranes. Enhanced ion transport activity was achieved by selective mutations within the foldamer sequences. HPU-AA, which has extended hydrophobic and narrower hydrophilic surfaces, showed the highest ion transport activity among the four foldamers. It exhibits distinct anion selectivity ($\text{I}^- \rightarrow \text{SCN}^- \rightarrow \text{NO}_3^- = \text{Cl}^- \rightarrow \text{Br}^- \rightarrow \text{OAc}^- \rightarrow \text{F}^-$), with ~ 3 -fold higher conductance value for I^- than Cl^- . These studies help us understand the self-assembly of these chimeric foldamers and offer opportunities for designing novel channels for various biomedical applications.