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IN THIS ISSUE

ISSN 0306-0012 CODEN CSRVBR 36(2) 125-440 (2007)



Cover

This issue celebrates two anniversaries in the field of supramolecular chemistry. The cover shows a firework display viewed through the annulus of [18]-crown-6. Image reproduced by permission of Philip A. Gale.

CHEMICAL SCIENCE

C9

Drawing together the research highlights and news from all RSC publications, *Chemical Science* provides a 'snapshot' of the latest developments across the chemical sciences showcasing newsworthy articles, as well as the most significant scientific advances.

Chemical Science

February 2007/Volume 4/Issue 2

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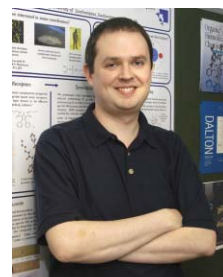
EDITORIAL

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Supramolecular chemistry anniversary

Philip A. Gale

Guest editor Philip Gale introduces the reviews in this themed issue of *Chemical Society Reviews* on Supramolecular Chemistry.



Philip A. Gale

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Charles J. Pedersen: Innovator in macrocyclic chemistry and co-recipient of the 1987 Nobel Prize in chemistry

Reed M. Izatt

A profile of the life and work of the Nobel Prize winner Charles J. Pedersen.



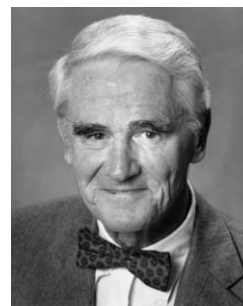
Dibenzo-18-crown-6

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Donald J. Cram

John C. Sherman

A profile of the life and work of the Nobel Prize winner Donald Cram.



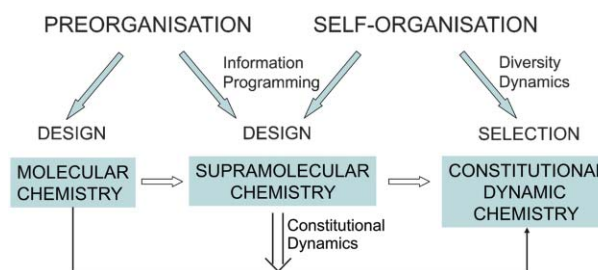
HIGHLIGHT

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From supramolecular chemistry towards constitutional dynamic chemistry and adaptive chemistry

Jean-Marie Lehn

From Molecular, to Supramolecular and to Constitutional Dynamic Chemistry under Preorganisation and Self-organisation by design and with selection.



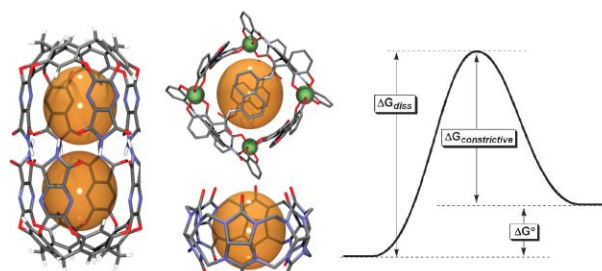
TUTORIAL REVIEWS

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Reversible guest exchange mechanisms in supramolecular host-guest assemblies

Michael D. Pluth and Kenneth N. Raymond*

Synthetic supramolecular assemblies reversibly encapsulate a wide variety of polyatomic guests. This tutorial review highlights common guest exchange mechanisms which exhibit constrictive binding.





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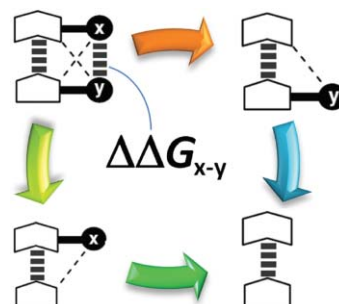
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Chemical double-mutant cycles: dissecting non-covalent interactions

Scott L. Cockroft and Christopher A. Hunter*

The double-mutant cycle is a robust thermodynamic tool that can be used to quantify individual weak non-covalent interactions by filtering out the noisy background of multiple secondary interactions that are usually present in molecular systems.

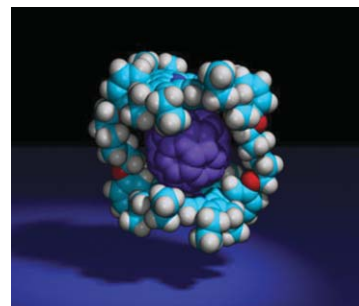


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Metalloporphyrin hosts for supramolecular chemistry of fullerenes

Kentarō Tashiro* and Takuzo Aida*

A review of the host-guest chemistry of fullerenes and metalloporphyrins, which can be widely tuned by changing the central metal ions of the metalloporphyrin complexes.

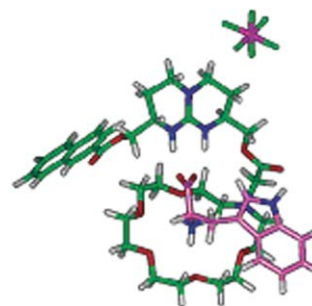


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Molecular recognition of oxoanions based on guanidinium receptors

Pascal Blondeau, Margarita Segura, Ruth Pérez-Fernández and Javier de Mendoza*

Two-point binding model for a complex between zwitterionic L-tryptophan and a receptor containing complementary guanidinium and crown ether binding sites.

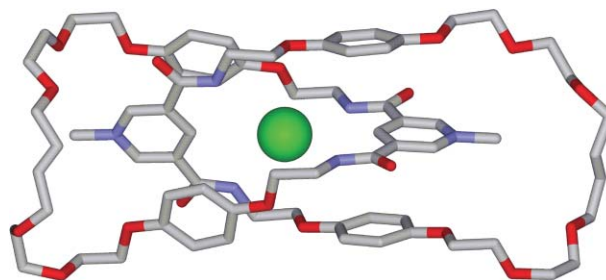


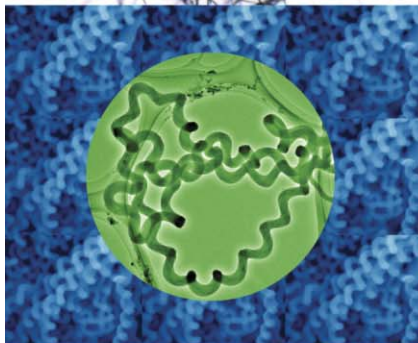
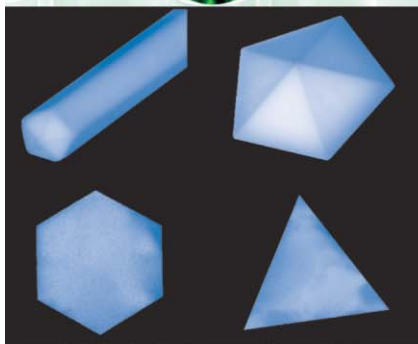
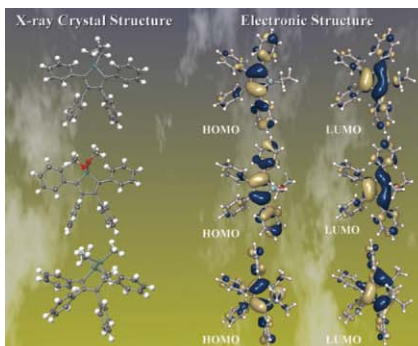
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Anion templated assembly of mechanically interlocked structures

Matthew S. Vickers and Paul D. Beer*

A new strategic anion templation methodology has been developed for the synthesis of interpenetrated pseudorotaxane, rotaxane and catenane structures, designed with a view to producing new highly selective anion receptors after template removal.





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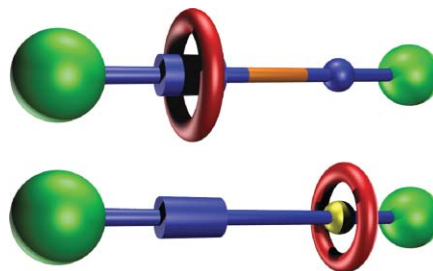
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Rotaxanes as ligands: from molecules to materials

Stephen J. Loeb

The supramolecular template (1,2-bis(pyridinium) ethane) $\text{C}(24\text{-crown-}8)$ can be used to prepare a variety of interlocked molecules from rotaxanes and catenanes to molecular machines and polymeric materials.

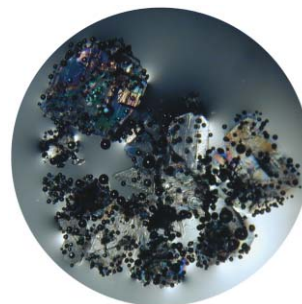


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Engineering void space in organic van der Waals crystals: calixarenes lead the way

Scott J. Dalgarno, Praveen K. Thallapally, Leonard J. Barbour* and Jerry L. Atwood*

Seemingly non-porous organic solids have the ability for guest transport and have also been shown to absorb gases to varied extents, including hydrogen, methane and acetylene.

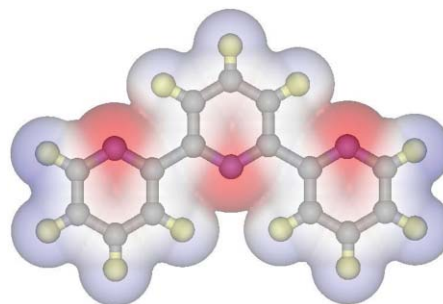


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2,2':6',2''-Terpyridines: From chemical obscurity to common supramolecular motifs

Edwin C. Constable

This article explains why the $\{M(\text{tpy})_2\}$ motif is so widely encountered in modern supramolecular chemistry.

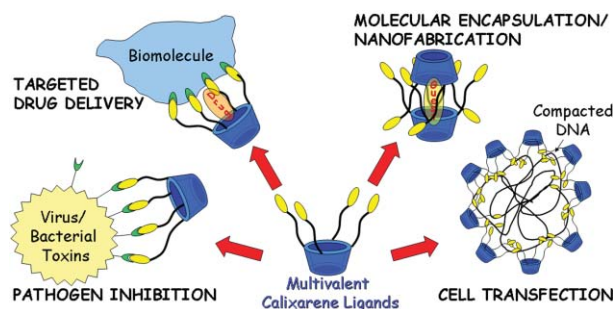


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Calixarene-based multivalent ligands

L. Baldini, A. Casnati,* F. Sansone and R. Ungaro*

Calixarenes enter Bionanotechnology through multivalency, a powerful concept guiding the synthesis of ligands for biomolecular recognition and nanofabrication.





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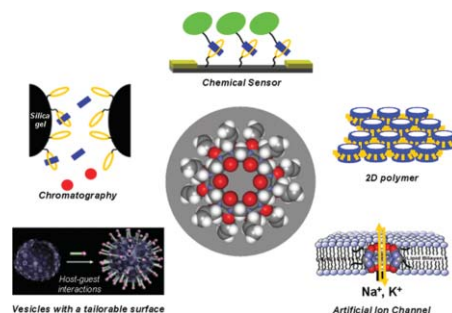
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Functionalized cucurbiturils and their applications

Kimoon Kim,* Narayanan Selvapalam, Young Ho Ko, Kyeng Min Park, Dongwoo Kim and Jeeyeon Kim

The recent advances and challenges in the functionalization of cucurbiturils (CBs) along with the applications of functionalized CBs are described.

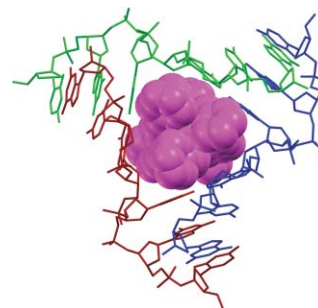


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Supramolecular DNA recognition

Michael J. Hannon

The size, surface dimensions and nature of DNA introduce new possibilities, challenges and opportunities for molecular recognition by supramolecular chemists.

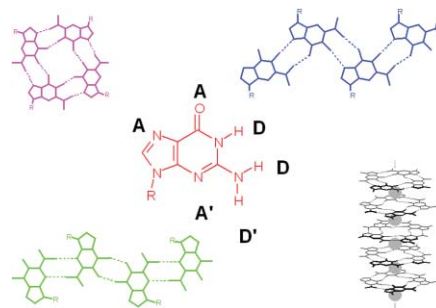


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Supramolecular architectures generated by self-assembly of guanosine derivatives

Jeffery T. Davis* and Gian Piero Spada*

Guanine derivatives stick together. Guanine's hydrogen bonding pattern enables formation of various supramolecular architectures, each with its own unique structure and function.

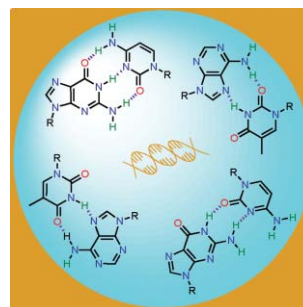


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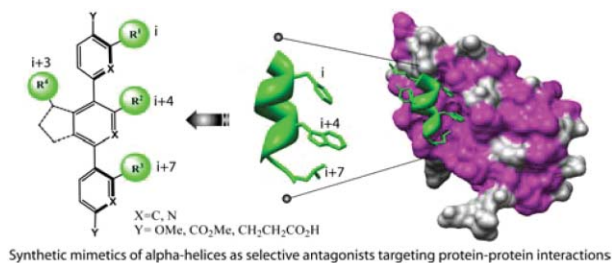
Molecular recognition via base-pairing

Jonathan L. Sessler,* Candace M. Lawrence and Janarthanan Jayawickramarajah

This review discusses both common hydrogen-bonding amongst nucleobases and less-common base-pairing structures from an artificial molecular recognition perspective, with an emphasis on their potential application in areas that include, but are not limited to, self-assembled macrocyclic and high-order ensemble synthesis, supramolecular polymer preparation, molecular cage construction, and energy and electron transfer modeling.



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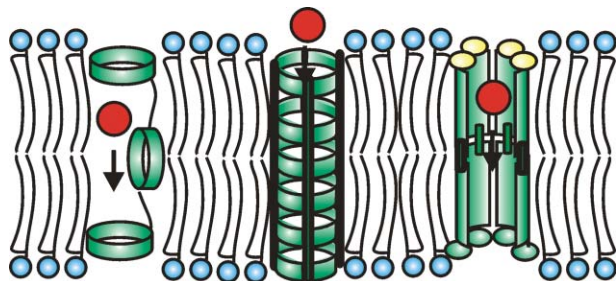


Synthetic non-peptide mimetics of α -helices

Jessica M. Davis, Lun K. Tsou and Andrew D. Hamilton*

α -Helices serve as important recognition regions on protein surfaces for many protein-protein, protein-DNA and protein-RNA interactions. Rational design of structural mimetics of these domains using synthetic small molecules has proven an effective means of modulating such protein functions. This *tutorial review* focuses on strategies that use synthetic antagonists to target protein-protein interactions involved in disease.

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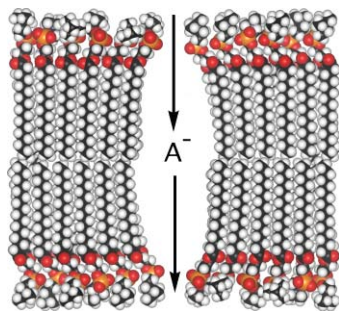


Synthetic ion channels in bilayer membranes

Thomas M. Fyles

Synthetic channels move ions through membranes as efficiently as natural protein channels and show other "signs of life".

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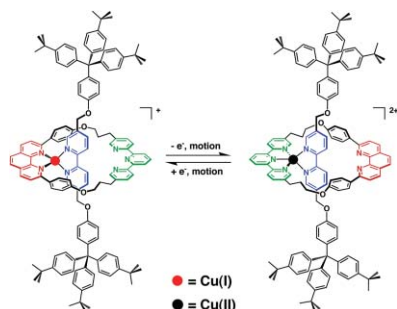


Development of synthetic membrane transporters for anions

Anthony P. Davis, David N. Sheppard and Bradley D. Smith

The molecular designs include monomolecular channels, self-assembled channels and mobile carriers; also discussed are the potential biomedical applications.

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Transition metal complexes as molecular machine prototypes

Benoît Champin, Pierre Mobian and Jean-Pierre Sauvage*

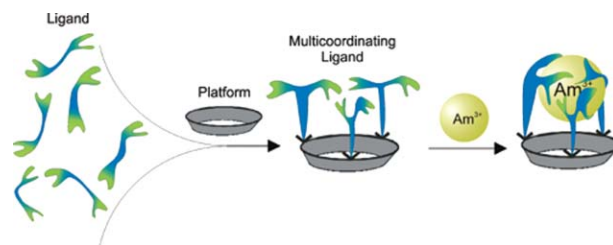
Various recently-prepared transition metal complexes, often components of catenanes and rotaxanes, can be regarded as molecular machine prototypes. The systems are set in motion by using redox, chemical or photonic signals.

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Multicoordinate ligands for actinide/lanthanide separations

Henk H. Dam, David N. Reinhoudt and Willem Verboom*

In nuclear waste treatment processes there is a need for improved ligands for the separation of actinides (An(III)) and lanthanides (Ln(III)). The preorganization of ligating groups onto a molecular platform results in a multicoordinate ligand with improved An(III) extraction properties. This review summarizes the most important An(III) ligands with emphasis on the preorganization strategy using (macro)cyclic platforms.

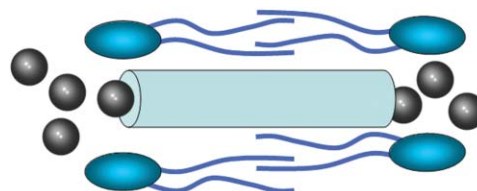


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Biologically active, synthetic ion transporters

George W. Gokel* and I. Alexandru Carasel

The compelling chemical goal of modeling protein channel behavior has led to synthetic compounds that are true ion channels. This *tutorial review* describes these novel structures and their activity in living systems.



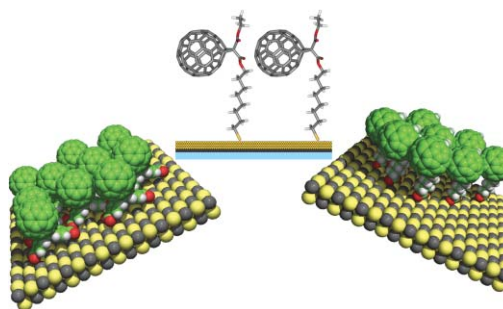
CRITICAL REVIEWS

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Supramolecular [60]fullerene chemistry on surfaces

Davide Bonifazi,* Olivier Enger and François Diederich*

This critical review highlights recent strategies to prepare organised monomolecular [60]fullerene-based films *via* monolayer self-assembly. Use of this method allows easy immobilisation of the fullerene cage onto surfaces, featuring new functional materials with potential applications in photovoltaic devices, sensorics and molecular electronics.

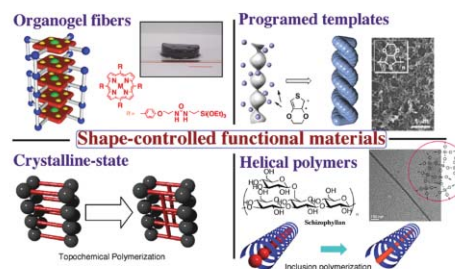


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Post-polymerization of preorganized assemblies for creating shape-controlled functional materials

Kazuki Sada, Masayuki Takeuchi, Norifumi Fujita, Munenori Numata and Seiji Shinkai*


This review focuses on recent advances in *in situ* post-modification under the influence of molecular assemblies as templates and polymerization of ordered molecular assemblies such as organogel fibers and organic crystals.



The shapes of the organic superstructures can be precisely fixed at the nanoscopic level through the post-polymerization utilizing the several templates

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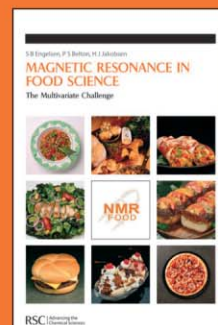
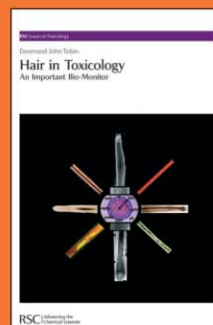
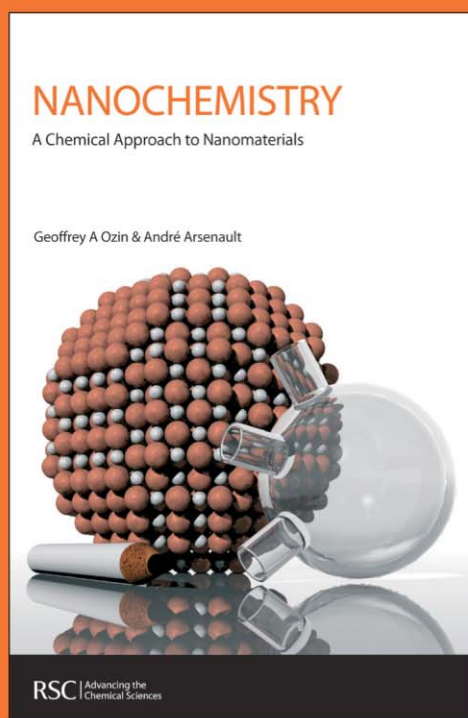
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