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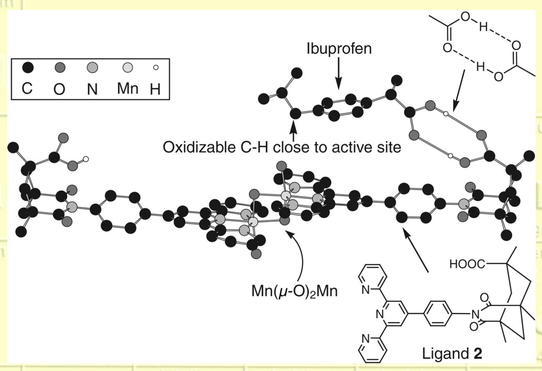
Compostos de coordinació que emulen els enzims

If there's one area of chemistry where nature continues to humble even the most masterful synthetic chemists, it is the selective functionalization of C-H bonds. While chemists struggle to transform one hydrocarbon bond in a molecule without altering its similarly reactive neighbors, nature simply orients molecules over an enzyme's catalytic site in a manner that guarantees that the reaction will occur only at one particular spot.

Scientists have tried to construct systems that emulate enzymes, but because these systems have smaller, simpler scaffolds, they tend to be less selective than their biological counterparts. Now, Yale University chemists Robert H. Crabtree and coworkers have developed an enzyme-inspired catalyst that regioselectively oxidizes saturated C-H bonds in ibuprofen and 4-methylcyclohexylacetic acid *(Science* **2006,** *312,* 1941).

The system's innovative design features a dimanganese catalytic core coordinated to a rigid tridentate ligand. The ligand contains a carboxylic acid group that holds onto the substrate's carboxylic acid group via hydrogen-bonding. According to the authors, this interaction orients the substrate so that the desired site of oxidation sits just above the catalytic core.

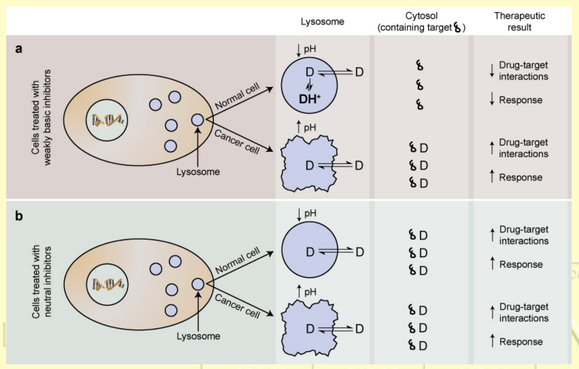


El pH, decisiu en la lluita contra el càncer

A new strategy for getting anti-cancer drugs to kill cancer cells, without causing serious harm to normal cells in the body, has been reported (J. P. Krise et al., *ACS Chem. Biol.* **2006,** *1*, 309) .

The new approach would allow anticancer drugs to accumulate in both normal and malignant cells. The drugs, however, would be tweaked by giving them basic chemical properties. Normal cells simply isolate anti-cancer drugs with basic properties, greatly reducing the toxic effects. Cancer cells, in contrast, have an impaired ability to isolate basic substances, and get hit with a full blast of toxicity.

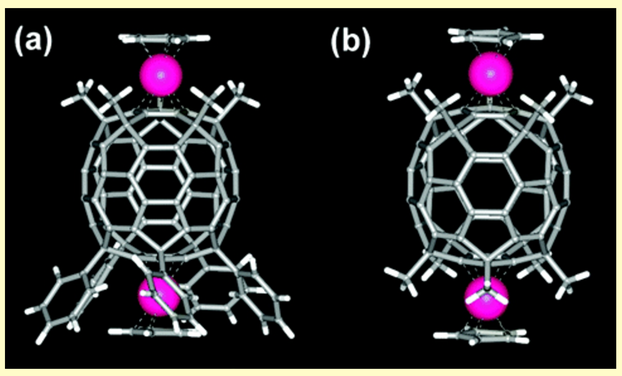
Krise's report describes a number of existing anti-cancer drugs that have basic properties, and notes that the new findings may provide the first explanation of why these drugs are so effective.



Ful·lerens i ferrocens plegats

By merging two ferrocene moieties and a buckyball, chemists at the University of Tokyo and Japan Science & Technology Agency have created a new class of linked diferrocenes (*J. Am. Chem. Soc.* **2006,** *128,* 7154). These so-called double-decker buckyferrocenes (shown), prepared by Eiichi Nakamura, Yutaka Matsuo, and Kazukuni Tahara, feature two Fe(II) atoms, each sandwiched between a discrete cyclopentadiene ring and a cyclopentadiene ring on opposite sides of the fullerene's cage. Using the fullerene's conjugated system as a network between them, the two ferrocene units can communicate electronically with one another. The system can reversibly undergo two successive single-electron oxidations as well as two successive single-electron reductions.

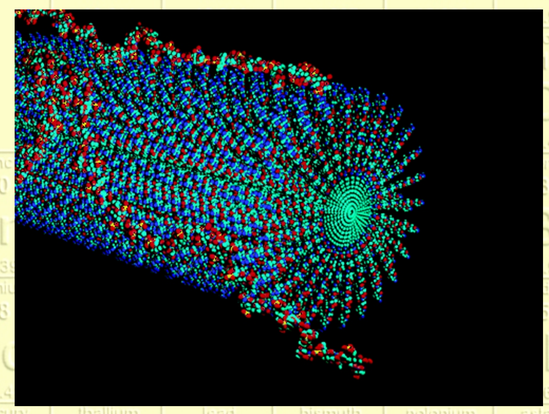
The team employed two different synthetic pathways to prepare the hybrid structures. One route installs both metals onto the fullerene at the same time, while the other method adds the metals to the fullerene sequentially. These approaches, they say, could be used to synthesize a variety of other bimetallic fullerene-metal complexes, possibly even with two different metals.



Les nanoestructures construeixen vasos sanguinis

Using the biopolymer heparin and a nanofiber scaffold, researchers at Northwestern University have developed a novel nanostructure that promotes blood vessel growth (*Nano Lett.* **2006,** *6,* 2086). The system, developed by Samuel I. Stupp and his colleagues, could become an important tool in regenerative medicine, where new blood vessel formation is critical for growing new tissue.

The nanofiber's basic building block is an amphiphile that has a hydrocarbon chain on one end and a peptide designed to bind heparin on the other. In the presence of heparin, these lengthy molecules assemble into cylindrical fibers with the hydrocarbon chains at the core and the peptide-heparin complex at the surface. When combined with nanogram amounts of angiogenic growth factors known to interact with heparin, the nanostructures stimulate extensive new blood vessel formation in vivo. The nanostructure's defined shape and surface account for its angiogenic properties. Preliminary experiments to treat skin wounds in rabbits and damaged heart tissue in mice have shown promising results.

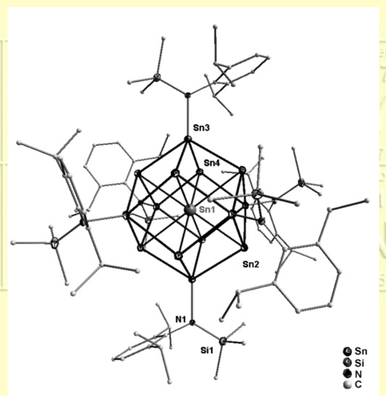


Els clústers s'acosten a les nanopartícules

Synthesis of novel tin cluster compounds has expanded the number of tin atoms in an isolable cluster from 10 to 15 atoms, signaling a potential leap forward in the quest to controllably synthesize "metalloid" nanoparticles (*Angew. Chem. Int. Ed.* **2006**, *45*, 4333).

Metalloid clusters, of interest for their electronic properties, are defined as molecules having more metal-metal bonds than metal-ligand bonds and, given enough metal atoms, taking on the close-packed lattice structure of bulk metals. Until now, this type of molecular cluster has been known only for group 13 elements aluminum and gallium and a few precious metals such as palladium and gold.

An international research team led by Michael F. Lappert at the University of Sussex, now reports the first metalloid tin clusters with the synthesis of $Sn_{15}L_6$, where L is a bulky amido ligand. The clusters, made by reacting a tin dimer ($LSnCl_2SnL$) with a lithium reagent, have a central tin atom surrounded by eight tin atoms in a body-centered cubic arrangement, with the remaining six tin atoms substituted with the ligands lying outside the periphery of the cube.



Breus

- El descobriment de Neil Bartlett de la reactivitat dels gasos nobles ha estat immortalitzat, 44 anys després, amb una placa commemorativa a la University of British Columbia (Vancouver), on va tenir lloc la fita [*Chem. Eng. News*, 3 juliol 2006, p. 43].
- Investigacions recents poden facilitar la crioconservació dels cossos humans [A. Bogdan, *J. Phys. Chem. B*, **2006,** *110,* 12205].
- La revista Nature dóna la llista dels *blogs* científics més importants: *http://www.nature.com/news*.
- Nous mètodes de simulació permeten predir les formes al·lotròpiques dels diferents elements a pressions molt elevades [A.R. Oganov. *et al*., *J. Chem. Phys.* **2006,** *124,* 244704]

L'element número **29**, **coure**, és conegut des de l'antiguitat. El seu nom prové del mot llatí *cuprum,* que designa l'illa de *Xipre.*