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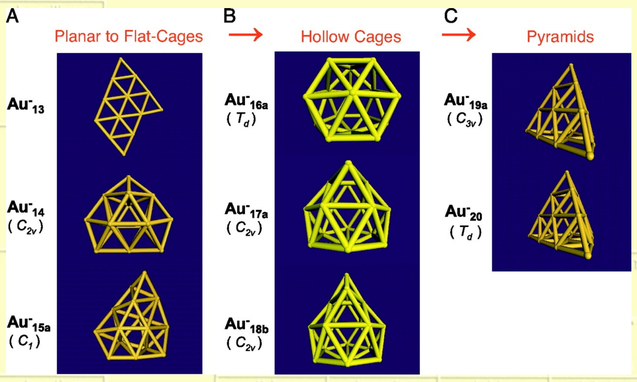
Una gàbia d'or

Clusters of 16, 17, or 18 gold atoms produced by laser vaporization of gold form hollow cage structures akin to fullerene molecules, new theoretical and experimental studies suggest (*Proc. Natl. Acad. Sci. USA*, **2006,** *103*, 8326). These anionic clusters are the first experimentally identified hollow cage structures made entirely of metal atoms, according to Lai-Sheng Wang of Washington State University, Richland, and Pacific Northwest National Laboratory and Xiao Cheng Zeng of the University of Nebraska, who jointly led the effort to identify the structures.

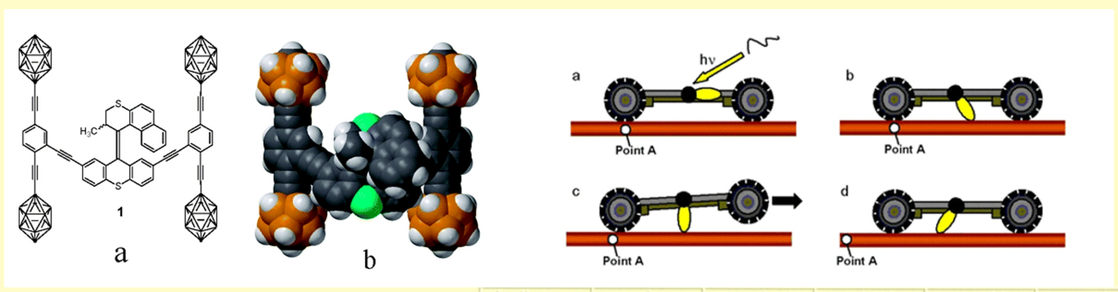
Gold anion clusters of 13 atoms or fewer tend to be planar, while clusters of 20 atoms take on a pyramidal structure. Wang and Zeng's group therefore speculated that gold clusters with 14 to 19 atoms would be the most likely to assume a hollow cage structure. Using photoelectron spectroscopy and theoretical calculations, they found that all but one of the lowest energy isomers of Au_{16}^- (shown), Au_{17}^-, and Au_{18}^- are hollow cages with an empty interior roughly 6 Å across.



El nanocotxe ja té motor

James M. Tour made nanoautomotive history last year, when his lab at Rice University built the world's first single-molecule car (*Notícies Inorgàniques*, *24*, novembre de 2005). But without an engine, this so-called nanocar couldn't go anywhere without being pushed.

Now Tour, along with colleagues Jean-François Morin and Yasuhiro Shirai, have taken a light-powered unidirectional molecular motor and attached it to the chassis of a newer model nanocar (*Org. Lett*. **2006,** *8*, 1713). The motor should propel the car forward with a paddle-wheel motion. The Rice team also replaced the fullerene wheels they used in the earlier model of the nanocar with p-carborane tires. The motor, they say, was completely inoperative in the presence of fullerenes, probably because of rapid energy transfer from the motor's excited state to the fullerenes. The *p*-carboranes are spherical enough to operate as wheels, and kinetic studies in solution demonstrate that the motor rotates when irradiated with light. Next, the group hopes to drive the nanocar across a flat surface.

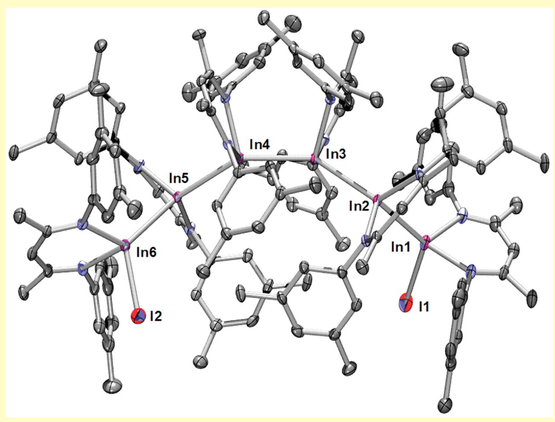


Sis àtoms d'indi en fila índia

A compound composed of six indium atoms arranged in a linear chain has been synthesized by researchers in England (M. S. Hill, P. B. Hitchcock and coworkers; *Science* **2006,** *311,* 1904). The study broadens understanding of main-group metal chemistry and may lead to novel strategies for preparing inorganic oligomers and polymers.

Unlike carbon and other group 14 elements, which readily form molecular chains of various lengths, elements in group 13 are far less likely to bond to one another in a linear fashion, particularly in chains of three or more atoms. But now researchers have shown that under the right circumstances, indium can form linear oligomers.

By reacting indium iodide with a protonated N-xylyl -diketiminate and a strong potassium base, the scientists formed a hexaindium chain in which one -diketiminate ligand is bound to each metal atom. On the basis of crystallography studies, the team reports that both ends of the chain are capped with iodine and that there are no bridging ligands supporting the five indium-indium single bonds.



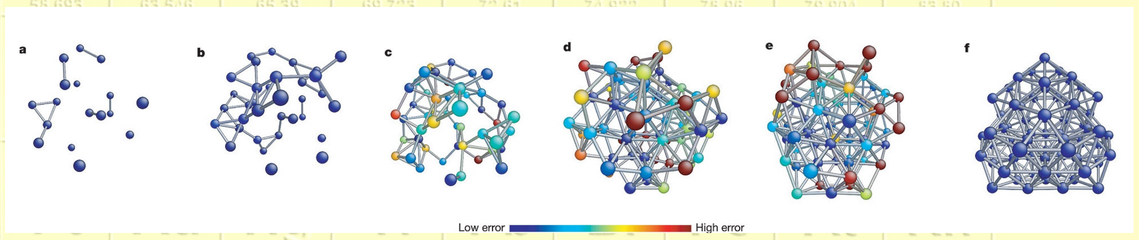
La *Liga*, un mètode de resolució estructural

Synthesize a new solid state compound, and modern crystallography methods usually can help solve the material's atomic structure, provided that samples of the material are available in the form of bulk crystals, even small ones. But for nanoparticles and other materials that lack long-range order, determining structures is challenging because crystallography methods aren't applicable.

A new computational method (*Liga*) is poised to help with the problem. Researchers have developed a numerical procedure for determining the atomic structures of aperiodic materials using the type of data measured in X-ray and neutron-diffraction studies of powders and other noncrystalline samples. The method may enable structures to be solved with subangstrom resolution even when crystallographic methods fail.

To build up structures, the algorithm "positions" a small number of atoms in a cluster and then compares the distance list derived from the computer-generated cluster with an experimentally measured list. Distance values obtained from other computer-generated clusters of the same size are also compared with the experimental data. The theoretical cluster that matches the experimental data most closely "wins" that round and is promoted to the next level, where structures of clusters with one additional atom are once again ranked according to the closeness of the match with experimental data (J. L. Billinge *et al*., *Nature* **2006,** *440,* 655).

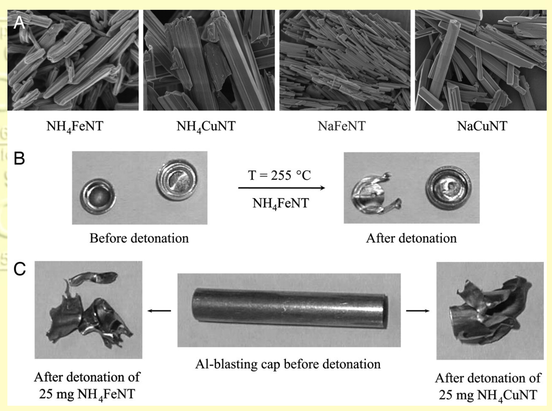
Billinge explains that the procedure was inspired by the rules of promotion and relegation (downgrading) that are used to rank teams in European soccer leagues, such as La Liga in Spain.



Un explosiu *segur* i *ecològic*

Environmentally friendly and safe substitutes for lead-based primaries have been developed by researchers at the University of North Carolina, Chapel Hill, and Los Alamos and Lawrence Berkeley National Laboratories.

Primaries are small explosive charges used to detonate larger charges, ranging from propellants for bullets to explosives used in mining. Most are lead-based and therefore potentially harmful for the environment and for people exposed to the residue after primaries explode. These materials can also detonate accidentally. Finding a replacement has been difficult, because the substitutes also have defects, including instability or toxicity. Now, UNC chemistry professor Thomas J. Meyer and his colleagues have synthesized four green primary explosives that meet all of the criteria needed to replace those containing lead (Proc. Natl. Acad. Sci. USA 2006, 103, 5409). Based on complex metal dianions and environmentally benign cations, the compounds can be desensitized by storage in water and release no harmful residues when they blow up.



Breus

- La *Royal Society of Chemistry* proporciona als científics dels països en vies de desenvolupament accés en línia gratuït de totes les seves revistes, però només fins a l'any 2004 (*Chemistry World*, març de 2006).
- La revista *Chemistry World* publica cada mes un sudoku amb elements químics.
- El *Chemistry Unpublished Papers Forum* (http://www.chemunpub.it) recull resultats químics que no s'han pogut publicar en revistes.
- Una directiva de la Unió Europea referent a la contaminació per metalls pesants podria arribar a prohibir la construcció de nous orgues per a esglèsies (*Chemistry World*, març de 2006).

L'element número **28**, **níquel**, va ser descobert el 1751 per Axel Fredrik Cronstedt. El seu nom prové del mot suec *kopparnickel,* que vol dir *diable del coure.*