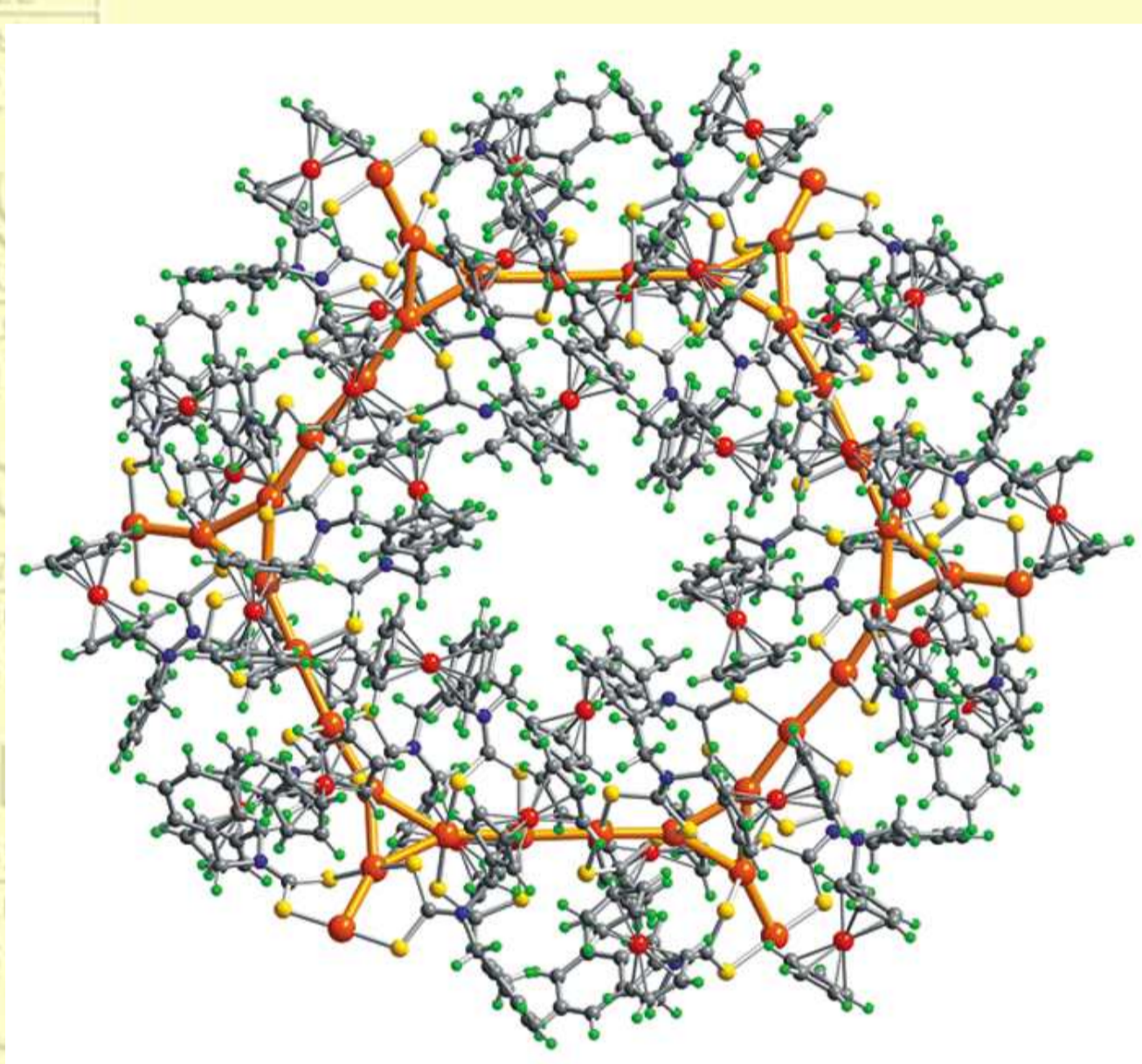


## Una corona d'or

In what some might call a crowning achievement of metal-metal bonding, chemists in China have assembled 36 gold atoms into a crownlike ring, creating the largest member of the gold ring family reported to date (*Angew. Chem. Int. Ed.*, **2008**, 47, 4551). A team led by Shu-Yan Yu of Renmin University of China created the compound (shown) by adding gold tetrahydrothiophene chloride to a bis(dithiocarbamate) ligand containing ferrocenylmethyl substituents. At first, Au<sub>6</sub> clusters supported by the ligand form in solution. When this solution is concentrated, the clusters assemble into a hexameric Au<sub>36</sub> structure. The researchers report that the gold-gold bonding interactions are strong, with an average bond length of 2.890 Å. This work provides a method for the construction of macrocyclic hosts from unique metal-metal bonding interactions and it is envisioned that the present work is not only promising for the development of supramolecular chemistry but also for nanostructured materials.

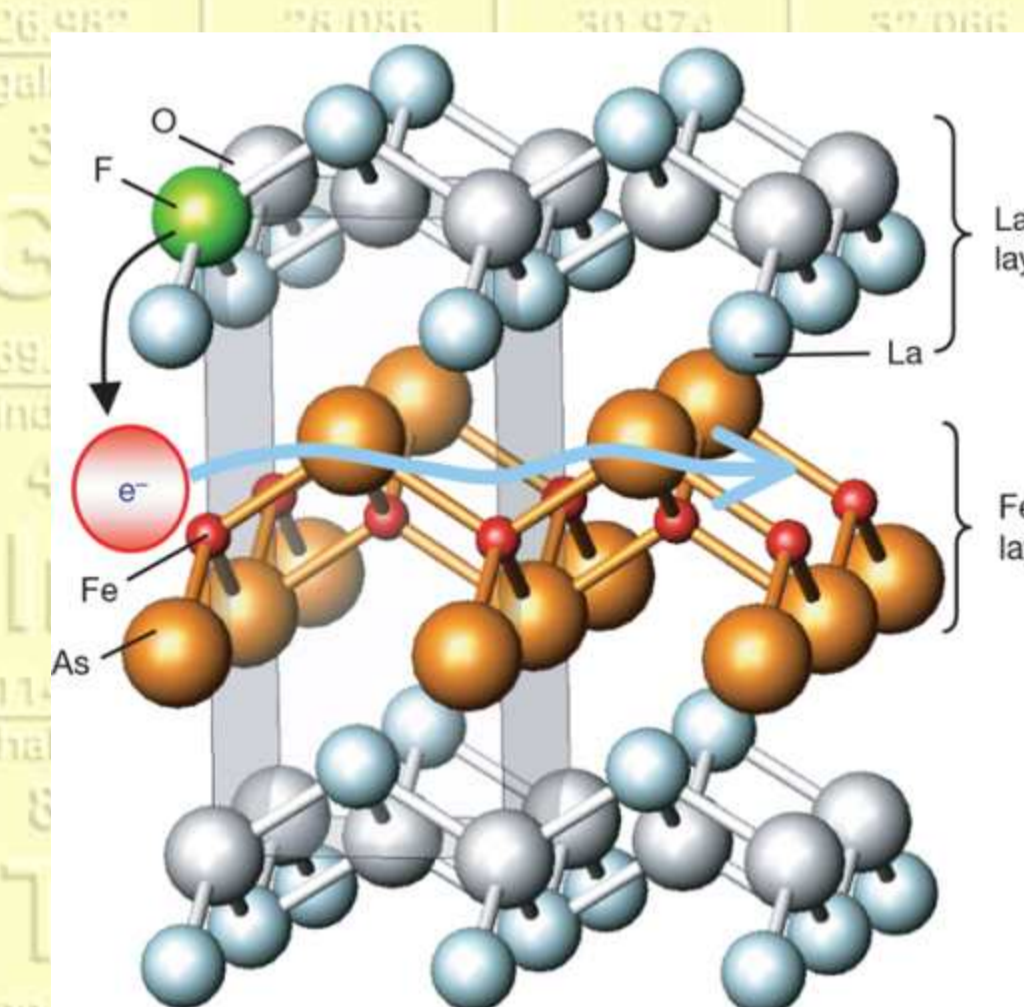


## Una nova família de superconductors

For the first time in years, a new class of high-temperature superconductors has been discovered, prompting labs around the world to begin synthesizing variants with ever higher superconducting temperatures. This newest family of high-temperature superconductors consists of layers of a fluorine-doped rare-earth metal oxide (lanthanum or samarium) sandwiched between layers of iron arsenide.

LaO<sub>(1-x)</sub>F<sub>x</sub>FeAs is the first set of these compounds, reported by Hideo Hosono and colleagues at the Tokyo Institute of Technology (*J. Am. Chem. Soc.* **2008**, 130, 3296). The compounds have a superconducting transition temperature, or T<sub>c</sub>, of 26 K.

Now, some of the original researchers have teamed up with Hiroki Takahashi and colleagues at Nihon University in Tokyo and have found that putting the new compounds under pressure bumps up the T<sub>c</sub> of the same class of materials to 43 K (*Nature* **2008**, 453, 376). In the meantime, several other labs in China have also reported synthesizing similar compounds with even higher T<sub>c</sub>. A team led by Zhong-Xian Zhao at the Institute of Physics of the Chinese Academy of Sciences in Beijing just reported that SmO<sub>(1-x)</sub>F<sub>x</sub>FeAs superconducts at 55 K.



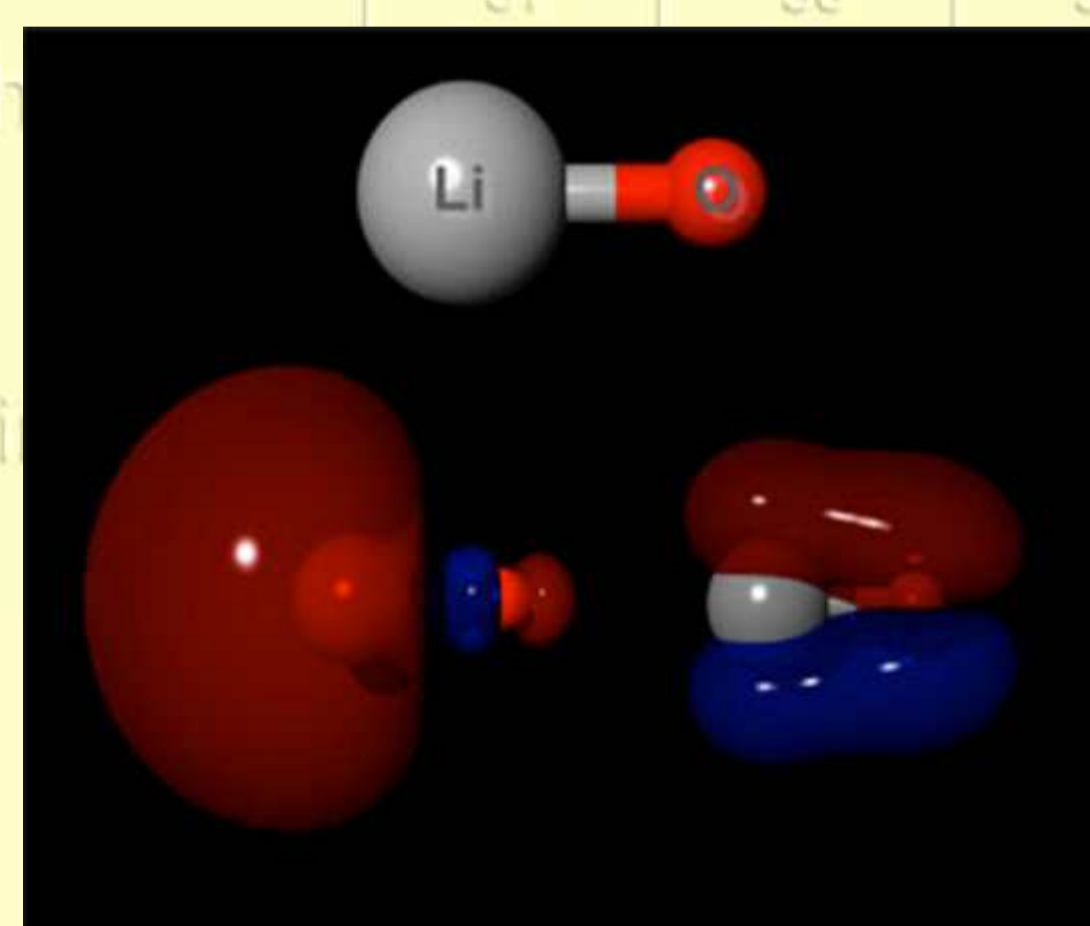
## El LiO<sup>-</sup>, la base més forta

Researchers have discovered the world's strongest base: the gas-phase lithium monoxide anion, LiO<sup>-</sup> (*Z. Tian et al., Proc. Natl. Acad. Sci. USA* **2008**, 105, 7647).

For the past 30 years, methane has been accepted as the weakest acid known. But CH<sub>4</sub> can give up a hydrogen ion to form CH<sub>3</sub><sup>-</sup>, which until now had the highest measured affinity of any compound to regain a lost hydrogen ion, making it the strongest base.

In their study, the researchers considered that in order to decrease the acidity of a compound below that of CH<sub>4</sub>, and thereby create a stronger base, one would need to use a highly electropositive substituent. They selected lithium, which is among the smallest and most electropositive elements, and carried out sets of calculations that show LiOH is about 2% less acidic than CH<sub>4</sub>. By their estimation, LiO<sup>-</sup> should therefore be the strongest base, and they have yet to determine any chemical species that can surpass it.

The team synthesized LiO<sup>-</sup> by using argon atoms to fragment lithium oxalate (LiC<sub>2</sub>O<sub>4</sub>) in an electrospray ionization mass spectrometer. This process sequentially knocked out CO<sub>2</sub> and then CO molecules to form LiO<sup>-</sup>. Thermodynamic measurements on LiO<sup>-</sup> confirmed its record basicity.

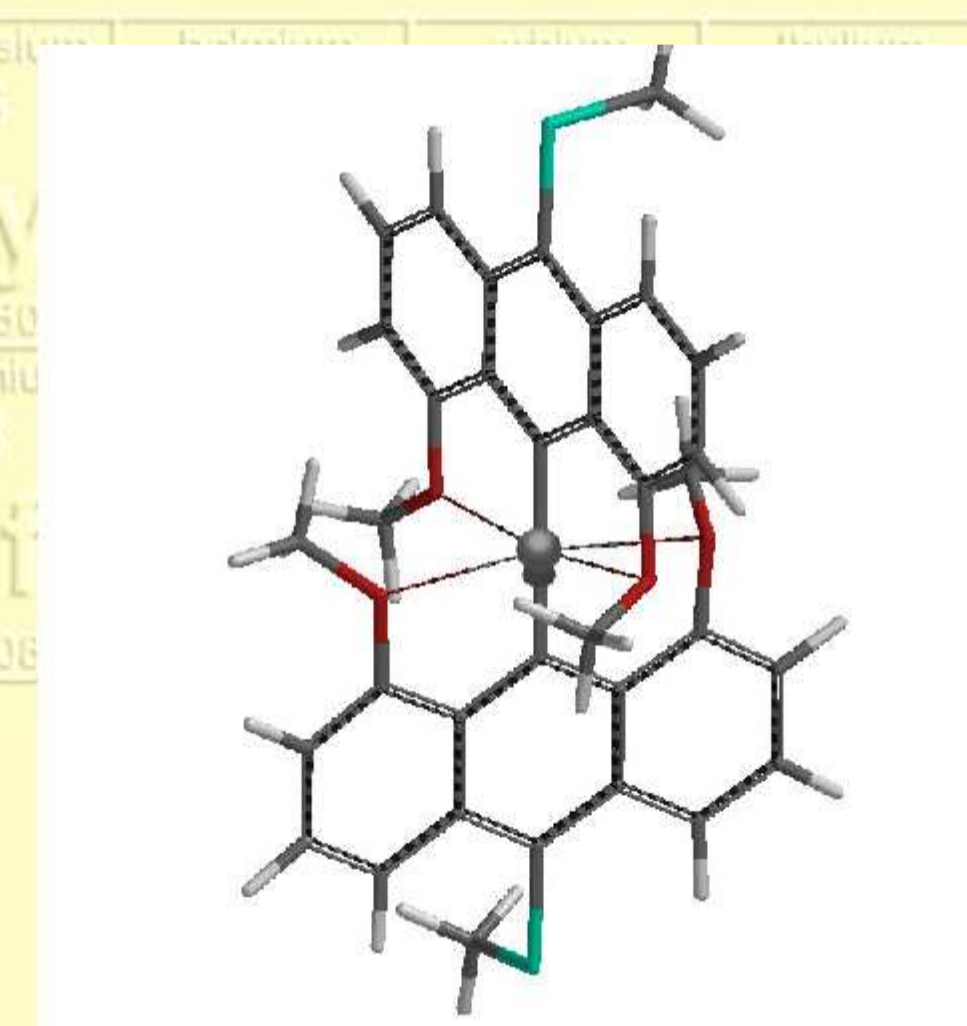


## Un carboni octaèdric

Carbon is a central element of chemistry. It enjoys a limitless molecular diversity in millions of molecules and yet, the structures of carbon compounds are typically understood in terms of the very simplest of bonding concepts. Whether di-, tri-, or tetracoordinate, carbon obeys the octet rule with great predictability. Hypervalence is common in heavier main group compounds but very rare in carbon compounds.

However, Y. Yamamoto (University of Hiroshima, Japan) and coworkers have recently reported an example of a hexacoordinate carbon with arguable hypervalence (*J. Am. Chem. Soc.* **2008**, 130, 6894). They have prepared a compound that features an allenic carbon bonded to two anthracene groups. Each of these groups has two methoxy groups that lie near the carbon.

Using x-ray crystallography, they found that the allene carbon-oxygen bond lengths (around 2.6 Å) are longer than a covalent C-O bond but shorter than the sum of the van der Waals radii, implying that they might be bonding. DFT calculations show that the oxygen is likely donating electron density into the \* orbital of the carbon.



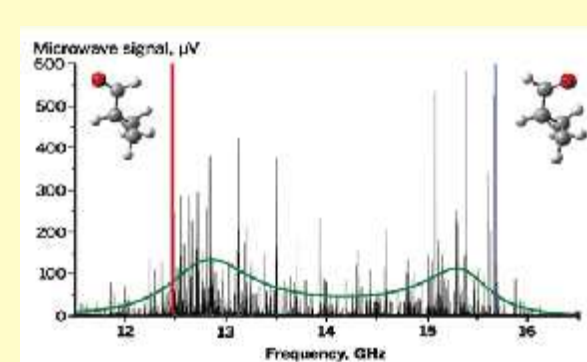
## Breus



- Un estudi fet per J. Petersson, de la universitat d'Uppsala (Suècia), suggereix que les verdures riques en nitrats, com ara els espinacs, poden ajudar a prevenir l'úlcer de estómac (*Chemistry World*, 15 de juny de 2008). Aquest treball contradiu estudis anteriors que afirmaven que la ingestió de nitrats pot ser perillosa per a la salut.



- La revista *Nature* ha publicat un editorial, intítulat *Comédie-Française*, criticant l'acord de l'Académie française en què s'oposa a la resolució de l'Assemblea Nacional Francesa d'incorporar a la seva Constitució, les dites llengües regionals, entre elles el català (*Nature*, **2008**, 453, 1144; doi: 10.1038/4531144b)



- Una nova tècnica espectroscòpica, basada en l'ús de les microones, permet observar com canvia la forma de les molècules (B. H. Pate i col., *Science*, **2008**, 320, 924). Aquest treball pot ajudar a comprendre per què els productes d'algunes reaccions depenen fortament de la forma dels reactius.

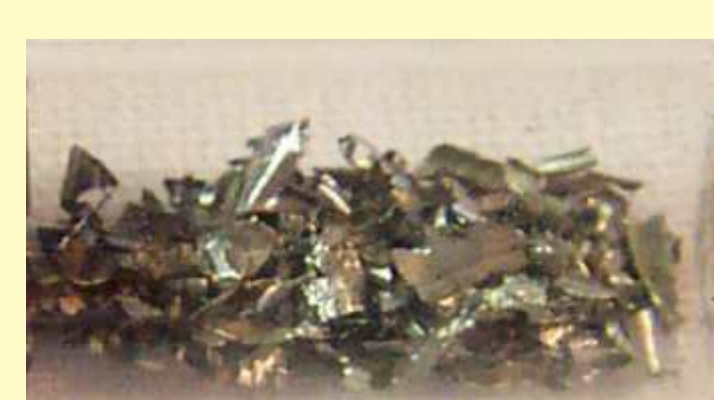
## Avui recomanem



La Universitat de Cambridge ha posat en Internet l'obra completa de Charles Darwin, incloent-hi el primer borrador de la teoria de l'evolució, les notes de la seva expedició en el vaixell Beagle i més de 20000 articles i 90000 fotografies relacionades amb aquest científic. Es poden consultar a la pàgina:

<http://www.darwin-online.com>

## L'element



L'element número 40, **zirconi**, fou descobert per M.H. Klaproth el 1789 a Berlín. El nom prové del mot persa/arab *zargon* que vol dir *daurat*, en referència al color del mineral zircó, una de les formes del ZrSiO<sub>4</sub>. Fou aïllat, si bé impur, per Berzelius per reducció del ZrF<sub>4</sub> amb potassi. S'utilitza en aliatges resistents a la corrosió i a la temperatura i, atesa la baixa secció de captura de neutrons que té, en reactors nuclears. El ZrO<sub>2</sub> (zircònia) té moltes aplicacions com a material refractari, ceràmic i en sensors d'oxigen.