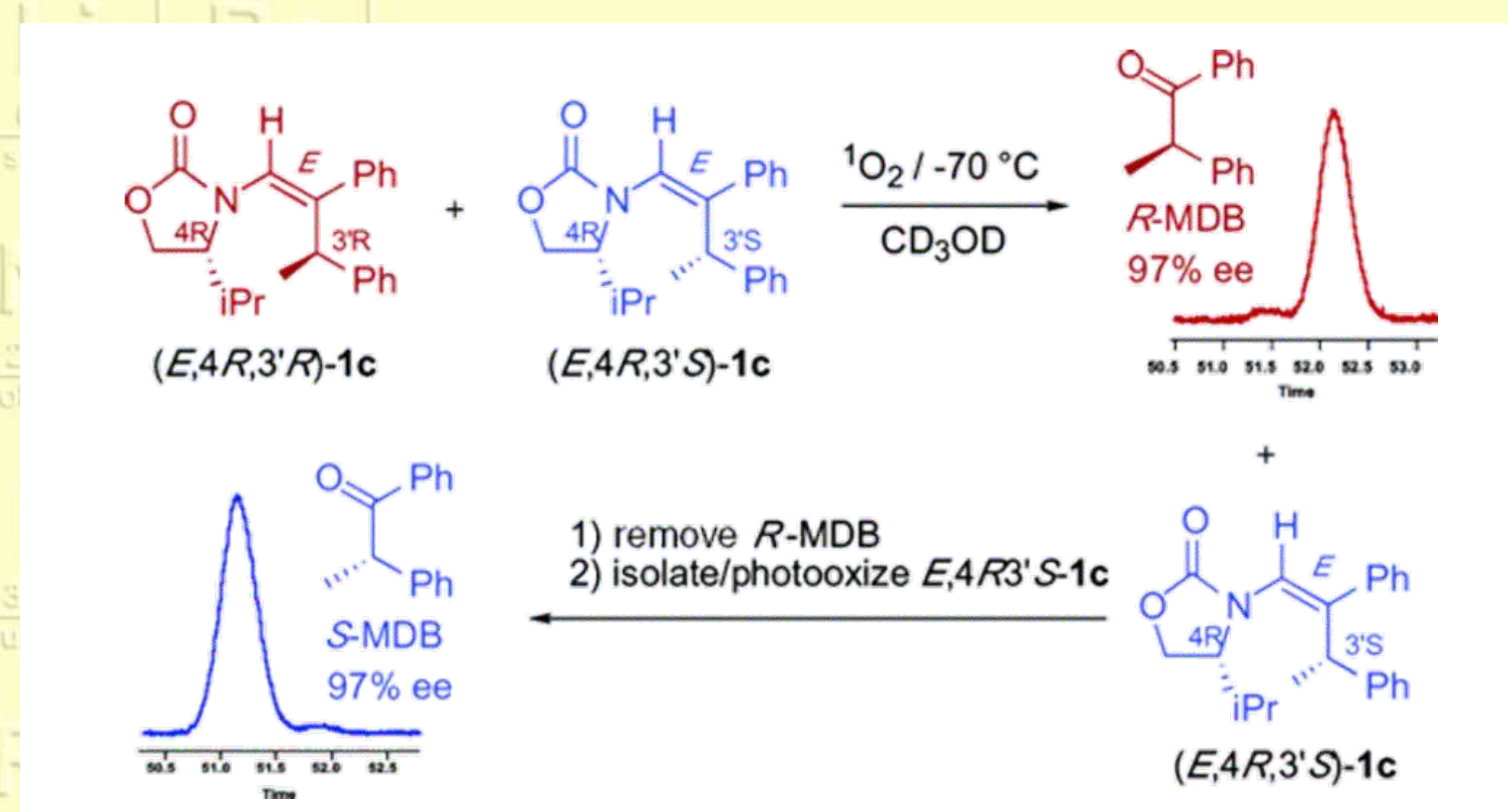


## L'oxigen singlet, agent de resolució quiral

What if resolving a racemic mixture did not require elaborate chiral auxiliaries or expensive transition-metal complexes? What if the task required only a reaction with a very simple, very small molecule? That possibility is here, courtesy of singlet oxygen, a reactive species formed by the action of light on molecular oxygen.

Chemistry professors Nicholas J. Turro at Columbia University and Waldemar Adam at the University of Puerto Rico, Río Piedras, and their colleagues have demonstrated the principle with the chiral compound methyldeoxybenzoin hitched to an oxazolidinone to form an enecarbamate.

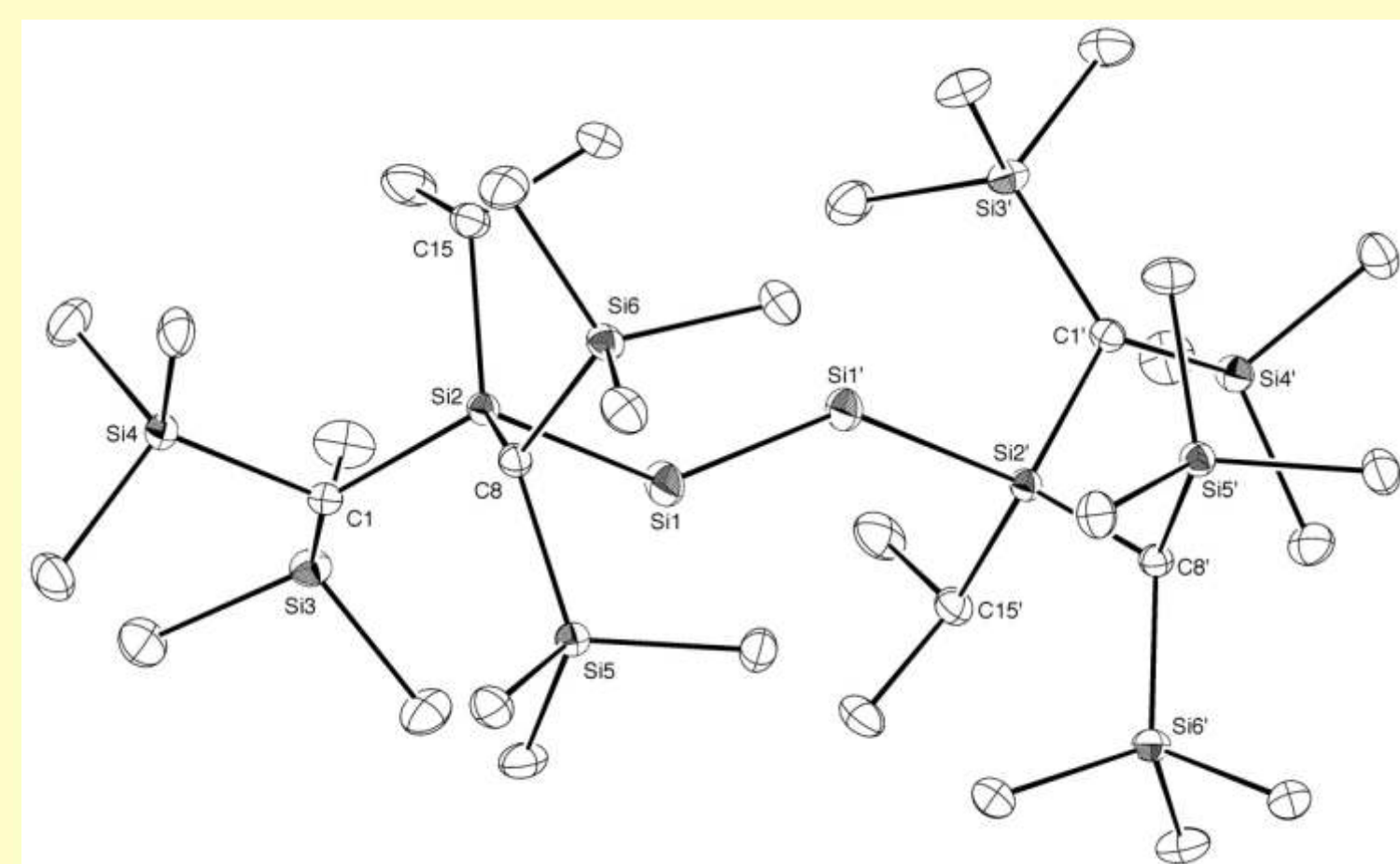
They find that under specific conditions, particularly of temperature, singlet oxygen adds to the enecarbamate's double bond to form one of two possible dioxetane diastereoisomers. This intermediate dissociates, releasing the corresponding enantiomer of methyldeoxybenzoin in 97% enantiomeric excess. At a different temperature, the other diastereoisomer is formed, from which the other enantiomer is released, also in 97% enantiomeric excess [*J. Am. Chem. Soc.*, **126**, 10498 (2004)].



## El silici forma "alquins"

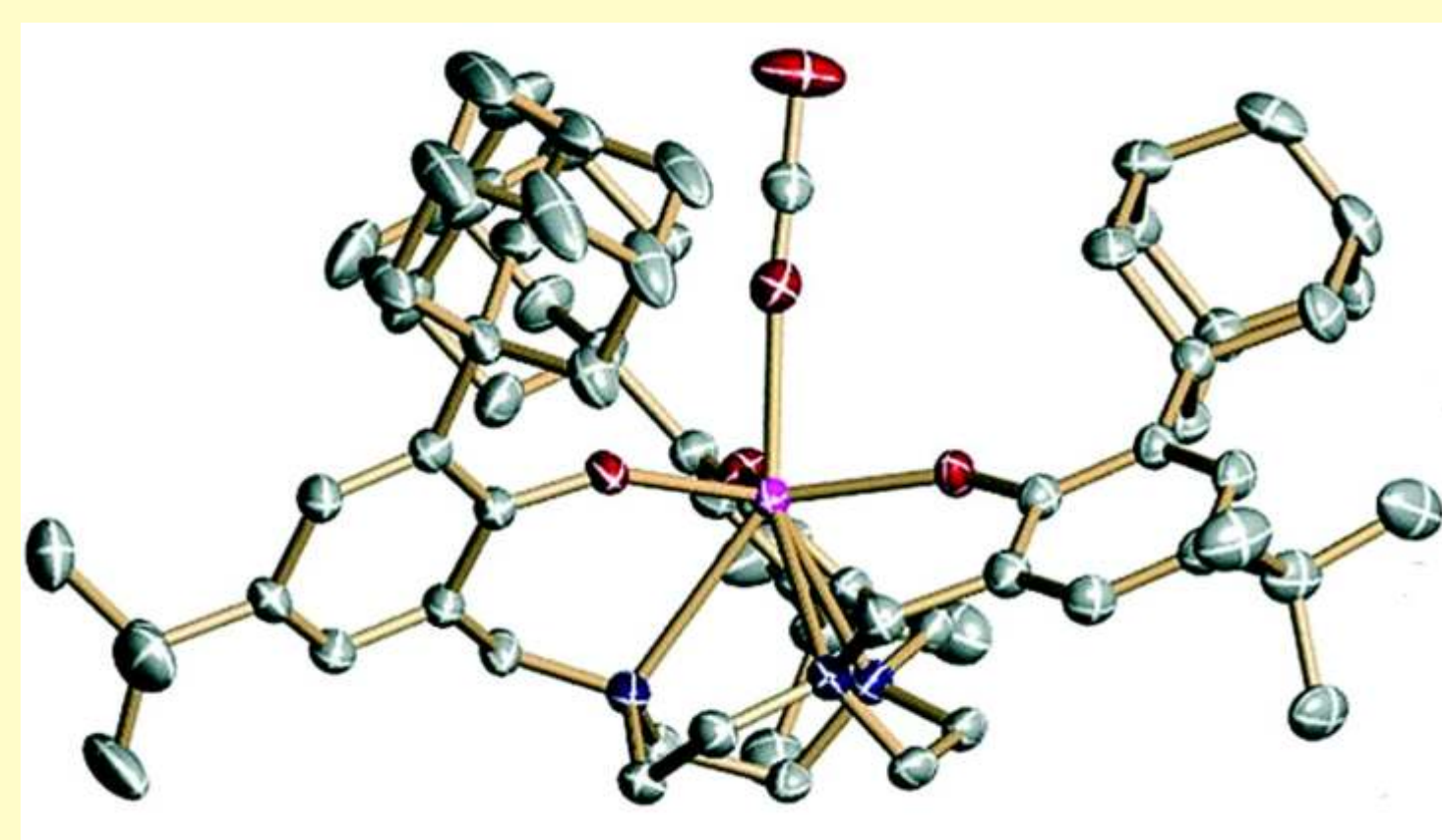
Double and triple bonds between two carbon atoms have been standard fare in chemistry for more than a century. And during the past 30 years, clever synthetic strategies have led to alkene and alkyne analogs of all the heavier group 14 elements from silicon to lead--with the exception of a compound containing a silicon-silicon triple bond. Now, the wait for this final member of the alkyne series is over.

Chemistry professor Akira Sekiguchi and coworkers Rei Kinjo and Masaaki Ichinohe of the University of Tsukuba, in Japan, report the synthesis and characterization of the first disilyne [*Science*, **305**, 1755 (2004)]. The team synthesized the compound by using potassium graphite ( $KC_8$ ) to reduce a brominated tetrasilane precursor containing extremely bulky groups. The emerald green disilyne crystals are heat stable, but they are air and moisture sensitive. X-ray studies show that the central silicon chain incorporating the triple bond is not linear like in alkynes, but is bent.



## L'urani fixa el CO<sub>2</sub> per un oxigen

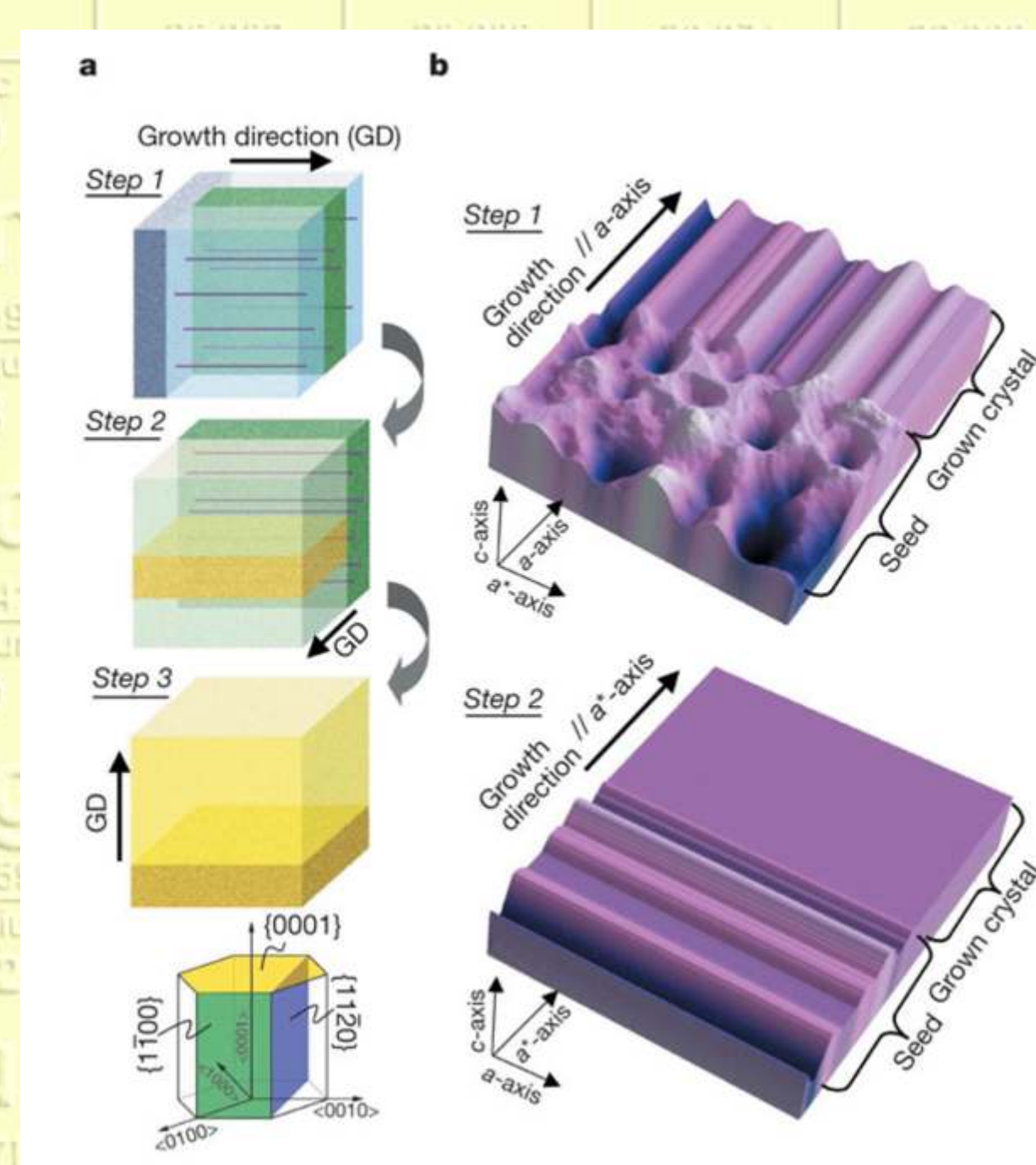
University of California, San Diego, chemists have isolated and structurally characterized a synthetic uranium complex that binds CO<sub>2</sub> in an unusual way: CO<sub>2</sub> is linearly coordinated to the metal via one of its oxygen atoms [*Science*, **305**, 1757 (2004)]. This linear metal-CO<sub>2</sub> coordination mode had previously been observed in the crystal structure of an iron enzyme involved in antibiotic synthesis, but until now scientists had not been able to obtain definitive structural evidence for its existence in synthetic systems, according to Karsten Meyer and Ingrid Castro-Rodriguez. In their new synthetic complex, bulky adamantane groups that surround the metal force U-OCO coordination (shown; purple = uranium, red = oxygen, gray = carbon, and blue = nitrogen). From bond lengths, magnetization data, and electronic and vibrational spectra, Meyer and Castro-Rodriguez conclude that upon CO<sub>2</sub> binding, U(III) is oxidized to U(IV), and CO<sub>2</sub> is reduced by one electron. The study of this and other metal complexes that bind and reduce CO<sub>2</sub> may someday lead to the development of simple compounds that can convert excess CO<sub>2</sub> into useful chemicals.



## El SiC, un cristall perfecte

Silicon carbide has been studied since the 1950s as a potential replacement for silicon in certain electronic devices. One lingering problem has been that SiC does not have a liquid phase, so the standard technique of controlled solidification of a liquid, used to make silicon and other semiconductors, can't be used. Instead, a vapor deposition method in which SiC is sublimed onto a seed crystal is used. But this technique leads to misalignment of some SiC molecular layers, introducing lattice defects that interfere with performance and have limited the material's use.

Daisuke Nakamura and Kazumasa Takatori at Toyota Central R&D Laboratories in Aichi, Japan, and colleagues have now solved this problem by growing SiC in multiple stages [*Nature*, **430**, 1009 (2004)]. The researchers start by growing a SiC layer on a SiC seed crystal. As expected, the growing crystal inherits defects from the seed crystal parallel to the growth direction, a pattern the researchers had previously observed. To combat propagation of the defects, the scientists stop crystal growth and then restart it on a new crystal face along an axis perpendicular to the original direction. The crystal growth in the new direction inherits fewer defects. By repeating this step-growth process on different perpendicular faces, the researchers gradually obtain crystals with a decreasing number of defects. The Japanese team can now prepare SiC wafers several centimeters in diameter that have two to three orders of magnitude fewer defects than SiC crystals grown traditionally.

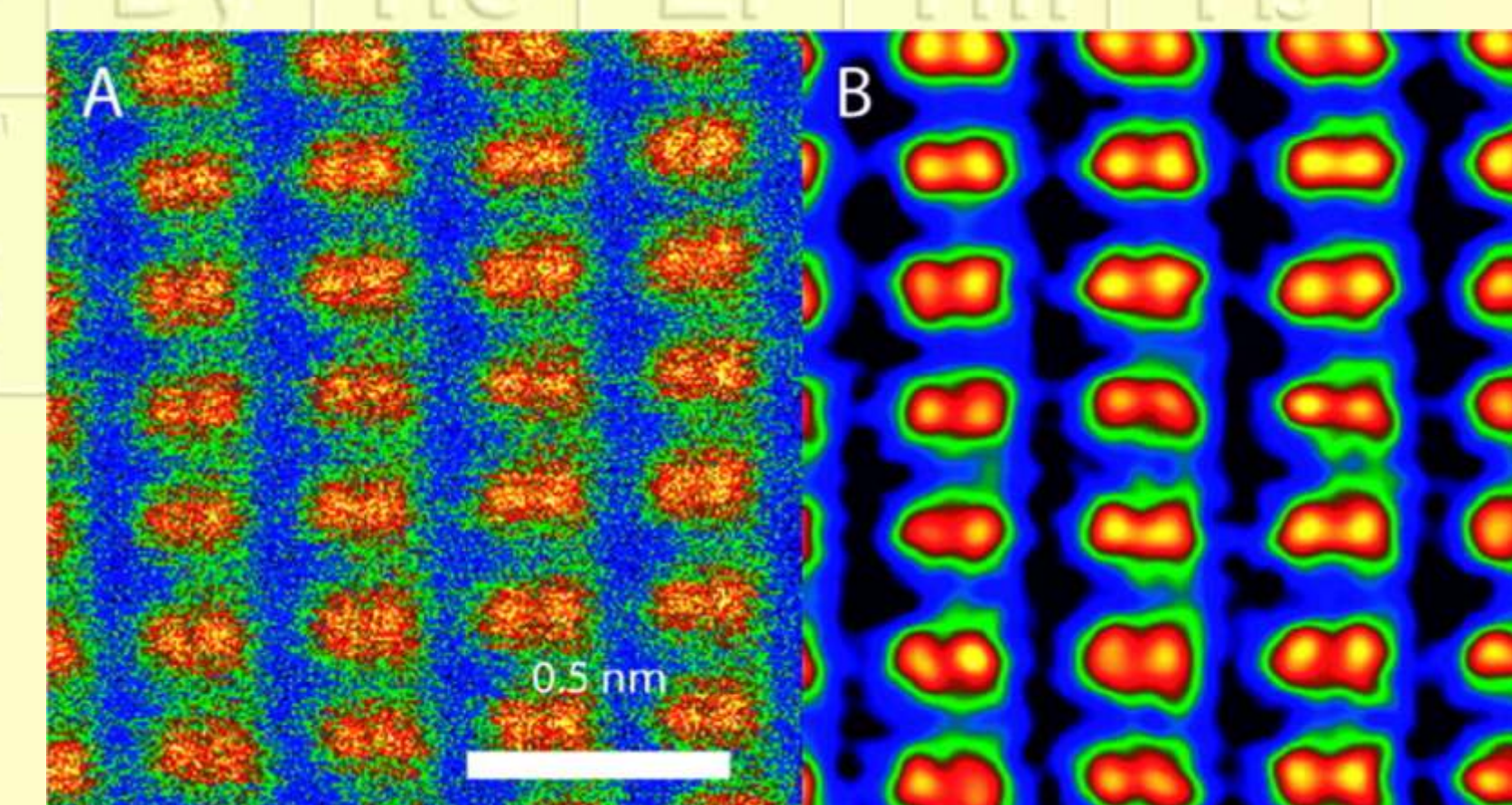


## Els àtoms, a ull nu

A milestone in electron microscopy--the first direct sub-angstrom imaging of a crystal lattice--has been reported by researchers at Oak Ridge National Laboratory and Nion, a company that specializes in advanced electron-microscope optics [*Science*, **305**, 1741 (2004)].

The researchers fitted a 300-kV scanning transmission electron microscope (STEM) at ORNL with a Nion aberration corrector and made a number of other technical enhancements to the system, producing what they believe to be the highest resolution electron microscope in the world.

In their images of a silicon crystal, they are able to distinguish columns of atoms that are 0.78 Å apart. The actual resolution limit of the microscope is 0.6 Å. This is a huge improvement over the resolution limit of 1.3 Å that they had before the aberration corrector was installed.



## Breus

- Aaron Ciechanover, Avram Hersko i Irwin Rose han rebut el Premi Nobel de Química 2004 pels seus estudis sobre la degradació de les proteïnes (<http://www.nobel.se>).
- Tal com havia anunciat *Notícies Inorgàniques* (número 14, febrer de 2004), augmenten les evidències d'un origen inorgànic del petroli [H.P. Scott *et al.*, *Proc. Natl. Acad. Sci. USA*, **101**, 14023 (2004)].
- El BOOMERANG (Better Observation Of Magnetization, Enhanced Resolution, And No Gradient) és el primer aparell de RMN portàtil [L.A. Madsen *et al.*, *Proc. Natl. Acad. Sci. USA*, **101**, 12804 (2004)]
- A l'adreça <http://www.reciprocalnet.org/common/index.html> es pot trobar informació sobre els compostos químics més habituals.

L'element número 18, argó, va ser descobert el 1894 per Lord Rayleigh and Sir William Ramsay. El seu nom prové del mot grec que significa *inactiu*.