

PHOTONICS

Graphene sees the light

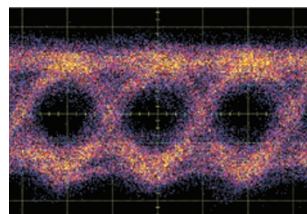
Three independent teams have boosted the performance of photodetectors that use graphene (atomically thick sheets of carbon) to convert light into electrical signals. This may enable fast optical communication within and between computer chips.

The latest devices boast data-transmission rates that rival those of conventional components and can sense a broader range of light wavelengths. Earlier graphene models produced weaker currents because most of the light failed to interact with their carbon layers. All three groups solved that problem by channelling light through silicon waveguides running along the graphene sheet.

The device built by Thomas Mueller at the Vienna University of Technology and his team produces 50 milliamps of current per watt of infrared light — only ten times less than germanium photodetectors, the current standard.

Dirk Englund of the Massachusetts Institute of Technology in Cambridge and his co-workers made a similar detector that handles an impressive 12 gigabits of data per second, and produces a clean electrical signal (pictured).

Meanwhile, a device from the group of Xiaomu Wang, then at the Chinese University of Hong Kong, picks up mid-infrared light at room



ECOLOGY

Another killer fungus hits amphibians

The Netherlands' population of wild fire salamanders (*Salamandra salamandra*; pictured) declined by 96% in the past three years, but no known infectious agent was found on their bodies. Now An Martel at Ghent University in Merelbeke, Belgium, and her team identify the problem as a new species of chytrid fungus, *Batrachochytrium salamandrivorans*. Healthy salamanders that were experimentally infected with the fungus developed skin lesions and died.

Unlike the only other chytrid fungus known to

cause deadly infections (*B. dendrobatidis*, which has ravaged global frog and toad populations), this new species does not affect midwife toads (*Alytes obstetricans*). It also grows at much lower temperatures, suggesting that the two chytrid species occupy different niches. The researchers developed a DNA-testing method to rapidly screen salamanders for the fungus, with the aim of tracking this latest threat to biodiversity.

Proc. Natl Acad. Sci. USA <http://doi.org/nrz> (2013)

temperature, suggesting that graphene detectors could bypass the restrictive cooling requirements of other photodetector materials.

Nature Photon. <http://doi.org/ns8>; <http://doi.org/ns9>; <http://doi.org/ntb> (2013)
For a longer story on this research, see: go.nature.com/zoilw

NEUROSCIENCE

Different strains of Alzheimer's

Protein fibres that build up in the brains of people with Alzheimer's disease take on different structures in

different patients.

Aggregates of the amyloid- β protein are a hallmark of Alzheimer's disease, but the molecular forms that they take in the brain have not been explored. Robert Tycko at the US National Institutes of Health in Bethesda, Maryland, and his team extracted amyloid- β from the brains of two patients who had died, and who had displayed different symptoms.

They used this amyloid- β to seed the growth of synthetic fibrils and analysed each sample with nuclear magnetic resonance and electron microscopy. Unexpectedly, all

the fibrils from each brain had the same molecular structure, but the structures differed between brains.

The researchers say that imaging agents that distinguish between fibril structures might allow more-precise diagnoses of Alzheimer's disease.

Cell 154, 1257–1268 (2013)

STRUCTURAL BIOLOGY

Rigid receptor denies HIV entry

The molecular structure of a protein commandeered by HIV to enter human cells reveals sites that could lead to

better anti-HIV drugs.

The protein CCR5 resides on the surface of certain immune cells. A team led by Beili Wu at the Chinese Academy of Sciences' Shanghai Institute of Materia Medica successfully crystallized CCR5 bound to the anti-HIV drug maraviroc. The structure suggests that the drug works by making CCR5 more rigid, and so prevents movements that allow HIV to enter cells. It also reveals why such HIV drugs fail to work with certain CCR5 mutants.

Differences between CCR5 and CXCR4, another protein used by HIV to enter cells, may explain why some HIV strains favour one protein gateway over the other.

Science <http://doi.org/ntj> (2013)

ZOOLOGY

Fertility smells like preen spirit

A bird's scent may indicate how many offspring it will produce.

Danielle Whittaker of Michigan State University in East Lansing and her colleagues analysed compounds that evaporate from the oily secretions that birds spread over their feathers when preening. The team collected oil from 12 female and 22 male dark-eyed juncos (*Junco hyemalis*; pictured) and found that the oil's chemical profile differed between the sexes.

Birds that released more chemicals characteristic of their sex produced more offspring. And males with more 'female' odours fledged more hatchlings fathered by other birds from their nests. Overall, the smell of a bird was a better predictor of reproductive success than either size or plumage.

Anim. Behav. <http://doi.org/nr3> (2013)



DONALD M. JONES/MINDEN PICTURES/FLPA

NATURAL PRODUCTS

African tree gets to the root of pain

An African plant used in traditional medicine for pain relief contains the same active ingredient as an artificial pain killer.

Together with scientists in Cameroon, France and Switzerland, Michel De Waard at Joseph Fourier University in Grenoble, France, collected extracts from the pincushion tree (*Nauclea latifolia*), separated compounds into groups on the basis of their mass and chemical properties, then tested each group in mice for its ability to relieve pain.

The team found an oily yellow compound in the most potent group and determined its chemical structure to be that of tramadol, which has been sold as a synthetic analgesic since the 1970s. The compound was detected only in the plant's roots — the same parts used in traditional remedies to treat pain. The researchers believe that this is the first time a widely prescribed synthetic drug has been found in a plant at clinically relevant concentrations.

Angew. Chem. <http://doi.org/f2dv27> (2013)

GENETICS

Ancient bear bone yields a sequence

The mitochondrial genome of a Pleistocene cave bear (*Ursus deningeri*) has been reconstructed using extremely short DNA molecules from a bone that is more than 300,000 years old. Apart from rare specimens preserved in permafrost, the fossil is some 200,000 years older than any other material used to generate a complete DNA sequence.

By reworking methods to purify the tiny amounts of damaged DNA that are typical of old samples,

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NUTRITION

Fruits shrink diabetes risk



Three large, long-running health surveys suggest that some fruits — but not fruit juice — reduce the risk of diabetes.

Researchers led by Qi Sun at the Harvard School of Public Health in Boston, Massachusetts, looked at people's reports of how often they ate certain fruits and whether they developed diabetes. Results came from a total of 187,382 US health professionals whose health and habits have been tracked for more than two decades, during which time more than 12,000 of the study participants developed diabetes.

Eating whole fruits such as apples, pears, grapes, raisins and particularly blueberries was associated with a lower risk of diabetes. By contrast, drinking fruit juice was associated with a slight increase in risk, perhaps because juices contain fewer fruit-specific chemicals and introduce more sugar into the bloodstream more quickly.

Br. Med. J. 347, f5001 (2013)

Jesse Dabney at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, and his colleagues collected and sequenced DNA strands as short as 30 basepairs. More than 90% of the sequences used to produce the genome were less than 50 basepairs long — too short to be used efficiently with conventional methods.

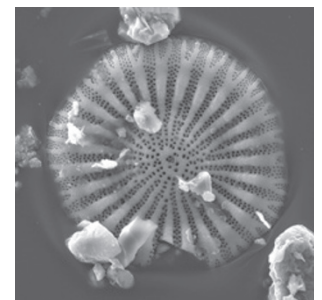
The technique could allow researchers to recover DNA from ancient humans and other specimens that are currently considered too degraded for most analyses. **Proc. Natl Acad. Sci. USA** <http://doi.org/nr4> (2013)

VOLCANOLOGY

Eruption sent microbes flying

Fragments of once-living creatures inside volcanic rocks can help to trace an eruption to its source.

New Zealand's North Island is blanketed in debris from a super-eruption of the Taupo volcano at the island's centre, which happened some 25,000 years ago. A team led by Alexa Van Eaton at the Victoria University



ALEXA R. VAN EATON/DAVID FLYNN

of Wellington searched for microfossils in rocks as far as 850 kilometres from the volcano. They found abundant skeletons of algae known as diatoms (pictured), including a type that lives only in lakes on the North Island. This confirms the findings of earlier work that the eruption blasted through a lake on that island.

Such fossils could help volcanologists to work out the locations and environmental settings of past eruptions, the authors say. They speculate that volcanoes might even disperse living cells across long distances.

Geology <http://doi.org/nr8> (2013)

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