



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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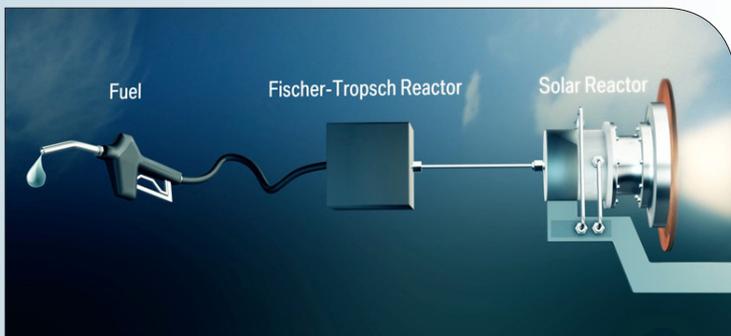
## FEATURE ARTICLES

### [Synthesized 'solar' jet fuel: Renewable kerosene from sunlight, water and carbon dioxide](#)

[Science Daily, 03MAY2014](#)

Researches in Switzerland have successfully demonstrated the entire production chain for renewable kerosene obtained directly from sunlight, water and carbon dioxide. This process has also the potential to produce any other type of fuel for transport applications, such as diesel, gasoline or pure hydrogen in a more sustainable way.

*Tags: Materials science, Energy, S&T EU, S&T Switzerland, Featured Article*



Artist's rendering of the functional principle. Credit SOLAR-JET

### [Optical traps on chip manipulate many molecules at once](#)

[Nanowerk, 29APR2014](#)

Researchers at Cornell University have shrunk the technology of an optical trap, which uses light to suspend and manipulate molecules like DNA and proteins, onto a single chip. Instead of just one molecule at a time, the new device can potentially trap hundreds of molecules at once, reducing month-long experiments to days.

[TECHNICAL ARTICLE](#)

*Tags: Advanced materials, Featured Article*

## S&T NEWS ARTICLES

### ADVANCED MATERIALS

#### [MIT to build new nanotechnology research hub – MIT.nano \(w/video\)](#)

[Nanowerk, 29MAY2014](#)

Starting in 2018, researchers from across MIT will be able to take advantage of comprehensive facilities for nanoscale research in a new building to be constructed at the very heart of the Cambridge campus.

*Tags: Advanced materials, S&T Policy*

#### [Organic crystal demonstrates superelasticity](#)

[Nanowerk, 07MAY2014](#)

Researchers in Japan found that terephthalamide crystals exhibit superelastic behavior with surprisingly little application of force. Shear stress on a specific surface of the crystal initially causes the crystal to bend, and then transition to a different crystal phase. When the tension is released, the phase transition moves back across the crystal, which returns to its original structure.

[TECHNICAL ARTICLE](#)

*Tags: Advanced materials, S&T Japan*

#### [Genetic approach helps design broadband metamaterial](#)

[Science Daily, 05MAY2014](#)

According to researchers at Penn State University a specially formed material that can provide custom broadband absorption in the infrared can be identified and manufactured using 'genetic algorithms'. These metamaterials can shield objects from view by infrared sensors. It can be manufactured to cover a variety of wavelengths. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials*

#### [Nanoengineers develop basis for electronics that stretch at the molecular level](#)

[Science Daily, 05MAY2014](#)

Researchers at UC San Diego are developing the design rules for a new generation of rubber- electronics for applications in energy, biomedical devices, wearable and conformable devices for defense applications, and for consumer electronics. They are taking these design rules

*continued...*

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and doing wet chemistry in the lab to make new semiconducting rubber materials. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials*

### [Future smart phones could be printed on your clothes](#)

[KurzweilAI](#), 30APR2014

Researchers in Australia have modeled the world's first "spaser" (surface plasmon amplification by stimulated emission of radiation) to be made completely out of carbon. They showed that graphene and carbon nanotubes can interact and transfer energy to each other through light. These optical interactions are very fast and energy-efficient, so they are suitable for electronic applications. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials, S&T Australia*

### [Carbon nanotube computer for the masses gets closer](#)

[Nanowerk](#), 29APR2014

Researchers at Stanford University have demonstrated that large scale fabrication techniques can be applied successfully to highly-scaled CNFETs, resulting in the ability to fabricate, in a scalable manner, larger-scale CNFET circuits at highly scaled technology nodes. The channel lengths are ranging from 90 nm to sub-20 nm. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials*

### [A paint that becomes conductive when dry can make almost anything electronic](#)

[Science Alert \(Australia\)](#), 28APR2014

The black non-toxic paint developed by a company in the UK uses carbon to conduct electricity when it dries. It is available in tins or in pens, which can be used to draw the lines of circuits.

*Tags: Advanced materials, S&T UK*

### [Bringing fiber optics to electronic components](#)

[Science Daily](#), 28APR2014

Researchers at the University of South Dakota have developed organic materials containing chromophore as an active compound. These bi-polar chromophores act like magnets. Components made from chromophores can provide a larger bandwidth and draw less power.

*Tags: Advanced materials*

### [Scientists track ripples in freestanding graphene for first time](#)

[Science Daily](#), 28APR2014

Researchers at the University of Arkansas produced images of individual atoms on a surface, to measure ultra-low frequency fluctuations in a one-square-angstrom region of freestanding graphene. The ripple dynamics are important for understanding mechanical stability and the efficient thermal conductivity transport properties of graphene. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials, Materials science*

## BIOTECHNOLOGY

### [First Reversible Glue Bandage Could Save Injured Soldiers' Vision](#)

[Newswise](#), 05MAY2014

When applied to a wounded eye, the adhesive warms up and becomes sticky, sealing the wound and minimizing further damage while the soldier is transported for treatment. Upon arriving at a hospital, doctors can simply apply cool saline solution to the glue, causing it to revert to its non-adhesive form and be removed with minimal discomfort.

*Tags: Biotechnology, Military technology*

### [Smell of male scientists may skew rodent studies](#)

[Futurity](#), 29APR2014

Scientists' inability to replicate research findings using mice and rats has contributed to mounting concern over the reliability of such studies. Pain researchers may have uncovered one important factor behind the problem: the sex of the experimenters has a big impact on the stress levels of rodents, which are widely used in preclinical studies.

*Tags: Biotechnology, Biology*

## COMMUNICATIONS TECHNOLOGY

### [Making wireless 10 times faster](#)

[EurekaAlert](#), 06MAY2014

Researchers at the University of Buffalo are developing a technology centered on cognitive radio to undo the gridlock resulting from the proliferation of smartphones, laptops and other gadgets. The system eliminates inefficiencies, allowing the transfer of as much information as possible while minimizing cross-interference.

*Tags: Communications Technology*

## CYBER SECURITY

### [Molecular networks provide insights for computer security: Viruses and other external threats drive evolution of robust architectures](#)

[Science Daily](#), 29APR2014

Environmental "noise" is a key evolutionary pressure that shapes the interconnections within cells, as well as those of neural networks and bacterial/ecological networks. According to researchers at Carnegie Mellon University this approach is particularly helpful in understanding how networks respond to cascading failures, whether it be an overloaded power grid or a computer network being overwhelmed by fake identities in a so-called sybil attack.

[TECHNICAL ARTICLE](#)

*Tags: Cyber security, Biology*

“The good thing about science is that it’s true whether or not you believe in it.”

NEIL DEGRASSE TYSON

## ENVIRONMENTAL SCIENCE

### [Light-sensitive buildings to reduce air pollution.](#)

EU Research, 06MAY2014

The basic idea is to mix titanium dioxide, which acts as a photocatalyst similar to the chlorophyll in plants, into the concrete. TiO<sub>2</sub> harvests sunlight, specifically the ultraviolet component. Once it is activated by light, TiO<sub>2</sub> catalyses reactions involving atmospheric oxygen and water resulting in the degradation of hazardous chemicals that come into contact with it. [PROJECT WEBSITE](#)

Tags: Environmental science, S&T EU

## FORECASTING

### [The Research & Innovation Performance of the G20](#)

Thomson Reuters, 01APR2014

The report draws on publication and citation data from Thomson Reuters Web of Science, which affords insights into the research areas of particular concentration and strength for each of the G20 nations. The report clarifies the dynamics of a tectonically shifting world, as emerging nations increase their prominence while long-standing powers adjust to a changing apportionment of output and influence. [REPORT](#)

Tags: Forecasting, Emerging technology, Forecasting

## IMAGING TECHNOLOGY

### [PHOTONIS Introduces NOCTURN Gigabit Ethernet Low Light Camera](#)

Physics World, 07MAY2014

The NOCTURN family of low light cameras provides day-through-night imaging, capturing images in extreme lighting conditions from daylight through quarter-moon darkness. The cameras are ideal for surveillance, security, man-portable and mobile applications where low power and small size is essential such as for UAVs, rifle scopes, border patrol and remote monitoring.

Tags: Imaging technology

### [Terahertz imaging on the cheap: Fewer sensors required for high-resolution imaging systems](#)

Science Daily, 05MAY2014

Researchers at MIT have developed a technique that could reduce the number of sensors required for terahertz or millimeter-wave imaging by a factor of 10, or even 100, making them more practical. The technique could also have implications for the design of new, high-resolution radar and sonar systems. [TECHNICAL ARTICLE](#)

Tags: Imaging technology, Sensors

### [Quantum telescope could make giant mirrors obsolete](#)

Physics World, 29APR2014

Quantum mechanics, rather than a huge telescope, could be the best route to high-resolution space images, according to new research carried out in the UK. If confirmed, a telescope of any size could resolve ever-smaller features of the night sky, allowing astronomers to discover exoplanets and other distant objects much more easily than is currently possible. [TECHNICAL ARTICLE](#)

Tags: Imaging technology, S&T UK, Space technology

## MATERIALS SCIENCE

### [Clues for superconductivity in an iron-based material](#)

Science Daily, 05MAY2014

Researchers at DOE’s Oak Ridge National Laboratory report that they can make different phases of calcium-iron-arsenide in single crystal forms and measure their structure and properties; and they now have Fermi surface signatures that explain why we can’t induce superconductivity in a certain structural phase of this material. The study adds critical knowledge to the field of superconductivity that will ultimately allow such widespread applications. [TECHNICAL ARTICLE](#)

Tags: Materials science, Government S&T

### [Diamond makes laser beams more brilliant](#)

PhysOrg.com, 05MAY2014

By exploiting optical interactions inside a several millimetres long diamond crystal, researchers in Australia have shown that diamond can radically improve the quality of high power laser beams. The major advantage of using diamond is its outstanding ability to dissipate heat – faster than other optical materials and for conversion to be achieved passively in a very small package. [TECHNICAL ARTICLE](#)

Tags: Materials science, Photonics, S&T Australia

### [New mathematical framework to characterize shape of graphene](#)

Science Daily, 05MAY2014

The mathematical framework developed by researchers in the UK allows one to make extremely accurate characterizations of shape. When the nodes of the structure, or mesh points, correspond with atomic positions, discrete differential geometry provides direct information on the potential chemistry and electronic properties of two-dimensional materials. [TECHNICAL ARTICLE 1, 2](#)

Tags: Materials science, S&T UK

*continued...*

**Breaking up water: Controlling molecular vibrations to produce hydrogen**

Science Daily, 01MAY2014

Researchers in Switzerland used lasers to determine how specific vibrations in a water molecule affect its ability to dissociate. The experimental results were used to optimize theoretical models for water dissociation (University of New Mexico), which can impact the design of future catalysts. [TECHNICAL ARTICLE](#)

Tags: *Materials science, S&T Switzerland*

**Multilayer, microscale solar cells enable ultrahigh efficiency power generation**

Science Daily, 28APR2014

Researchers at the University of Illinois have developed a printing approach which allows manipulation of ultrathin, small semiconductor elements that can be stacked on top of one another to yield an unusual type of solar cell capable of operating across the entire solar spectrum at exceptionally high efficiency. [TECHNICAL ARTICLE](#)

Tags: *Materials science, Energy, Solar energy*

**New Physics of Metamaterials**

arXiv, 15APR2014

In this paper, we find a new transformation where Maxwell's equations are still unchanged. Consequently, Veselago's metamaterial and other systems that have negative phase velocities without double negative permittivity and permeability can be described by a unified theory.

Tags: *Materials science*

**FEATURED RESOURCE****Science Watch**

Thomson Reuters ScienceWatch is an open Web resource for science metrics and research performance analysis that include data and commentary on the people, places and topics at the forefront of science today. It highlights the important role of research evaluation and management in support of strategic decision-making.

**MICROELECTRONICS****Smaller microchips that keep their cool**

EurekaAlert, 05MAY2014

Researchers in Germany have developed a new type of high-temperature process to fabricate extremely compact microchips that operate flawlessly even at temperatures of up to 300 degrees Celsius. Potential applications include production of geothermal energy and aviation.

Tags: *Microelectronics, S&T Germany*

**Integrating nanoelectronic devices onto live plants and insects**

Nanowerk, 02MAY2014

Researchers in Korea have integrated all-carbon based electronic devices to live plants and insects. Technologies to interface electronic circuits, especially sensor networks that have capabilities of transferring information and power wirelessly, with living flora and fauna can monitor the conditions of the environment, including the detection of chemical weapons, pollution, and infections, etc.

[TECHNICAL ARTICLE](#)

Tags: *Microelectronics, Flexible electronics*

**PHOTONICS****Scientists overcome fundamental atom laser limit to build brightest atom laser to date**

PhysOrg.com, 07MAY2014

An international team of researchers (Greece, Singapore) has demonstrated a novel, ultra-bright atom laser that overcomes the fundamental atom laser limit, achieving a flux of 107 atoms per second, which is seven times brighter than the brightest atom lasers to date. Using the same technique, the researchers also created an ultra-cold atom beam, which at just 200 nanoKelvin is two orders of magnitude colder than any atom beam reported to date.

[TECHNICAL ARTICLE](#)

Tags: *Photonics*

**QUANTUM SCIENCE****Proving uncertainty: New insight into old problem**

Science Daily, 29APR2014

Nearly 90 years after Werner Heisenberg pioneered his uncertainty principle, an international team of researchers (UK, Finland, Germany) has provided substantial new insight into this fundamental tenet of quantum physics with the first rigorous formulation supporting the uncertainty principle as Heisenberg envisioned it. [TECHNICAL ARTICLE](#)

Tags: *Quantum science*

**S&T POLICY****Basic science finds corporate refuge**

Nature, 29APR2014

Statistics compiled by the US National Science Foundation suggest a jump in industrial funding of basic research beginning in 2006 (see 'Corporate masters'). In a climate of stagnant federal and university funding, the increase stands out. Even as some companies have trimmed their research units, others seem to have bolstered them. [RELATED ARTICLE: 'New kids on the block'](#)

Tags: *S&T policy*

## SENSORS

**Now Your Phone's Tilt Sensor Can Identify You**  
MIT Technology Review, 02MAY2014

Researchers from the University of Illinois and University of South Carolina found that tiny hardware imperfections in smartphone and tablet accelerometers lead to unique “fingerprints” within the data they produce. Even if you don't allow apps to see your personal data or location, just the raw movements of the phone—which can be measured without permission—can betray the phone's unique identity and track it over time. TECHNICAL ARTICLE

*Tags: Sensors*

**This Microsoft sensor could make touching your phone a thing of the past**

Digital Trends, 02MAY2014

Microsoft Research has announced that it is currently working on a new transparent electric field sensor that may allow users to execute commands on a smartphone without even touching it. The technology is based on an off-the-shelf processor and a custom array that is made up of one transmit electrode and five receiver electrodes. When a hand comes near the sensor, the electric field is coupled with the user, which then changes the signal.

*Tags: Sensors*

**Ultrawideband Engine-Area Network Lets Sensors Talk Under the Hood**

IEEE Spectrum, 29APR2014

Researchers in Turkey have worked out a theoretical map of nodes in what is essentially an engine-area wireless network featuring ultrawideband communications. Ultrawideband is resistant against multipath fading and signal power attenuation providing robust communication at low transmission power and high communication rate.

TECHNICAL ARTICLE

*Tags: Sensors* ■

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