



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[Scientists form new nerve cells—directly in the brain](#)

[Science Daily, 26MAR2013](#)

Two years ago, researchers at Lund University in

Sweden were the first in the world to re-programme human skin cells to dopamine-producing nerve cells—without taking a detour via the stem cell stage. The research group has now gone a step further and shown that it is possible to re-programme both skin cells and support cells directly to nerve cells, in place in the brain. [TECHNICAL ARTICLE](#)

Tags: Breakthrough technology, Neuroscience, Featured Article

[Invisibility cloak research moves forward at MTU](#)

[PhysOrg.com, 25MAR2013](#)

Researchers at the Michigan Technological University used ordinary dielectric materials such as ceramics having differing dielectric permittivity instead of metamaterials. They were able to cloak larger cylindrical objects and cloak them more effectively than using metamaterials. It is eight to nine times thinner than metamaterial cloaks and much simpler to make. The multi-layer dielectric cloak could easily be scaled to work in a variety of frequency ranges.

Tags: Advanced materials, Military technology, Featured Article



*Artist's rendering of neurons in brain.
(Credit: © nobeastsofierce / Fotolia)*

[Scientists discover new nanotechnology technique to charge memory chips](#)

[Nanowerk, 22MAR2013](#)

IBM research scientists showed that it is possible to reversibly transform metal oxides between insulating and conductive states by the insertion and removal of oxygen ions driven by electric fields at oxide-liquid interfaces. The experiments showed that the materials maintain a stable metallic state even when power to the device is removed. [TECHNICAL ARTICLE](#)

Tags: Microelectronics, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Multi-purpose wonder can generate hydrogen, produce clean water and even provide energy](#)

[Science Daily, 23MAR2013](#)

Researchers in Singapore have developed Multi-use Titanium Dioxide (TiO₂). It is formed by turning titanium dioxide crystals into patented nanofibres, which can then be easily fabricated into patented flexible filter membranes which include a combination of carbon, copper, zinc or tin, depending on the specific end product needed.

[TECHNICAL ARTICLE 1, 2](#)

Tags: Advanced materials, Materials science

[Carbon aerogel is the world's lightest material](#)

[Nanowerk, 22MAR2013](#)

Researchers in China have developed a material called carbon aerogel with a density of just 0.16 milligrams per cubic centimeter. The material is derived from a gel, with the liquid component replaced by a gas. It is expected to play an important role in pollution control such as oil spill control, water purification and even air purification.

[TECHNICAL ARTICLE](#)

Tags: Advanced materials, Materials science, S&T China

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AUTONOMOUS SYSTEMS & ROBOTICS

From complex living systems to smarter computers

Science Daily, 23MAR2013

Living organisms have an enviable ability to adjust to new situations, make complex decisions, and even to heal themselves when damaged. By contrast, technological systems struggle to cope with the unexpected. The European collaborative research Project "SWAM-ORGAN" tries to understand complex living systems such as cells making an organ, or the spatially-controlled growing of a plant, and to apply these principles to technological systems, in particular more intelligent and adaptable robot swarms.

Tags: *Autonomous systems & robotics, S&T EU*

Video Friday: Robots That Fold, Robots That Drive, Robots That Drink

IEEE Spectrum, 22MAR2013

It's a good thing that these origami robots can't fold themselves and multiply, because if they could, the world would have ended by now.

Tags: *Autonomous systems & robotics*

BREAKTHROUGH TECHNOLOGY

Laser empties atoms from the inside out

Nanowerk, 25MAR2013

Using one of the world's most powerful lasers an international team of researchers from the USA, UK and Russia demonstrated that it is possible to remove the two most deeply bound electrons from atoms, emptying the inner most quantum shell and leading to a distinctive plasma state. [TECHNICAL ARTICLE](#)

Tags: *Breakthrough technology, Materials science, Particle physics*

Measuring the magnetism of antimatter: Antiprotons measured more accurately than ever before

Science Daily, 25MAR2013

By precisely measuring the oscillations of each particle, a team of researchers at Harvard University was able to measure the magnetism of a proton more than 1,000 times more accurately than an antiproton had been measured before. Similar tests with antiprotons produced a 680-fold increase in accuracy in the size of the magnet in an antiproton. The breakthrough could one day yield important clues about the nature of matter itself. [TECHNICAL ARTICLE](#)

Tags: *Breakthrough technology, Particle physics*

COMMUNICATIONS TECHNOLOGY

Towards high-capacity fibre-optic communications at the speed of light in vacuum

Nature Photonics, 24MAR2013

Researchers in the UK report a fundamentally improved hollow-core photonic-bandgap fibre that provides a record combination of low loss (3.5 dB km⁻¹) and wide bandwidth (160 nm), and use it to transmit 37 × 40 Gbit s⁻¹ channels at a 1.54 μs km⁻¹ faster speed than in a conventional fibre. This represents the first experimental demonstration of fibre-based wavelength division multiplexed data transmission at close to (99.7%) the speed of light in vacuum.

Tags: *Communications Technology*

Research team develops new compact and energy-efficient nanoscale microwave oscillators

PhysOrg.com, 21MAR2013

In collaboration with US and Italian researchers Chinese researchers made major experimental improvements to develop a more compact, more energy-efficient generation of a mobile communication device known as spin transfer nano-oscillator (STNO). [TECHNICAL ARTICLE](#) Note: In October 2012 a team of researchers from Germany and the US reported the following: [Magnetic nano-oscillator driven by pure spin current](#) Vladislav E. Demidov, et al. Nature Materials, 11, 1028–1031, 2012

Tags: *Communications Technology, S&T China*

New Player in Electron Field Emitter Technology Makes for Better Imaging and Communications

Science Daily, 08MAR2013

A team of researchers from NIST and UMD used silicon carbide and a room-temperature chemical process to make it highly porous like a sponge. Then they patterned it into microscopic emitting structures in the shape of pointed rods or sharp-edged fins. When an electric field is applied, these novel field emitters can produce an electron flow comparable to a thermionic source. [TECHNICAL ARTICLE](#)

Tags: *Communications Technology, Government S&T*

ENERGY

Breakthrough in electricity storage: New large and powerful redox flow battery

Fraunhofer Research Institute, 26MAR2013

Fraunhofer scientists have recently made an important breakthrough with their development of a redox flow battery that reaches stack power up to 25 kW, with a cell size of 0.5 square meters. This is eight times larger than the previous A4-sized systems.

Tags: *Energy, Battery, S&T Germany*

continued...

“If you are out to describe the truth, leave elegance to the tailor.”

ALBERT EINSTEIN

Discovery may allow scientists to make fuel from CO2 in the atmosphere

Science Daily, 26MAR2013

A new process is made possible by a unique microorganism called *Pyrococcus furiosus*, or “rushing fireball,” which thrives by feeding on carbohydrates in the super-heated ocean waters near geothermal vents. By manipulating the organism’s genetic material, scientists at the University of Georgia have created a kind of *P. furiosus* that is capable of feeding at much lower temperatures on carbon dioxide.

TECHNICAL ARTICLE

Tags: Energy, Climatology

Simulations Uncover Obstacle to Harnessing Laser-Driven Fusion: Under Realistic Conditions, Hollow Cones Fail to Guide Energetic Electrons to Fuel

Science Daily, 26MAR2013

Researchers at Ohio State University found compelling evidence that the cone-guided approach to Fast Ignition has a serious flaw. A once-promising approach for using next-generation, ultra-intense lasers to help deliver commercially viable fusion energy has been brought into serious question.

TECHNICAL ARTICLE

Tags: Energy

Super batteries? Hybrid ribbons a gift for powerful batteries

Science Daily, 26MAR2013

Ribbons of vanadium oxide and graphene created at Rice University are thousands of times thinner than a sheet of paper, yet have potential that far outweighs current materials for their ability to charge and discharge very quickly.

TECHNICAL ARTICLE

Tags: Energy

FORECASTING

Novel Method Accurately Predicts Disease Outbreaks

Science Daily, 22MAR2013

The new method developed by APL and DOD, known as PRedicting Infectious Disease Scalable Model (PRISM), extracts relationships between clinical, meteorological, climatic and socio-political data. It can be used in any geographical region and extended to other environmentally influenced infections affecting public health and military forces worldwide.

TECHNICAL ARTICLE

Tags: Forecasting

GOVERNMENT S&T

DARPA Envisions the Future of Machine Learning

DARPA News, 19MAR2013

Probabilistic programming is a new programming paradigm for managing uncertain information. By incorporating it into machine learning, PPAML (The Probabilistic Programming for Advanced Machine Learning) seeks to greatly increase the number of people who can successfully build machine learning applications and make machine learning experts radically more effective.

BAA

Tags: Government S&T, Artificial intelligence

IMAGING TECHNOLOGY

Backpack Mapping System Captures Intelligence in Tough-to-Get-to Places

EurekaAlert, 26MAR2013

Enhanced Mapping and Positioning System (EMAPS) developed by Johns Hopkins University for the Defense Threat Reduction Agency (DTRA) is an approximately 6-inch cube that weighs less than 4 pounds captures a floor-plan-style map of the area traversed as well as 360-degree photos and sensor readings of that area using a combination of lasers and sensors.

Tags: Imaging technology

Glasses-Free 3-D From Almost Any Angle (w/ video)

IEEE Spectrum, 23MAR2013

By modulating the light going to each grating, researchers at Hewlett-Packard produced a series of images each angled to produce a 3-D picture from a different point of view. The technique could lead to effective, inexpensive glasses-free 3-D screens for cellphones or tablets that function over a wide field of view.

Tags: Imaging technology

INFORMATION TECHNOLOGY

Shrinking Blob Computes Traveling Salesman Solutions

MIT Technology Review, 26MAR2013

Researchers at the University of the West of England in the UK reveal an unusual approach to solving the Traveling Salesman problem. They say a reasonable solution can be found by representing the cities as a series of dots in a virtual petri dish, submerging the dots in a blob of virtual goo and then shrinking the blob.

VIDEOS, TECHNICAL PAPER

Tags: Information Technology, Mathematics, S&T UK

continued...

MATERIALS SCIENCE

Engineers explain physics of fluids some 100 years after original discovery

Science Daily, 23MAR2013

Some 135 years ago, Rayleigh wrote that two fluid jets or drops do not always merge into one body of liquid. Researchers at Virginia Tech studied two silicone oil jets bouncing off each other upon collision. They found that when the speed of the flow is increased beyond a certain threshold, the air is no longer stable due to the high inertia of jets, and the liquid jets will coalesce. This might impact a variety of industrial and everyday processes such as fuel efficiency, ink jet printing, and the development of spray coatings. [TECHNICAL ARTICLE](#)

Tags: *Materials science*

MEDICAL SCIENCES

Old mice, young blood: Rejuvenating blood of mice by reprogramming stem cells that produce blood

Science Daily, 25MAR2013

Scientists in Sweden have now rejuvenated the blood of mice by reversing, or reprogramming, the stem cells that produce blood. [TECHNICAL ARTICLE](#)

Tags: *Medical Sciences, Biology*

FEATURED RESOURCE

Printed Electronics World

Provides daily updates to the latest industry developments. Launched in May 2007, this free portal covers the progress of printed electronics in all its forms from transistor circuits to power, sensors, displays, materials and manufacturing. [RSS](#)

MICROELECTRONICS

Probing the resolution limits of electron-beam lithography

Nanowerk Spotlight, 26MAR2013

Researchers at MIT have achieved the EBL (Electron Beam Lithography) fabrication of 2 nm feature size and 10 nm periodic dense structures, which are the highest resolution patterns ever achieved with common resists. The researchers expect this technique to impact a wide array of fields that strive for sub-5-nm patterning, such as excitonics, plasmonics, nano-optics, and molecular electronics. [TECHNICAL ARTICLE](#)

Tags: *Microelectronics***Evidence of magnetic superatoms could open doors to new spin electronics**

PhysOrg.com, 22MAR2013

Researches from Johns Hopkins University have found evidence for the existence of magnetic superatoms—small, compact clusters of atoms whose electrons occupy a set of orbitals around the entire cluster rather than around the individual atoms. If scientists can synthesize superatoms with magnetic properties, then one day they may use them to create new spin-dependent electronics. [TECHNICAL ARTICLE](#)

Tags: *Microelectronics, Materials science*

NEUROSCIENCE

Brain scans predict which criminals are more likely to re-offend

Nature News, 25MAR2013

Researchers in New Mexico used functional magnetic resonance imaging (fMRI) to scan the prisoners' brains during computer tasks in which subjects had to make quick decisions and inhibit impulsive reactions. The scans focused on activity in a section of the anterior cingulate cortex (ACC). After four years, among the ex-convicts, men who had lower ACC activity during the quick-decision tasks were more likely to be arrested again even after the researchers accounted for other risk factors such as age, drug and alcohol abuse and psychopathic traits.

Tags: *Neuroscience*

QUANTUM SCIENCE

China to Launch Quantum Experiment Satellite in 2016

Chinese Academy of Science, 26MAR2013

China has initiated to launch a satellite for quantum information and technology experiments in 2016. Prof. Pan Jianwei said, "We hope to establish a quantum communication network from Beijing to Vienna. Such a plan is impossible without international collaborations."

Tags: *Quantum science, S&T China***Shedding Light on a Quantum Black Box**

American Physical Society Spotlight, 26MAR2013

Researchers use a technique called quantum process tomography (QPT) to fully characterize the quantum process a quantum device implements. The most straightforward strategy consists of sending a large ensemble of known quantum states into the input of the device and measuring how the quantum process transforms them at the output. The possibility of extending the tomography of quantum processes to physical systems outside the realm of optics, such as to Bose-Einstein condensates, represents one of the next attractive challenges of this field of research. [TECHNICAL ARTICLE](#)

Tags: *Quantum science*

Quantum computers counting on carbon nanotubes

Science Daily, 21MAR2013

A study by physicists in Germany has shown how nanotubes can store information in the form of vibrations. Up to now, researchers have experimented primarily with electrically charged particles. Because nanomechanical devices are not charged, they are much less sensitive to electrical interference. [TECHNICAL ARTICLE](#)

Tags: *Quantum science*

SCIENCE WITHOUT BORDERS

Speed of light may not be fixed, scientists suggest; Ephemeral vacuum particles induce speed-of-light fluctuations

Science Daily, 26MAR2013

Two new articles challenge established wisdom about the nature of vacuum. In one article scientists have identified a quantum level mechanism for interpreting vacuum as being filled with pairs of virtual particles with fluctuating energy values. As a result, the inherent characteristics of vacuum, like the speed of light, may not be a constant after all, but fluctuate. [TECHNICAL ARTICLE 1, 2](#)

Tags: *Science without borders*

Ultra-precision Positioning

Science Newsline, 26MAR2013

Researchers in China describe a new rotary actuator that accurately delivers more torque than previous devices. While the new device can be driven at higher frequencies, the resulting higher speeds mean less accuracy because the rotor is harder to stop due to the additional rotational inertia of the rotor. [TECHNICAL ARTICLE](#)

Tags: *Science without borders, S&T China*

What if Africa were to become the hub for global science?

BBC News, 23MAR2013

At first sight, it seems unlikely—a continent most associated with war and famine producing globally significant scientific research. It is a low base to start from, but the tide is turning. Real, serious scientific work is taking place now in sub-Saharan Africa, especially in math, physics and astronomy.

Tags: *Science without borders*

Mysterious Monopole Remains Elusive

American Physical Society Spotlight, 22MAR2013

A team of physicists in Sweden argues that old, high-latitude rocks derived from the Earth's interior should be prime hunting ground for the hypothetical particles. Although the team's search came up empty, their strategy may offer a way to set stronger limits on the abundance of monopoles within the planet. [TECHNICAL ARTICLE](#)

Tags: *Science without borders*

SENSORS

Compact radar takes an inside view

Fraunhofer Research Institute, 26MAR2013

A compact millimeter wave sensor developed by researchers in Germany penetrates non-transparent material. It transmits signals at frequencies between 75 and 110 GHz and can be applied in a broad range of areas, from flight safety and logistics to industrial sensor technology and medical technology.

Tags: *Sensors, Imaging Technology, S&T Germany*

Cooled integrated circuit amplifies with lowest noise so far

Science Daily, 22MAR2013

Researchers in Sweden have developed a unique indium phosphide-based process for what is known as high electron mobility transistors (HEMT). Transistors and other semiconductor components have been fabricated on a monolithic chip on an indium phosphide wafer. All parts of the design such as semiconductor layers, components, process and circuit design have been optimised for the lowest noise performance. [TECHNICAL ARTICLE 1, 2](#)

Tags: *Sensors, Astronomy, S&T Sweden*

Electrical engineer to provide Navy better radar performance with less data

EurekAlert, 21MAR2013

Researchers at UT Arlington are working to provide the US Navy a signal processing system that provides better information for radar even though it collects less data. They are working to simplify data collection through an algorithmic system.

Tags: *Sensors, Military technology* ■

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