



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[3-D Printer Can Build Synthetic Tissues](#)

[Science Daily, 04APR2013](#)

Oxford University scientists have demonstrated that a custom-built programmable 3D printer can create materials with several of the properties of living tissues. The new type of material consists of thousands of connected water droplets, encapsulated within lipid films, which can perform some of the functions of the cells inside our bodies. [TECHNICAL ARTICLE](#)

Tags: Biotechnology, S&T UK, Synthetic biology, Featured Article

[A 'light switch' in brain illuminates neural networks: Scientists can see cells communicate by flipping a neural light switch](#)



Researchers at the Norwegian University of Science and Technology's Kavli Institute of Systems Neuroscience have used advanced techniques to make select rat neurons light sensitive, enabling them to understand which cells talk to other cells in the brain. The picture shows a greatly enlarged rat neuron and a laboratory rat. (Credit: Geir Mogen, NTNU)

[Science Daily, 04APR2013](#)

Researchers in Norway have combined a range of advanced techniques that enable them to identify which neurons communicate with each other at different times in the rat brain, and in doing so, create the animal's sense of location. [TECHNICAL ARTICLE](#)

Tags: Neuroscience, Featured Article

[New camera system creates high-resolution 3-D images from up to a kilometer away](#)

[Science Daily, 04APR2013](#)

A new Time-of-Flight (ToF) system developed by researchers in Scotland works by sweeping a low-power infrared laser beam rapidly over an object. It then records, pixel-by-pixel, the round-trip flight time of the photons in the beam as they bounce off the object and arrive back at the source. The system can resolve depth on the millimeter scale over long distances using a detector that can "count" individual photons.

[TECHNICAL ARTICLE](#)

Tags: Imaging technology, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Nanotechnology transforms molecular beams into functional nano-devices with controlled atomic architectures](#)

[Nanowerk, 03APR2013](#)

By using aluminum as a catalyst instead of the canonical gold, a team of researchers from Canada and Germany demonstrated that the growth of nanowires triggers a self-doping process involving the injection of aluminum atoms thus providing an efficient route to dope nanowires without the need of post-growth processing typically used in the semiconductor industry. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Nanotechnology, S&T Canada, S&T Germany

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Robot Rocket, Giant Sphero, and 3D Printed Head

IEEE Spectrum, 05APR2013

And more from Festo. And iRobot. And JPL.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

New 'transient electronics' disappear when no longer needed

Science Daily, 08APR2013

The devices developed by researchers at the University of Illinois, Urbana, are enclosed in material that dissolves completely after a certain period of time when exposed to water or body fluids. By altering the number of layers of the wrapping, scientists can define everything about how the device will dissolve in the body or in the environment, including its overall lifetime.

*Tags: Biotechnology, Materials science***Sonic lasso catches cells and assembles nanomaterials**

Nanowerk, 03APR2013

Researchers in the UK have demonstrated for the first time that a sonic lasso can be used to grip microscopic objects, such as cells, and move them about. With further development this could be used to assemble human tissue as part of a tissue engineering production line. TECHNICAL ARTICLE

Tags: Biotechnology, S&T UK

COMMUNICATIONS TECHNOLOGY

A Step Toward Optical Transistors?

Newsweek, 09APR2013

Researchers at McGill University show that all-optical modulation and basic Boolean logic functionality – key steps in the processing and generation of signals – can be achieved by using laser-pulse inputs to manipulate the quantum mechanical state of a semiconductor nanocrystal. TECHNICAL ARTICLE

*Tags: Communications Technology, S&T Canada***Advancing secure communications: A better single-photon emitter for quantum cryptography**

Science Daily, 09APR2013

The new emitter designed by researchers at the University of Michigan is a single nanowire made of gallium nitride with a very small region of indium gallium nitride that behaves as a quantum dot. The material used to make the emitter is commonly used in LEDs and solar cells. The researchers grew the nanowires on a wafer of silicon. Because their technique is silicon-based, the infrastructure to manufacture the emitters on a larger scale already exists. TECHNICAL ARTICLE

*Tags: Communications Technology, Quantum science***Quantum signal sent from aircraft**

Physics World, 07APR2013

Physicists in Germany are the first to transmit quantum information from a flying aircraft to a ground station. The sender and receiver were separated by about 20 km and the aircraft was travelling at nearly 300 km/h. TECHNICAL ARTICLE, Special issue on Quantum physics

*Tags: Communications Technology, Quantum science, S&T Germany***All-optical signal processing using dynamic Brillouin gratings**

Nature Scientific Reports, 03APR2013

Researchers in Italy demonstrate some unique processing properties of fiber optics, realizing functionalities more typically associated to digital electronics or, even, that cannot be achieved by electronics devices. The processing functions presented here are based on a single nonlinear effect, stimulated Brillouin scattering (SBS), in particular on the generation and manipulation of the so-called dynamic Brillouin gratings (DBGs).

*Tags: Communications Technology, Optical communication, S&T Italy***Building quantum states with individual silicon atoms**

e! Science News, 03APR2013

By introducing individual silicon atom 'defects' using a scanning tunnelling microscope, scientists in the UK have coupled single atoms to form quantum states. The study demonstrates the viability of engineering atomic-scale quantum states on the surface of silicon -- an important step toward the fabrication of devices at the single-atom limit. TECHNICAL ARTICLE

Tags: Communications Technology, S&T UK

COUNTER WMD

Highly lethal Ebola virus has diagnostic Achilles' heel for biothreat detection, scientists say

Science Daily, 05APR2013

By screening a library of a billion llama antibodies on live Ebola viruses scientists in the US have identified a potential weakness in the make-up of these deadly agents that can immediately yield a sensitive test. TECHNICAL ARTICLE

Tags: Counter WMD, Biology

ENERGY

'Artificial leaf' gains the ability to self-heal damage and produce energy from dirty water

Science Daily, 09APR2013

A researcher from Harvard University explained that the "leaf" mimics the ability of real leaves to produce

continued...

“Never before in history has innovation offered promise of so much to so many in so short a time.” **BILL GATES**

energy from sunlight and water. The device, however, actually is a simple catalyst-coated wafer of silicon, rather than a complicated reproduction of the photosynthesis mechanism in real leaves. The artificial leaf likely would find its first uses in providing “personalized” electricity to individual homes in areas that lack traditional electric power generating stations and electric transmission lines.

Tags: Energy

Peel-and-stick thin film solar cells

[Asia Research News, 09APR2013](#)

Hanyang University, Korea, in collaboration with Stanford University has succeeded in fabricating peel-and-stick thin film solar cells (TFSCs). The Si wafer is clean and reusable. Moreover, as the peeled-off TFSCs from the Si wafer are thin, light-weight, and flexible, it can be attached onto any form or shape of surface like a sticker.

Tags: Energy, Solar energy

A mighty wind

[MIT News, 03APR2013](#)

Researchers at MIT have run their own experiments and found that ionic thrusters may be a far more efficient source of propulsion than conventional jet engines. In their experiments, they found that ionic wind produces 110 newtons of thrust per kilowatt, compared with a jet engine's 2 newtons per kilowatt.

Tags: Energy

Breakthrough in hydrogen fuel production could revolutionize alternative energy market

[Science Daily, 03APR2013](#)

Researchers at Virginia Tech have discovered a way to extract large quantities of hydrogen from any plant, a breakthrough that has the potential to bring a low-cost, environmentally friendly fuel source to the world.

TECHNICAL ARTICLE

Tags: Energy

GOVERNMENT S&T

Recruiting engineered cells to work for warfighters

[EurekAlert, 08APR2013](#)

The Office of Naval Research has launched a collaborative initiative with university researchers focused on synthetic, or engineered, cells. The grand plan is to try and take advantage of the natural capabilities of microbes to collect chemical and physical signal information of different types and process this information.

Tags: Government S&T, Synthetic biology

INFORMATION TECHNOLOGY

Forget your password: The future is 'passthoughts'

[UC Brekeley, 07APR2013](#)

From their experiments researchers at UC Berkeley found that brainwave signals, even those collected using low-cost non-intrusive EEG sensors in everyday settings, can be used to authenticate users with high degrees of accuracy.

Tags: Information Technology

MATERIALS SCIENCE

Nanotechnology imaging breakthrough

[EurekAlert, 09APR2013](#)

A team of researchers at Carnegie has made a major breakthrough in measuring the structure of nanomaterials under extremely high pressures. They developed a new way to get around the severe distortions of high-energy X-ray beams that are used to image the structure of a gold nanocrystal.

Tags: Materials science

Cry me a river of possibility: Scientists design new adaptive material inspired by tears

[Science Daily, 08APR2013](#)

Researchers at Harvard University are designing a new kind of adaptive material with tunable transparency and wettability features. The bioinspired material is a continuous liquid film that coats, and is infused in, an elastic porous substrate -- which is what makes it so versatile. It is based on a core concept: any deformation of the substrate -- such as stretching, poking, or swelling -- changes the size of the pores, which causes the liquid surface to change its shape. **TECHNICAL ARTICLE**

Tags: Materials science

New 'transient electronics' disappear when no longer needed

[Science Daily, 08APR2013](#)

It is known that electric conductivity increases more strongly the higher the temperature gets. Thus a feedback loop is created, in which the components continue to be heated up even further. Researchers in Germany analyse the typical feedback effects and describe them for organic semi-conductors. **TECHNICAL ARTICLE**

Tags: Materials science, S&T Germany

Material turns 'schizophrenic' on way to superconductivity

[Science Daily, 06APR2013](#)

Researchers at Rice University describe a material that

continued...

becomes “schizophrenic”—simultaneously exhibiting the characteristics of both a metallic conductor and an insulator. They have proposed a unified phase diagram for the alkaline iron selenides in which this schizophrenic phase connects between the lower-temperature, superconducting phase at one extreme and a higher-temperature insulating phase at the other. [TECHNICAL ARTICLE](#)

Tags: Materials science

FEATURED RESOURCE

[Futurity](#)

Futurity features the latest discoveries by scientists at top research universities in the US, UK, Canada, and Australia. The nonprofit site, launched in 2009, is supported solely by its university partners. [RSS](#)

[Solid or Liquid? Physicists Redefine States of Matter](#)

[Simons Science News, 03APR2013](#)

Researchers in France and the US have identified two characteristics of materials that dramatically change form at the intersections of temperature and pressure where liquids turn solid. These characteristics could define the difference between the two states of matter.

Tags: Materials science, S&T France

[A new understanding of metallic glass](#)

[MIT News, 02APR2013](#)

Researchers at MIT address one of the “grand challenges” in physics: understanding what happens during what is known as the “glass transition” in materials, when their molecular structure settles into a disordered, yet solid, state. [TECHNICAL ARTICLE](#)

Tags: Materials science

[Materials: Magnetic mystery solved](#)

[Science Daily, 28MAR2013](#)

By modeling the behaviors of ions and electrons in a series of MOFs, researchers in Singapore showed that if a copper ion is absent from a cluster, its carboxylate group will carry an unpaired, magnetic electron instead. Its magnetic field affects itinerant electrons in the MOF’s organic linkers, which in turn affect any unpaired electrons in the next copper cluster. If the magnetic message reaches enough clusters, the material as a whole becomes ferromagnetic. [TECHNICAL ARTICLE](#)

Tags: Materials science

NEUROSCIENCE

[How to Build a Dream-Reading Machine](#)

[Science NOW, 05APR2013](#)

Researchers in Japan successfully predicted images seen in sleep based exclusively on MRI scans of brain activity. Although researchers warn that we’re still far from having a machine that can fully read our dreams, the work is being described as a success. [TECHNICAL ARTICLE](#), [VIDEO](#) from [BBC](#).

Tags: Neuroscience, S&T Japan

QUANTUM SCIENCE

[‘Spooky action at a distance’ aboard the International Space Station](#)

[Science Daily, 09APR2013](#)

A team of researchers from Germany and Austria have proposed using the International Space Station (ISS) to test the limits of this “spooky action” and potentially help to develop the first global quantum communication network. “During a few months a year, the ISS passes five to six times in a row in the correct orientation for us to do our experiments. We envision setting up the experiment for a whole week and therefore having more than enough links to the ISS available” say researchers. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T EU, S&T Germany

[Quantum tricks drive magnetic switching into the fast lane](#)

[Nanowerk, 04APR2013](#)

Researchers at Iowa State University, and the University of Crete in Greece have found a new way to switch magnetism that is at least 1000 times faster than currently used in magnetic memory technologies. Magnetic switching is used to encode information in hard drives, magnetic random access memory and other computing devices. [TECHNICAL ARTICLE](#)

Tags: Quantum science, Government S&T

[Optoelectronic materials: Photon on demand](#)

[Nature China, 03APR2013](#)

A team of researchers from Germany and China embedded an indium gallium arsenide (InGaAs) quantum dot in a high-quality microcavity. They then used picosecond laser pulses to excite the InGaAs quantum dot. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T China, S&T Germany

SCIENCE WITHOUT BORDERS

[Listening to the Big Bang—in high fidelity](#)

[Science Daily, 04APR2013](#)

University of Washington researchers have updated the decade-old re-creation of the sound of the Big Bang that

continued...

started the universe. More complete data were recently gathered by an international collaboration using the European Space Agency's Planck satellite mission, which has detectors so sensitive that they can distinguish temperature variations of a few millionths of a degree in the cosmic microwave background. [Sound of the Big Bang](#)
Tags: Science without borders

[Shape from sound: New methods to probe the universe](#)

Science Daily, 03APR2013

As the universe expands, it is continually subjected to energy shifts, or "quantum fluctuations," that send out little pulses of "sound" into the fabric of space-time. Using a mathematical tool that should allow one to use these sounds to help reveal the shape of the universe, researchers at Princeton University are trying to understand the shape of the universe. [TECHNICAL ARTICLE](#)
Tags: Science without borders

[What is behind Einstein's turbulences? Calculations give initial insight into relativistic properties of this process](#)

PhysOrg.com, 03APR2013

Turbulence is still regarded as one of the six most important problems in mathematics today. Researchers in Germany have now taken a major step toward solving this problem: For the first time, a new computer code has provided relativistic calculations that give scientists a better understanding of turbulent processes in regimes that can be found in astrophysical phenomena. [TECHNICAL ARTICLE](#)
Tags: Science without borders, Mathematics

SENSORS

[Ultrasound Signal Reveals Microstructure](#)

American Physical Society Spotlight, 07APR2013

As a steel girder or concrete slab ages, its internal microstructure may change and lead to catastrophic failure. A proposed technique for analyzing the noise in ultrasound signals could provide an early warning system. The method is an adaption of an analysis previously used to characterize DNA. [TECHNICAL ARTICLE](#)
Tags: Sensors, Materials science

[Forget Fingerprints, Now There's 'Breathprints'](#)

Science NOW, 03APR2013

Unlike older methods, which required samples to be prepared and then injected into the machine, the device designed by researchers in Denmark used in this study can directly accept breath and show the results in seconds. The researchers found that individuals' breathprints changed slightly from sample to sample, but always kept a core signature that was unique enough to identify that person. [TECHNICAL ARTICLE](#)
Tags: Sensors ■

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