



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[Discovery of New Material State Counterintuitive to Laws of Physics](#)

Science Daily, 12JUN2013

Researchers at Argonne National Laboratory found a way to apply pressure to make a material expand instead of compress/contract. The scientists put zinc cyanide in a diamond-anvil cell and applied high pressures of 0.9 to 1.8 gigapascals. By using different fluids around the material as it was squeezed, the scientists were able to create five new phases of material.

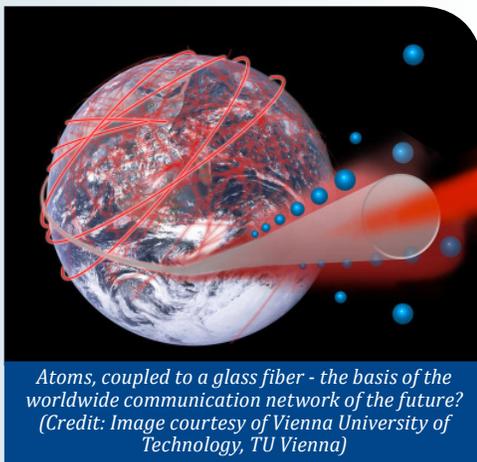
[TECHNICAL ARTICLE](#)

Tags: [Advanced materials](#), [Government S&T](#), [Featured Article](#)

[Global Quantum Networks Based On Optical Fibers: Scientists Quantum Mechanically Couple Atoms to Glass Fiber Cables](#)

Science Daily, 12JUN2013

Researchers at the Vienna University of Technology quantum mechanically couple atoms to glass fiber cables. Now, they have shown that their technique enables storage of quantum information over a sufficiently long period of time to realize global quantum networks based on optical fibers.



Atoms, coupled to a glass fiber - the basis of the worldwide communication network of the future? (Credit: Image courtesy of Vienna University of Technology, TU Vienna)

[TECHNICAL ARTICLE](#)

Tags: [Communications Technology](#), [Quantum science](#), [Featured Article](#)

[Dance of the Atoms: Clustering of Atoms Observed](#)

Science Daily, 10JUN2013

Scientists at the Vienna University of Technology have discovered that only with the right molecular partner do atoms dance across the surface. They filmed the atoms, proving that carbon monoxide is the partner responsible for the quick motion. Their movies show that the motion leads directly to clustering—an effect that can do great harm in catalysis. [TECHNICAL ARTICLE](#)

Tags: [Materials science](#), [S&T Italy](#), [Featured Article](#)

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

[3D printing looks set to pack a \\$4B punch by 2025](#)

Printed Electronics World, 12JUN2013

Highest growth will be seen in the medical and dental fields, as well as the jewellery, designer products, and architectural areas, although this will not be monotonic as 3D printing locks into the capital investment cycles of the aerospace and automotive industries, as discussed in the new report from IDTechEx [3D Printing 2013-2025: Technologies, Markets, Players](#)

Tags: [Advanced manufacturing](#)

AUTONOMOUS SYSTEMS & ROBOTICS

[Video Friday: Quadrotor Acrobatics, Telerobotic Pitcher, and RoboRoach](#)

IEEE Spectrum, 14JUN2013

Students from Northeastern University have developed a quadrotor called TRAQ, an autonomous quadrotor that uses a unique four-element antenna array to locate and navigate to the source of a radio signal.

Tags: [Autonomous systems & robotics](#)

[Wi-Fi Signals Enable Gesture Recognition Throughout Entire Home](#)

Science Daily, 04JUN2013

University of Washington computer scientists have developed gesture-recognition technology that shows it is possible to leverage Wi-Fi signals around us to detect specific movements without sensors on the human body or cameras. By using an adapted Wi-Fi router and a few wireless devices in the living room, users could control their electronics and household appliances from any room in the home with a simple gesture.

Tags: *Autonomous systems & robotics*

BIOTECHNOLOGY

[University of Toronto breakthrough allows fast, reliable pathogen identification](#)

EurekAlert, 12JUN2013

Researchers from the University of Toronto have created an electronic chip with record-breaking speed that can analyze samples for panels of infectious bacteria. The new technology can report the identity of the pathogen in a matter of minutes, and looks for many different bacteria and drug resistance markers in parallel, allowing rapid and specific identification of infectious agents.

[TECHNICAL ARTICLE](#)

Tags: *Biotechnology, S&T Canada, Sensors*

COMMUNICATIONS TECHNOLOGY

[Mapping a Room in a Snap: Four Microphones and a Computer Algorithm Are Enough to Produce a 3-D Model of a Simple, Convex Room](#)

Science Daily, 17JUN2013

Researchers in Switzerland have developed a computer algorithm that can map a room from a sound that's picked up by four microphones. It might be possible to implement this algorithm in mobile devices and use them to deduce location information inside buildings—a place where GPS signals do not penetrate well. [TECHNICAL ARTICLE](#)

Tags: *Communications Technology, S&T Switzerland*

[Wall Filters out the Sound You Want to Hear](#)

American Physical Society Spotlight, 13JUN2013

Researchers in Korea have created the opposite of a soundproof wall by punching small holes in a metal sheet and then covering the holes with tightly stretched plastic wrap. At the membrane's resonance frequency, incoming sound waves pass through the wall nearly unimpeded.

[TECHNICAL ARTICLE](#)

Tags: *Communications Technology*

FORECASTING

[Predicting future conflict between team-members with parameter-free models of social networks](#)

Nature Scientific Reports, 17JUN2013

Researchers in Spain found that group-based models of complex networks successfully anticipate conflict in small teams whereas micro-based models of structural balance, which have been traditionally used to model conflict, do not.

Tags: *Forecasting, Big Data*

[Navy, civilian planners get big assist in storm predictions](#)

PhysOrg.com, 14JUN2013

New technology sponsored by the Office of Naval Research (ONR) will be used to help Navy and civilian officials alike plan for stormy weather. Called the Coupled Ocean/Atmosphere Mesoscale Prediction System-Tropical Cyclone (COAMPS-TC), the groundbreaking new weather prediction model offers forecasters a detailed look at tropical storms and gives accurate predictions of a storm's intensity from one to five days out.

Tags: *Forecasting, Climatology*

[Predicting Collective Online Behavior](#)

Science Daily, 14JUN2013

Researchers in Hong Kong show that small websites, in terms of daily user flux based on number of clicks, have a disproportionately high impact when it comes to traffic generation and influence compared to larger websites.

[TECHNICAL ARTICLE](#)

Tags: *Forecasting*

GOVERNMENT S&T

[Faster, More Precise Airstrikes Within Reach](#)

DARPA News, 14JUN2013

Persistent Close Air Support (PCAS) aims to enable ground forces and combat aircrews to jointly select and employ precision-guided weapons from a diverse set of airborne platforms. The program seeks to leverage advances in computing and communications technologies to fundamentally increase CAS effectiveness, as well as improve the speed and survivability of ground forces engaged with enemy forces.

Tags: *Government S&T, Military technology*

[Air Force announces basic research awards](#)

EurekAlert, 13JUN2013

The Air Force Office of Scientific Research granted seven awards to various academic institutions to perform multi-disciplinary basic research. The AFOSR awards, totaling \$67.5 million, are the result of the Fiscal Year 2013

“One finds joy that is beyond expression in sounding the abyss of science and the secrets of the infinite mind” FLORENCE BASCOM

competition conducted by AFOSR, the Army Research Office, and the Office of Naval Research under the Department of Defense (DoD) Multidisciplinary University Research Initiative (MURI) Program.

Tags: Government S&T

DARPA Develops Tiny Helpers To Spot Bioterror Attacks

Government Information Week, 13JUN2013

Researchers at the University of Michigan, Honeywell International, and MIT demonstrated how ultra-high-performance vacuum micropumps work, as part of DARPA's Chip-Scale Vacuum Micro Pumps (CSVMP) program. The purpose of the program—launched in 2008—was to develop a system that's less than 0.5 cubic centimeters in size, excluding power source, plumbing and control circuitry.

Tags: Government S&T, DARPA

Researchers Reveal Next-Generation Emergency Response Technology

NSF News, 13JUN2013

Researchers at the University of North Texas designed several innovative smart phone apps that virtually place 9-1-1 operators at the scene of an emergency, allowing them to quickly and accurately collect information, assist victims and help first responders save lives.

Tags: Government S&T, NSF

IMAGING TECHNOLOGY

Cameras Five Times More Sensitive to Light? An Ultrasensitive Molybdenum-Based Image Sensor Developed

Science Daily, 12JUN2013

In 2011, researchers in Switzerland discovered the amazing semi-conducting properties of molybdenite (MoS₂), and they have been exploring its potential in various technological applications ever since. The material, which has the potential to improve the sensitivity of photographic image sensors by a factor of five, has been integrated in a prototype of an image sensor. **TECHNICAL ARTICLE**

Tags: Imaging technology, S&T Switzerland

Network of Cameras Used to Track People in Complex Indoor Settings

Science Daily, 12JUN2013

Researchers at Carnegie Mellon University have developed a method for tracking the locations of multiple individuals in complex, indoor settings using a network of video

cameras. They proved their technique with actual residents and employees in a nursing facility—with camera views compromised by long hallways, doorways, people mingling in the hallways, variations in lighting and too few cameras to provide comprehensive, overlapping views.

Tags: Imaging technology

New Quantum Dot Technique Combines Best of Optical and Electron Microscopy

Science Daily, 12JUN2013

The new microscopy technique developed by researchers at NIST uses a beam of electrons to excite a specially engineered array of quantum dots, causing them to emit low-energy visible light very close to the surface of the sample, exploiting “near-field” effects of light. By correlating the local effects of this emitted light with the position of the electron beam, spatial images of these effects can be reconstructed with nanometer-scale resolution.

TECHNICAL ARTICLE

Tags: Imaging technology, Government S&T

Compressive Object Tracking using Entangled Photons

arXiv.org, 10JUN2013

We present a compressive sensing protocol that tracks a moving object by removing static components from a scene. The implementation is carried out on a ghost imaging scheme to minimize both the number of photons and the number of measurements required to form a quantum image of the tracked object. This procedure tracks an object at low light levels with fewer than 3% of the measurements required for a raster scan, permitting us to more effectively use the information content in each photon. **TECHNICAL ARTICLE**

Tags: Imaging technology, Photonics

INFORMATION TECHNOLOGY

Millimeter Waves May Be the Future of 5G Phones

IEEE Spectrum, 13JUN2013

Samsung's millimeter-wave transceiver technology could enable ultrafast mobile broadband by 2020. By the end of this decade, analysts say, 50 billion things such as clothes, cars, trains, tractors, body sensors, and tracking tags will connect to mobile networks. They'll consume 1000 times as much data as today's mobile gadgets, at rates 10 to 100 times as fast as existing networks can support. As carriers rush to roll out 4G equipment, engineers are already beginning to define a fifth generation of wireless standards.

Tags: Information Technology

continued...

Cheap translations, but not replacement for humans

PhysOrg.com, 12JUN2013

An Israeli startup says it has come up with a way to overcome language barriers when conducting international business: an automated service that provides quick translations between English and seven other languages with nothing more than a telephone.

Tags: *Information Technology*

MATERIALS SCIENCE

Surprising turns in magnetic thin films could lead to better data storage

PhysOrg.com, 18JUN2013

A magnetic phenomenon newly discovered by MIT researchers could lead to much faster, denser and more energy-efficient chips for memory and computation. The finding could reduce the energy needed to store and retrieve one bit of data by a factor of 10,000. The team found that when the thin ferromagnetic film was deposited on a slab of platinum, it exhibited a backward flow. [TECHNICAL ARTICLE](#)

Tags: *Materials science, Big Data*

Nanoparticle Opens the Door to Clean-Energy Alternatives

Science Daily, 13JUN2013

Researchers at Penn State University have found that an important chemical reaction that generates hydrogen from water is effectively triggered by a nanoparticle composed of nickel and phosphorus, two inexpensive elements that are abundant on Earth. [TECHNICAL ARTICLE](#)

Tags: *Materials science, Energy*

FEATURED RESOURCE

RSS Feed Readers

Google Reader will be retired on July 1, 2013. Here is a partial list of Readers.

Material scientists build ferroelectric memory device based on light response

PhysOrg.com, 12JUN2013

Researchers in Singapore, in collaboration with the University of California, have succeeded in building a prototype ferroelectric memory device that uses light to read its polarity. The researchers note that their prototype device is approximately 10,000 times faster than DRAM and only requires 3 volts of electricity to read a cell, compared to the average of 15 volts for DRAM. [TECHNICAL ARTICLE](#)

Tags: *Materials science, Information technology*

Molecular 'Sieves' Harness Ultraviolet Irradiation for Greener Power Generation

Science Daily, 12JUN2013

New research in the UK shows that exposing polymer molecular sieve membranes to ultraviolet irradiation in the presence of oxygen produces highly permeable and selective membranes for more efficient molecular-level separation, an essential process in everything from water purification to controlling gas emissions.

[TECHNICAL ARTICLE](#)

Tags: *Materials science, S&T UK*

Nano-Thermometer Enables First Atomic-Scale Heat Transfer Measurements

Science Daily, 12JUN2013

In findings that could help overcome a major technological hurdle in the road toward smaller and more powerful electronics, an international research team involving University of Michigan engineering researchers, has shown the unique ways in which heat dissipates at the tiniest scales. [TECHNICAL ARTICLE](#)

Tags: *Materials science*

New additive offers near-perfect results as nucleating agent for organic semiconductors

EurekaAlert, 12JUN2013

Scientists at UC Santa Barbara report that by adding minute amounts of a commonly used sugar-based additive during the fabrication of organic semiconductors, they have been able to dramatically increase yield and control crystallization, which could, in the near future, make the technology not only cheaper and more accessible, but also enhance its performance. [TECHNICAL ARTICLE](#)

Tags: *Materials science*

'Popcorn' particle pathways promise better lithium-ion batteries

Nanowerk, 11JUN2013

Researchers at Sandia National Laboratory have confirmed the particle-by-particle mechanism by which lithium ions move in and out of electrodes made of lithium iron phosphate (LiFePO₄, or LFP). Findings could lead to better performance in lithium-ion batteries in electric vehicles, medical equipment and aircraft. [TECHNICAL ARTICLE](#)

Tags: *Materials science, Battery*

Man-made material shows surprisingly magnetic personality

PhysOrg.com, 10JUN2013

Scientists from SLAC and Stanford have used finely tuned X-rays to pin down the source of a mysterious magnetism that appears when two materials are sandwiched together, although neither material shows a hint of magnetism on its own. The team proved the magnetism comes from the

titanium atom but still does not know precisely what is causing the change in a fundamental property. [TECHNICAL ARTICLE](#)

Tags: Materials science

[Metamaterial flexible sheets could transform optics](#)

[Nanowerk](#), 05JUN2013

Researchers at Los Alamos National Laboratory demonstrated broadband, high-performance linear polarization conversion using ultrathin planar metamaterials, enabling possible applications in the terahertz (THz) frequency regime. Their design can be scaled to other frequency ranges from the microwave through infrared. This could boost security screening systems, infrared thermal cameras, energy harvesting, and radar systems. [TECHNICAL ARTICLE](#)

Tags: Materials science, Government S&T

[Catalyst Could Jump-Start E-Cars, Green Energy](#)

[Science Daily](#), 04JUN2013

Los Alamos National Laboratory scientists have designed a new type of nanostructured-carbon-based catalyst. The new material has the highest oxygen reduction reaction (ORR) activity in alkaline media of any non-precious metal catalyst developed to date. This activity is critical for efficient storage of electrical energy. [TECHNICAL ARTICLE](#)

Tags: Materials science, Energy, Government S&T

MEDICAL SCIENCES

[Danish researchers expose new cause of life-threatening disease](#)

[Bright Stuff Biology](#), 10JUN2013

Danish researchers have just published findings that explain a previously unknown mechanism used by cells to communicate with one another. The research significantly contributes to understanding why some children are born with malformations and why children and adults may develop life-threatening diseases.

Tags: Medical Sciences, Biology

NEUROSCIENCE

[Scientists Map Process by Which Brain Cells Form Long-Term Memories](#)

[Science Daily](#), 09JUN2013

Scientists at the Gladstone Institutes in San Francisco have deciphered how a protein called Arc regulates the activity of neurons—providing much-needed clues into the brain's ability to form long-lasting memories. [TECHNICAL ARTICLE](#)

Tags: Neuroscience

QUANTUM SCIENCE

[Physicists show self-correcting quantum computers are theoretically possible](#)

[PhysOrg.com](#), 12JUN2013

Error correction in quantum computers cannot be performed the same way as in classical computers, where information is stored multiple times for redundancy.

Since copying quantum information is impossible due to the no-cloning theorem, physicists must find other ways to protect quantum information against errors. Researchers in Canada show that self-correcting quantum computing at a finite temperature is not impossible as a matter of principle. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T Canada

[Quantum computer solves simple linear equations](#)

[PhysOrg.com](#), 12JUN2013

Researchers in Canada, Singapore and China have solved pairs of linear equations using a simple quantum computer. Their experiment involves encoding quantum information into four photons and sending them through a system of optical devices. They claim that their set-up could be improved and modified further to solve other types of problems. [TECHNICAL ARTICLE](#)

Tags: Quantum science

S&T POLICY

[R&D Roadmap Points Way to Biological Preparedness](#)

[The White House](#), 17JUN2013

The Roadmap, drafted by the interagency Biosurveillance Science and Technology Working Group under the National Science and Technology Council's Committee on Homeland and National Security, builds upon the National Strategy for Biosurveillance, published in July 2012.

Tags: S&T policy

SENSORS

[Can You Feel Me Now? New Array Measures Vibrations Across Skin, May Help Engineers Design Tactile Displays](#)

[Science Daily](#), 14JUN2013

Researchers at MIT have built an array that precisely tracks a motor's vibrations through skin in three dimensions. The array consists of eight miniature accelerometers and a single pancake motor.

Tags: Sensors

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