



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[Quantum Internet: First Teleportation to a Solid-State Quantum Memory](#)

[MIT Technology Review](#), 03FEB2014

A European team of physicists has demonstrated a device that can teleport quantum information to a solid-state quantum memory over telecom fibre, a crucial capability for any future quantum internet. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T EU, Featured Article

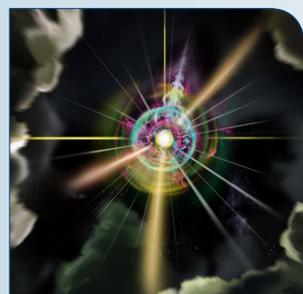
[It's alive! Scientists combine liquid crystals and living bacteria](#)

[PhysOrg.com](#), 31JAN2014

A team of researchers from Kent State University, Argonne National Laboratory and Northwestern University found that the novel material displays a wide range of useful and occasionally surprising properties that lend themselves to a wide array of potential biosensing, biomedical, submicrometer, autonomous microprobe, and structural imaging applications. [TECHNICAL ARTICLE](#)

[TECHNICAL ARTICLE](#)

Tags: Breakthrough technology, Advanced materials, Government S&T, Featured Article



Artistic illustration of the synthetic magnetic monopole. (Image: Heikki Valja)

These observations lay the foundation for the underlying structure of the natural magnetic monopole—the detection of which would be a revolutionary event comparable to the discovery of the electron. According to researchers, it opens up amazing avenues for quantum research. [TECHNICAL ARTICLE](#)

Tags: Breakthrough technology, Quantum science, Featured Article

[Scientists discover long-awaited synthetic particle](#)

[Nanowerk](#), 30JAN2014

An international team of researchers (USA, Finland) has created and photographed synthetic magnetic monopoles under laboratory conditions. [TECHNICAL ARTICLE](#)

[TECHNICAL ARTICLE](#)

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Diamond defect boosts quantum technology](#)

[Science Daily](#), 04FEB2014

Researchers at Carnegie Institution have shown that a remarkable defect in synthetic diamond produced by chemical vapor deposition allows researchers to measure, witness, and potentially manipulate electrons in a manner that could lead to new “quantum technology” for information processing. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

[Researchers report revolutionary technique to prepare nanowires \(w/video\)](#)

[Nanowerk](#), 04FEB2014

An international team of researchers (Germany, Poland, USA, South Korea) has reported a breakthrough leading to a revolutionary and remarkably simple technique for preparing one-dimensional nanostructures. The technique achieves simplicity of protocol, fast execution, and low energy input. As an example, they demonstrate a unique approach to growing amorphous boron nanowires. [TECHNICAL ARTICLE](#)

[TECHNICAL ARTICLE](#)

Tags: Advanced materials

[Diamond film possible without the pressure: Rules for ultrathin ‘diamane’ devised](#)

[Science Daily](#), 03FEB2014

An international team of researchers (USA, Russia) has calculated a “phase diagram” for the creation of diamane. They built computer models to simulate the forces applied by every atom involved in the process. Diamanes can be applied as very thin, dielectric hard films in nanocapacitors or mechanically stiff, nanothick elements in nanoelectronics. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

[New technique grows tiny ‘hairy’ materials at the microscale](#)

[PhysOrg.com](#), 03FEB2014

Scientists at the U.S. Department of Energy’s Argonne National Laboratory have developed a new technique to

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grow tiny “hairy” materials that assemble themselves at the microscale. By tweaking the process, the team can grow many different shapes: short forests of dense straight hairs, long branching strands or “mushrooms” with tiny pearls at the tips. The material has applications in technologies like batteries, photovoltaic cells or sensors.

Tags: Advanced materials, Government S&T

Spintronics: Deciphering a material for future electronics

[PhysOrg.com](#), 03FEB2014

It has been unclear how exactly a normal material can become a topological insulator, and also how to implement them for real technological impact. Researchers in Switzerland offer solutions to both problems by studying the spin structure of common topological insulator films that are just a few atoms thick. [TECHNICAL ARTICLE](#)

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

AUTONOMOUS SYSTEMS & ROBOTICS

Robots with insect-like brains: Robot can learn to navigate through its environment guided by external stimuli

[Science Daily](#), 04FEB2014

Researchers in Germany used the relatively simple nervous system of the honeybee as a model for its working principles. The outstanding feature of this artificial mini brain is its ability to learn by simple principles. The network-controlled robot is able to link certain external stimuli with behavioral rules. Much like honeybees learn to associate certain flower colors with tasty nectar, the robot learns to approach certain colored objects and to avoid others. [TECHNICAL ARTICLE](#)

Tags: Autonomous systems & robotics

System can make military convoys autonomous

[Defense Systems](#), 31JAN2014

The Army Tank-Automotive Research, Development and Engineering Center (TARDEC) and Lockheed Martin successfully demonstrated the Autonomous Mobility Appliqué System (AMAS) earlier this month at Fort Hood, Texas.

Tags: Autonomous systems & robotics, Military technology

Video Friday: Hacked Anki Drive, Cereal Arms, and Rocket Launching Drones

[IEEE Spectrum](#), 31JAN2014

One of NASA's research Global Hawks is heading to Guam to study some upper atmosphere climate change. If you need an aircraft on station in the middle of nowhere for hours at a time at 60,000 feet, there's really no better platform.

Tags: Autonomous systems & robotics

BIG DATA

Mind meld: The genius of swarm thinking (w/video)

[New Scientist](#), 04FEB2014

According to researchers at Princeton University when animals swarm they exhibit a complex collective intelligence that could help us build robots, heal wounds and understand the brain.

Tags: Big data

BIOTECHNOLOGY

The next pandemic could be downloaded from the internet

[The Conversation](#), 03FEB2014

Many people are familiar with the first printed gun. But many would probably be surprised to learn that analogous technology is used to print pathogens. For example, the polio virus was successfully recreated in 2002, and the 1918 flu virus was resurrected by a DNA synthesiser in 2005.

Tags: Biotechnology, Biology

COMMUNICATIONS TECHNOLOGY

Cleaning up space debris with sailing satellites

[PhysOrg.com](#), 03FEB2014

Researchers in the UK, working with the European Space Agency, have developed a [Gossamer Sail for Satellite Deorbiting](#). The idea is to attach a large and very light, or gossamer, sail to a satellite, which can be deployed after its mission is over.

Tags: Communications Technology, S&T EU, Satellite technology, Space technology

Low-cost multi-fiber optical connector developed

[PhysOrg.com](#), 03FEB2014

Researchers in Japan have developed a connector that can accommodate different lengths of optical fiber with a spring mechanism slashing the cost required to connect optical fibers by more than half. It is anticipated that this technology will increase data transmission speed between boards, increasing overall server performance.

Tags: Communications Technology, S&T Japan

Researchers take magnetic waves for a spin

[Science Daily](#), 29JAN2014

Researchers at New York University have developed a method for creating and directing fast moving waves in magnetic fields that have the potential to enhance communication and information processing in computer chips and other consumer products. [TECHNICAL ARTICLE](#)

Tags: Communications Technology, Microelectronics

“Innovation distinguishes between a leader and a follower.”

STEVE JOBS

CYBER SECURITY

[Cryptography Breakthrough Could Make Software Unhackable](#)

Wired, 03FEB2014

Researchers at the University of California, Los Angeles and University of Texas, Austin, have proposed a solution to a fundamental problem called “program obfuscation.” They demonstrated a candidate protocol for a kind of obfuscation known as “indistinguishability obfuscation.” This is the first serious positive result in the quest for a universal obfuscator. [TECHNICAL ARTICLE 1, 2](#)

Tags: *Cyber security, Cryptology*

ENERGY

[Breakthrough in rechargeable batteries: New twist to sodium-ion battery technology](#)

Science Daily, 29JAN2014

Researchers at Kansas State University have demonstrated that a composite paper—made of interleaved molybdenum disulfide and graphene nanosheets—can be both an active material to efficiently store sodium atoms and a flexible current collector. The newly developed composite paper can be used as a negative electrode in sodium-ion batteries. [TECHNICAL ARTICLE](#)

Tags: *Energy, Battery*

ENVIRONMENTAL SCIENCE

[Climate study projects major changes in vegetation distribution by 2100](#)

Science Daily, 30JAN2014

The models developed by an international team of researchers (USA, South Korea, China) consistently project increasing precipitation over the high latitudes of the northern hemisphere and reduced precipitation in south-western North America, the Mediterranean, northern and southern Africa and all of Australia. The distribution of species of vegetation over nearly half the world’s land area could be affected by predicted global warming. [TECHNICAL ARTICLE](#)

Tags: *Environmental science, Climatology*

FORECASTING

[Predictions from Davos - 2014](#)

World Policy Blog, 21FEB2014

According to the the [World Economic Forum’s Global Risks Report](#) income disparity is the risk most likely to cause an impact on a global scale in the next decade. Other highly probable, high impact risks include extreme weather events, unemployment, and fiscal crises.

Tags: *Forecasting, Science without borders*

[What’s behind a #1 ranking?](#)

Harvard University, 31JAN2014

Behind every “Top 100” list is a generous sprinkling of personal bias and subjective decisions. To shed light on the trustworthiness of rankings, Harvard researchers have created [LineUp](#), an open-source application that empowers ordinary citizens to make quick, easy judgments about rankings based on multiple attributes. [TECHNICAL ARTICLE](#)

Tags: *Forecasting*

INFORMATION TECHNOLOGY

[Optical data storage has virtually unlimited lifetime](#)

PhysOrg.com, 04FEB2014

Researchers in the UK have demonstrated a data storage technique that has a lifetime of about 3×10^{20} years at room temperature—virtually unlimited—which could lead to a new era of eternal data archiving. [TECHNICAL ARTICLE](#)

Tags: *Information Technology, S&T UK*

[Storage system for ‘big data’ dramatically speeds access to information](#)

MIT News, 31JAN2014

Storing data over a network is slow because there is a significant additional time delay in managing data access across multiple machines in both software and hardware. Researchers at MIT have developed a storage system for big-data analytics that can dramatically speed up the time it takes to access information. It is based on a network of flash storage devices.

Tags: *Information Technology*

MATERIALS SCIENCE

[Materials database proves its mettle with new discoveries](#)

MIT News, 04FEB2014

[Materials Project](#), developed by researchers at MIT, is a massive computerized database and simulation system that can sort through thousands of potential materials in the time it previously might have taken to study just one. It was built based on work by MIT and the Lawrence Berkeley National Laboratory. The vision is to create a compendium of materials’ characteristics: electrical conductivity, crystal structure, hardness, stability, and so on.

Tags: *Materials science, S&T Policy*

continued...

PHOTONICS

Making color: When two red photons make a blue photon[Science Daily, 31JAN2014](#)

Researchers at the University of Maryland have demonstrated a new semiconductor microstructure that performs frequency conversion. This design is a factor of 1000 smaller than previous devices. Through a combination of microcavity engineering and nonlinear optics, they can create a very small frequency conversion device that could be more easily integrated onto optical chips. [TECHNICAL ARTICLE](#)

Tags: Photonics, Communications Technology

Quantum dots provide complete control of photons[Science Daily, 31JAN2014](#)

An international team of researchers (Sweden, Thailand) has developed a method where asymmetrical quantum dots of a nitride material with indium is formed at the top of microscopic six-sided pyramids. With these, they have succeeded in creating light with a high degree of linear polarization, on average 84%. The light source can be used for energy-saving computer screens and wiretap-proof communications. [TECHNICAL ARTICLE](#)

Tags: Photonics, Quantum science

FEATURED RESOURCE

Physics Spotlight (APS)

A selection of papers from the Physical Review journals. Viewpoints, Focus stories, and Synopses are featured. [RSS](#)

QUANTUM SCIENCE

Physicists correct quantum errors[PhysOrg.com, 03FEB2014](#)

An international team of researchers (the Netherlands, USA) have succeeded in detecting and correcting errors during the storage of quantum states in diamond. This is an important step towards protecting fragile quantum information long enough to realize a functioning quantum computer.

Tags: Quantum science

Quasi-particle swap between graphene layers[Nanowerk, 03FEB2014](#)

Researchers in Belgium used the equations reflecting a theoretical world consisting of a bi-dimensional space sheet—a so-called brane. They described the quantum behaviour of excitons in a universe made of two such brane worlds. They then made an analogy with a bilayer of graphene sheets, in which quantum particles live in a separate space-time. [TECHNICAL ARTICLE](#)

Tags: Quantum science, Materials science

SENSORS

Thermal Cloaks Get Hot[American Physical Society Spotlight, 04FEB2014](#)

Researchers in Singapore report experimental demonstrations of three-dimensional metamaterial “cloaks” for thermal flux which has the potential to improve thermal imaging setups. [TECHNICAL ARTICLE 1, 2](#)

Tags: Sensors, Advanced materials, Military technology

Detecting Underwater Weapons of Mass Destruction[Technology Org, 03FEB2014](#)

Researchers at Naval Research Laboratory designed and built SuperMISTI, a hybrid detection, identification, and imaging system for sources of gamma-ray radiation at stand-off distances. It is based on the Mobile Imaging and Spectroscopic Threat Identification (MISTI) system they designed for the Department of Homeland Security. The system has successfully detected, identified, and localized gamma and neutron sources in a maritime environment at operationally relevant distances.

Tags: Sensors, Government S&T

MIT's Sensory Fiction prototype gives you physical feedback from your books[MIT News, 02FEB2014](#)

Traditionally, fiction creates and induces emotions and empathy through words and images. By using a combination of networked sensors and actuators, the Sensory Fiction author is provided with new means of conveying plot, mood, and emotion while still allowing space for the reader's imagination. These tools can be wielded to create an immersive storytelling experience tailored to the reader.

Tags: Sensors

Electronic nose with artificial sensing intelligence[Nanowerk, 30JAN2014](#)

An international team of researchers (Israel, Spain) used molecularly modified SiNW FETs (selective silicon nanowire field effect transistor) to detect VOCs (volatile organic compounds). They found that one SiNW FET sensor could provide multiple sensing signals of VOCs. Furthermore the multiple sensing character of one SiNW FET was similar to a sensor array. Thus, the concept of E-nose can rely on one SiNW FET sensor to selectively detect VOCs. [TECHNICAL ARTICLE](#)

Tags: Sensors

Facial-Recognition Tech Can Read Your Emotions[Live Science, 30JAN2014](#)

Using a software called Facet developed by a company in California, a simple digital camera can analyze a human face and determine whether that person is feeling joy,

continued...

sadness, surprise, anger, fear, disgust, contempt or any combination of those seven emotions. The system is able to read the emotions registering on a person's face in a single photograph or video frame.

Tags: Sensors, Biometrics

Photon recoil provides new insight into matter

Nanowerk, 30JAN2014

An international team of researchers (Germany, USA) has shown that contrary to the original quantum logic spectroscopy, the "photon-recoil spectroscopy" (PRS) technique allows the investigation of ions which remain in their excited state for a few micro- or even nano-seconds only. This not only allows extremely accurate frequency measurements, but also increases the chances of finding discrepancies in observations of a possible change in the fine-structure constant. TECHNICAL ARTICLE

Tags: Sensors

To hear without being heard: First nonreciprocal acoustic circulator created

Science Daily, 30JAN2014

Researchers at the University of Texas, Austin, have built the first-ever nonreciprocal circulator for sound that is able to break sound wave reciprocity. The device is a 'one-way road for sound' that transmits acoustic waves in one direction but blocks them in the other. With this device, you can listen without being heard. TECHNICAL ARTICLE

Tags: Sensors, Military technology ■

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