



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[Machine-Learning Maestro Michael Jordan on the Delusions of Big Data and Other Huge Engineering Efforts](#)

IEEE Spectrum, 20OCT2014

The overeager adoption of big data is likely to result in catastrophes of analysis comparable to a national epidemic of collapsing bridges. Hardware designers creating chips based on the human brain are engaged in a faith-based undertaking likely to prove a fool's errand. Despite recent claims to the contrary, we are no further along with computer vision than we were with physics when Isaac Newton sat under his apple tree.

Tags: [Big data](#), [Artificial intelligence](#), [Featured Article](#)

[Light finds a one-way street](#)

Nanowerk, 17OCT2014

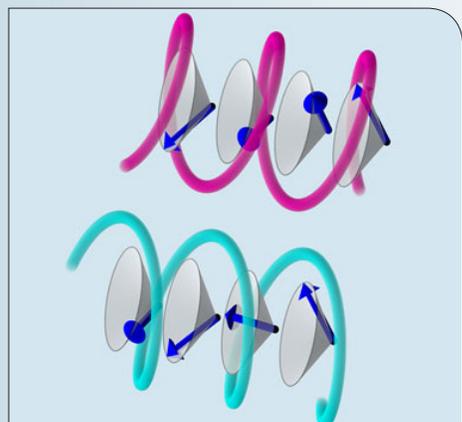


Figure 1: Multiferroics have a screw spin structure (arrows) with clockwise (lower) and anti-clockwise (upper) orientations that can control the propagation of light at terahertz and gigahertz frequencies. (Image: Youtarou Takahashi, RIKEN Center for Emergent Matter Science)

was made in the multiferroic 'helimagnet' gallium-doped copper iron oxide, could lead to new possibilities in the control of light at gigahertz and terahertz frequencies. [TECHNICAL ARTICLE](#)

Tags: [Photonics](#), [S&T Japan](#), [Featured Article](#)

ADVANCED MANUFACTURING

[Self-assembly fabricating method for graphene nanoribbons brings scientists a step closer to revolutionizing electronics](#)

Nanowerk, 17OCT2014

An international team of researchers (USA, Japan) has discovered a new self-assembly method for producing defect-free graphene nanoribbons with periodic zigzag-edge regions. They use copper substrate's unique properties to change the way the precursor molecules react to one another as they assemble into graphene nanoribbons. This allows scientists to control the nanoribbons' length, edge configuration and location on the substrate. [TECHNICAL ARTICLE](#)

Tags: [Advanced manufacturing](#)

[Precision printing: Unique capabilities of 3-D printing revealed](#)

Science Daily, 15OCT2014

Researchers at the DOE's Oak Ridge National Laboratory demonstrated the new method using an ARCAM electron beam melting system in which successive layers of a metal powder are fused together by an electron beam into a three-dimensional product. By manipulating the process to precisely manage the solidification on a microscopic scale, they demonstrated 3-dimensional control of the microstructure of a nickel-based part during formation.

Tags: [Advanced manufacturing](#), [Government S&T](#)

ADVANCED MATERIALS

[Carbon-nanotube paper electrodes with very high loading for lithium-sulfur batteries](#)

Nanowerk, 17OCT2014

Researchers in China have developed a bottom-up routine in which sulfur was first well dispersed into the multi-walled CNTs network to obtain building blocks. Multi-walled CNTs network and vertically aligned CNTs were assembled into macro-CNT-S films via the

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dispersion in ethanol followed by vacuum filtration. Sulfur electrodes with hierarchical CNT scaffolds can accommodate over 5-10 times sulfur compared to conventional electrodes. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Battery, S&T China

[Graphene aerogels go crystalline](#)

[Nanotechweb](#), 16OCT2014

Researchers in the US have developed a new way to make graphene oxide-based aerogels containing highly crystalline graphene sheets. The aerogels—which might find use in catalysts, energy-storage devices, sensors, composites and even in desalination technologies—are much better than previously made foams that were of a much poorer quality.

[TECHNICAL ARTICLE](#)

Tags: Advanced materials

[New catalyst could improve biofuels production](#)

[Science Daily](#), 16OCT2014

One of the biggest challenges in biofuels production is grabbing carbon for fuel while also removing oxygen. Researchers at Washington State University developed a mixture of two metals, iron along with a tiny amount of palladium, to serve as a catalyst to efficiently and cheaply remove oxygen.

Tags: Advanced materials, Materials science

AUTONOMOUS SYSTEMS & ROBOTICS

[Robots recognizes humans in disaster environments](#)

[Science Daily](#), 20OCT2014

Researchers in Mexico focused on the recognition of human silhouettes in disaster situations. They devised a system in which a robot, equipped with a flashlight and a stereoscopic camera, obtains images of the environment and, after a series of mathematical operations, distinguishes between people and debris.

Tags: Autonomous systems & robotics

[Video Friday: Keecker Not a Robot, Drone Racing, and Robotics Tipping Point](#)

[IEEE Spectrum](#), 17OCT2014

The University of Pennsylvania has outfitted one of their quadrotors with gecko-inspired adhesive from Stanford, resulting in a quadrotor that can stick itself (or perch) on smooth surfaces at angles of up to 90 degrees.

Tags: Autonomous systems & robotics

COMMUNICATIONS TECHNOLOGY

[World record in data transmission with smart circuits](#)

[Science Daily](#), 21OCT2014

Researchers in Sweden have designed circuits for signals at 140 Gigahertz, where there is a large bandwidth. In laboratory testing they have achieved a transmission rate

of 40 Gigabit data per second, which is twice as fast as the previous world record at a comparable frequency.

Tags: Communications Technology, S&T Sweden

ENERGY

[Nanotube-based Li-ion Batteries Can Charge to Near Maximum in Two Minutes](#)

[IEEE Spectrum](#), 14OCT2014

Researchers in Singapore have developed a Li-ion battery capable of 20 years of deep discharges, more than 10 times that of existing Li-ion batteries. The new battery design can be charged up quickly so that it can reach 70 percent of its maximum charge in just two minutes.

Tags: Energy, Battery

ENVIRONMENTAL SCIENCE

[Major breakthrough could help detoxify pollutants](#)

[Science Daily](#), 19OCT2014

Researches in the UK report that most biological systems simply don't know how to deal with halogen atoms contained in pollutants. They have identified some organisms which use vitamin B12 in a very different way to remove halogen atoms than currently understood.

Detailing how this novel process of detoxification works means that we are now in a position to look at replicating it. [TECHNICAL ARTICLE](#)

Tags: Environmental science, S&T UK

IMAGING TECHNOLOGY

[Extremely high-resolution magnetic resonance imaging](#)

[Science Daily](#), 21OCT2014

An international team of researchers (Switzerland, Germany) is working on massively increasing the resolution of magnetic resonance imaging with the goal of eventually imaging at the level of single molecules — demanding an over one million times finer resolution. By detecting the signal from a single hydrogen atom, they have now reached an important milestone toward such single-atom MRI. [TECHNICAL ARTICLE](#)

Tags: Imaging technology

[Imaging electric charge propagating along microbial nanowires](#)

[Science Daily](#), 19OCT2014

Researchers at UMass Amherst report that using electrostatic force microscopy, they have shown that electric charges do indeed propagate along microbial nanowires just as they do in carbon nanotubes. Applications currently being developed are Geobacter based electronic sensors to detect environmental contaminants and microbiological computers. [TECHNICAL ARTICLE](#)

Tags: Imaging technology

continued...

“Our job in physics is to see things simply, to understand a great many complicated phenomena, in terms of a few simple principles.” STEVEN WEINBERG

MATERIALS SCIENCE

[Ultra-stretchable silicon for flexible electronics \(w/video\)](#)

Nanowerk, 21OCT2014

An international team of researchers (Saudi Arabia, Canada) demonstrated ultra-stretchability in monolithic single-crystal silicon. The design is based on an all silicon-based network of hexagonal islands connected through spiral springs. They have been able to achieve a stretch ratio of about 1000%. [TECHNICAL ARTICLE](#)

Tags: Materials science, Flexible electronics

[Puzzling new behaviour observed in high-temperature superconductors](#)

PhysOrg.com, 20OCT2014

An international team of researchers (USA, Poland, Switzerland, Taiwan, China) has observed an unexpected form of collective movement of electrical charges in copper-based high-temperature superconductors, which poses a major challenge for the researchers. Theoretical physicists will now have to factor the new results into their explanations of the origin of high-temperature conductivity. [TECHNICAL ARTICLE](#)

Tags: Materials science

[Light bending material facilitates the search for new particles](#)

Science Daily, 16OCT2014

To investigate matter's smallest constituents created by collisions researchers need to detect the cone of light—known as Cherenkov radiation—formed around a particle that travels faster than light in a transparent material. An international team of researchers (Belgium, Sweden) has designed a material that manipulates the Cherenkov cone so that particles with high momentum get a distinct light cone angle too. [TECHNICAL ARTICLE](#)

Tags: Materials science, Particle physics

[Magnetic mirrors enable new technologies by reflecting light in uncanny ways](#)

Science Daily, 16OCT2014

An international team of researchers (USA, South Korea) has demonstrated a new type of mirror that forgoes a familiar shiny metallic surface and instead reflects infrared light by using an unusual magnetic property of a non-metallic metamaterial. Using nanoscale antennas, researchers are able to capture and harness electromagnetic radiation in ways that have tantalizing potential in new classes of chemical sensors, solar cells, lasers, and other optoelectronic devices. [TECHNICAL ARTICLE](#)

Tags: Materials science

[A new piece in the high-temperature superconductivity puzzle: 'Dressing' in superconductors](#)

Science Daily, 15OCT2014

An international team of researchers (Italy, Germany, UK, Japan, Russia) developed a new technique to look directly at the dressing of excitations in complex systems. Their experiments showed that the electrons definitely undergo a coupling process mediated by a net that holds them together despite the strong Coulomb repulsion. This observation can now drive research into the theory of high-temperature superconductors. [TECHNICAL ARTICLE](#)

Tags: Materials science

[Researchers develop world's thinnest electric generator](#)

Science Daily, 15OCT2014

Researchers at the Georgia Institute of Technology have made the first experimental observation of piezoelectricity and the piezotronic effect in an atomically thin material, molybdenum disulfide (MoS₂), resulting in a unique electric generator and mechanosensation devices that are optically transparent, extremely light, and very bendable and stretchable. [TECHNICAL ARTICLE](#)

Tags: Materials science

[Future computers could be built from magnetic 'tornadoes'](#)

Science Daily, 14OCT2014

Using computer simulations, researchers in the UK have shown it is possible to create magnetic 'logic gates' using magnetic materials. In wires of magnetic material, magnetism can form into swirling 'tornadoes'. They used vortices where the magnetism turns clockwise to represent 0 and vortices where it turns anticlockwise to represent 1, allowing us to encode binary data. [TECHNICAL ARTICLE](#)

Tags: Materials science, S&T UK

MICROELECTRONICS

[Superconducting circuits, simplified](#)

MIT News, 17OCT2014

Researchers at MIT present a new circuit design that could make simple superconducting devices much cheaper to manufacture. While the circuits' speed probably wouldn't top that of today's chips, they could solve the problem of reading out the results of calculations performed with Josephson junctions. [TECHNICAL ARTICLE](#)

Tags: Microelectronics

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PHOTONICS

Reversible tractor beam could be used to retrieve nanoparticles

Nanowerk, 20OCT2014

Using a hollow laser beam that is bright around the edges and dark in its centre, researchers in Australia built a tractor beam that can repel and attract objects. It moved gold-coated hollow glass particles one fifth of a millimetre in diameter a distance of up to 20 centimetres, around 100 times further than previous experiments. Unlike previous techniques, which used photon momentum to impart motion the Australian tractor beam relies on the energy of the laser heating up the particles and the air around them. It could be used in controlling atmospheric pollution or for the retrieval of tiny delicate or dangerous particles for sampling. [TECHNICAL ARTICLE](#)

Tags: Photonics, S&T Australia

FEATURED RESOURCE

American Physical Society Spotlight

Provides daily online-only news and commentary about a selection of papers from the APS journal collection. [RSS](#)

Engineers find a way to win in laser performance by losing

Science Daily, 14OCT2014

To help laser systems overcome loss, operators often pump the system with an overabundance of photons to achieve optical gain. But now an international team of researchers (USA, Austria, Japan) has shown a new way to reverse or eliminate such loss by adding loss to a laser system to actually reap energy gains. [TECHNICAL ARTICLE](#)

Tags: Photonics

QUANTUM SCIENCE

Quantum holograms as atomic scale memory keepsake

Science Daily, 21OCT2014

Researchers in Russia have developed a theoretical model of quantum memory for light, adapting the concept of a hologram to a quantum system. For the first time, they demonstrate that it is theoretically possible to retrieve, on demand, a given portion of the stored quantised light signal of a holographic image—set in a given direction in a given position in time sequence. This is done by shaping the control field both in space and time. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T Russia

1980s aircraft helps quantum technology take flight

PhysOrg.com, 20OCT2014

According to researchers in Australia, 1980s experimental aircraft have lots to do with state-of-the-art quantum technology. Researchers have been able to turn fragile quantum systems into useful pieces of advanced technology, useful for everything from computation and communications to building specialised sensors for industry. The trick was figuring out how to protect them from their environments using control theory. [TECHNICAL ARTICLE](#)

Tags: Quantum science

Serious security: Device-Independent Quantum Key Distribution guards against the most general attacks

PhysOrg.com, 20OCT2014

Researchers at UC Berkeley and CalTech have devised a strong proof of DIQKD security using a standard variation of Artur K. Ekert's entanglement-based protocol targeting general or coherent attacks. The researchers say that their protocol is robust and is based on a new quantitative understanding of the monogamous nature of quantum correlations in the context of a multiparty protocol. [TECHNICAL ARTICLE](#)

Tags: Quantum science

Mapping the relationship between two quantum effects known as topological insulators

PhysOrg.com, 17OCT2014

In topological insulators, quantum anomalous Hall effect can be achieved without an external magnetic field. Researchers in Japan have experimentally mapped the relationship between the quantum anomalous Hall (QAH) effect in topological insulators and the well-known QH effect in semiconductors, which should facilitate the development of QAH-based technologies. [TECHNICAL ARTICLE](#)

Tags: Quantum science, S&T Japan

Saving Space with Quantum Information

American Physical Society Spotlight, 17OCT2014

An international team of researchers (Canada, Israel, Japan) demonstrates the compression of quantum data by reducing the number of qubits needed to store a given amount of information. In this first experiment they compressed three qubits into two but they say the results can lead to larger numbers of qubits in the future. [TECHNICAL ARTICLE](#)

Tags: Quantum science

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S&T POLICY

New 100 Gbps high-speed transatlantic network to benefit science collaborations

PhysOrg.com, 20OCT2014

Scientists across the U.S. will soon have access to new, ultra high-speed network links spanning the Atlantic Ocean, thanks to a project currently underway to extend ESnet (the U.S. Department of Energy's Energy Sciences Network) to London, Amsterdam and Geneva. It will deliver a total capacity of 340 gigabits-per-second and serve dozens of scientific collaborations. The ESnet extension will be in place before Spring of 2015.

Tags: S&T policy, Science without borders

International Scientific Collaboration of China: Collaborating Countries, Institutions and Individuals

arXiv, 05OCT2014

Using bibliometric methods, researchers in China show that nearly 95% international co-authored papers are from collaboration with only 20 countries, among which the USA accounts for more than 40% of all papers. Chinese immigrant scientists are playing an important role in China's international scientific collaboration, especially in English-speaking countries.

Tags: S&T policy, S&T China

SCIENCE WITHOUT BORDERS

Isaac Asimov Mulls "How Do People Get New Ideas?"

MIT Technology Review, 20OCT2014

The contents of the essay, written by Isaac Asimov in 1959, are as broadly relevant today as when he wrote it. It describes not only the creative process and the nature of creative people but also the kind of environment that promotes creativity.

Tags: Science without borders

Q&A with Futurist Martine Rothblatt

MIT Technology Review, 20OCT2014

In a conversation with MIT Technology Review Martine Rothblatt makes legal and ethical arguments for why intelligent software might eventually deserve all the rights of flesh-and-blood people. She argues that humanity is on a fast track to a next evolutionary step of copying people's personalities into machines. It is inevitable that these mindfiles will be animated as "mindclones": conscious, digital versions of people living or dead.

Tags: Science without borders

SENSORS

Creating e-noses using fruit flies

KurzweilAI, 15OCT2014

An international team of researchers (UK, Australia) hopes to integrate the fly sensors into future e-noses, making the devices much faster and more sensitive to a host of chemicals. The e-noses could be used in applications such as law enforcement, health monitoring, food-quality testing, environmental management, and even geological monitoring (volcanoes) and agriculture (detecting pests).

TECHNICAL ARTICLE

Tags: Sensors ■

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