



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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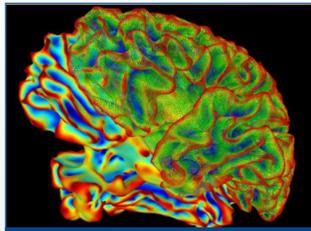
## FEATURE ARTICLES

### [BRAIN Initiative Gets \(a Little\) More Detailed](#)

[Science Magazine, 17SEP2013](#)

To hammer out a plan for its \$40 million contribution, the National Institutes of Health (NIH) recruited 15 top scientists to identify research priorities. Recently released team's report lists nine top research priorities, all geared toward developing tools to help scientists understanding of how linked "circuits" of neurons work together. [REPORT](#)

*Tags: S&T policy, Neuroscience, Featured Article*



*Shaping up. In a highly anticipated report, the mysterious BRAIN Initiative begins to take form.*

### [Scientists Discover Cosmic Factory for Making Building Blocks of Life](#)

[Science Daily, 15SEP2013](#)

A team of researchers from the UK and Lawrence Livermore National Laboratory have discovered that when icy comets collide into a planet, amino acids can be produced. These essential building blocks are also produced if a rocky meteorite crashes into a planet with an icy surface. [TECHNICAL ARTICLE](#)

*Tags: Science without borders, Featured Article*

### [NASA Spacecraft Embarks on Historic Journey Into Interstellar Space](#)

[NASA News, 12SEP2013](#)

NASA's Voyager 1 spacecraft officially is the first human-made object to venture into interstellar space. The 36-year-old probe is about 12 billion miles (19 billion kilometers) from our sun. New and unexpected data indicate Voyager 1 has been traveling for about one year through plasma present in the space between stars. Voyager is in a transitional region immediately outside the solar bubble, where some effects from our sun are still evident. [VOYAGER WEB SITE](#)

*Tags: Government S&T, NASA, Space technology, Featured Article*

## S&T NEWS ARTICLES

### ADVANCED MANUFACTURING

#### [Invention Jet Prints Nanostructures With Self-Assembling Material](#)

[Science Daily, 16SEP2013](#)

An international team of researchers (US, Korea) has developed a new approach to the fabrication of nanostructures which combines top-down advanced ink-jet printing technology with a bottom-up approach that involves self-assembling block copolymers, a type of material that can spontaneously form ultrafine structures. [TECHNICAL ARTICLE](#)

*Tags: Advanced manufacturing*

#### [Printing out Particle Detectors with 3D-Printers, a Potentially Transformational Advance for HEP Instrumentation](#)

[arXiv.org, 05SEP2013](#)

Improvements of current industrial 3D-printing capabilities by one to two orders of magnitude in terms of printing resolution, speed, and object size together with developing the ability to print composite materials could enable the production of any desired 3D detector structure directly from a digital model. [TECHNICAL ARTICLE](#)

*Tags: Advanced manufacturing, Particle physics*

### ADVANCED MATERIALS

#### [Spider Silk Coated With Carbon Nanotubes Has Multiple Surprising Uses](#)

[Science Daily, 13SEP2013](#)

Researchers at Florida State University discovered that spider silk coated with carbon nanotubes can be used as a humidity sensor, a strain sensor, an actuator and as an electrical wire. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials, Materials science*

#### ['Terminator' Polymer: Self-Healing Polymer That Spontaneously and Independently Repairs Itself](#)

[Science Daily, 13SEP2013](#)

Researchers in Spain have demonstrated that a permanently cross-linked poly (urea-urethane) elastomeric

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network completely mended itself after being cut in two by a razor blade. It is the metathesis reaction of aromatic disulphides, which naturally exchange at room temperature, that causes regeneration. [TECHNICAL ARTICLE 1, 2](#)

*Tags: Advanced materials, Materials science*

### [The '50-50' Chip: Memory Device of the Future? Material Built from Aluminum and Antimony Shows Promise for Next-Generation Data-Storage Devices](#)

[Science Daily, 13SEP2013](#)

An electronic alloy, developed by researchers in China, consisting of 50 aluminum atoms bound to 50 atoms of antimony may be promising for building next-generation "phase-change" memory devices, which may be the data-storage technology of the future. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials, S&T China*

### [Toward a truly white organic LED: Physicists develop polymer with tunable colors](#)

[Science Daily, 13SEP2013](#)

By inserting platinum atoms into an organic semiconductor, researchers at the University of Utah were able to "tune" the plastic-like polymer to emit light of different colors—a step toward more efficient, less expensive and truly white organic LEDs for light bulbs of the future. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials, Materials science*

### [Artificial muscles lift heavy loads](#)

[Physics World, 10SEP2013](#)

Researchers in Singapore have made human-like artificial muscles from polymers that can extend to five times their original length while lifting loads 80 times their own weight. They mimic the operation of their natural counterparts by contracting and expanding rapidly in response to electrical stimuli. This development is a first for robotics and could pave the way towards a new generation of more efficient, greener and cheaper robots.

*Tags: Advanced materials, Autonomous Systems & Robotics*

## AUTONOMOUS SYSTEMS & ROBOTICS

### [Video Friday: Quadrotor Tour Guides, Laser Hexapods, and Robots vs. Gymnasts](#)

[IEEE Spectrum, 13SEP2013](#)

Skycall is a project from MIT's Senseable City Lab that explores "novel, positive uses of UAV technology in the urban context."

*Tags: Autonomous systems & robotics*

## BIOTECHNOLOGY

### [Stem cells: Living adult tissue transformed back into embryo state](#)

[BBC News, 11SEP2013](#)

The living tissue inside an animal has been regressed back into an embryonic state for the first time, Spanish

researchers say. They believe it could lead to new ways of repairing the body. However, the study published in the journal *Nature*, showed the technique led to tumours forming in mice. [TECHNICAL ARTICLE](#)

*Tags: Biotechnology, Biology*

## COMMUNICATIONS TECHNOLOGY

### [Space Weather May Be to Blame for Some Satellite Failures](#)

[Science Daily, 16SEP2013](#)

MIT researchers found that most of the failures occurred at times of high-energy electron activity during declining phases of the solar cycle. This particle flux, the scientists theorize, may have accumulated in the satellites over time creating internal charging that damaged their amplifiers.

*Tags: Communications Technology*

## CYBER SECURITY

### ["Tamper-Proof" Chips, with Some Work, Might Give Up Their Secrets](#)

[MIT Technology Review, 11SEP2013](#)

Researchers in the US and Germany have shown that with costly equipment and determination, it's possible to mill down the back of the silicon on chips and steal the data with microscopic probes. The research is valuable for showing that physical protections on chips have their limits.

*Tags: Cyber security, Communications Technology*

## ENERGY

### [A new class of high-energy rechargeable batteries—molten air](#)

[Nanowerk, 16SEP2013](#)

Unlike prior rechargeable molten batteries, the molten air battery developed by researchers at George Washington University is not burdened by the weight of the active chargeable cathode material. The rechargeable molten air electrode instead uses oxygen directly from the air to yield high battery capacity. [TECHNICAL ARTICLE](#)

*Tags: Energy, Battery*

### [Super Efficient Combustion Engine Emits Half the Carbon Dioxide](#)

[Science Daily, 12SEP2013](#)

Researchers in Switzerland have developed a natural gas-diesel hybrid internal combustion engine based on a system of sophisticated control engineering that emits less than half the CO<sub>2</sub> compared to a regular engine without compromising performance. This corresponds to fuel consumption of less than 2.4l per 100km. [TECHNICAL ARTICLE](#)

*Tags: Energy, S&T Switzerland*

“That is the essence of science: ask an impertinent question, and you are on the way to the pertinent answer.” JACOB BRONOWSKI

## ENVIRONMENTAL SCIENCE

### [Tracking dust across the Atlantic](#)

[PhysOrg.com](#), 13SEP2013

Dry air masses from Africa can sap the moisture-collecting energy of storm systems over the ocean. More dust can also mean fewer storms because it blocks incoming sunlight, leading to cooler ocean temperatures. Deciphering the effect of Saharan air and dust is one of the research goals of NASA's Hurricane and Severe Storm Sentinel airborne field campaign this year.

*Tags: Environmental science, Climatology, Government S&T, NASA*

## FORECASTING

### [Superconductivity to Meet Humanity's Greatest Challenges](#)

[Science Daily](#), 16SEP2013

A superconductivity roadmap developed by an international team of researchers explains how superconducting technologies can move out of laboratories and hospitals and address wider issues such as water purification, earthquake monitoring and the reduction of greenhouse gases.

[TECHNICAL ARTICLE](#)

*Tags: Forecasting*

### [Tracking Criminal Movement Using Math](#)

[Science Daily](#), 12SEP2013

Researchers at UCLA propose a mathematical model that analyzes criminal movement in terms of a Lévy flight, a pattern in which criminals tend to move locally as well as in large leaps to other areas. [TECHNICAL ARTICLE](#)

*Tags: Forecasting*

## INFORMATION TECHNOLOGY

### [Machine Learning Used to Boil Down the Stories That Wearable Cameras Are Telling](#)

[Science Daily](#), 13SEP2013

Researchers at the University of Texas, Austin, developed a technique that uses machine learning to automatically analyze recorded videos and assemble a better short “story” of the footage than what is available from existing methods.

*Tags: Information Technology*

### [Software May Be Able to Take Over from Hardware in Managing Caches](#)

[Science Daily](#), 13SEP2013

Researchers at MIT have developed a new system, dubbed Jigsaw, that monitors the computations being performed by a multicore chip and manages cache memory accordingly. In experiments simulating the execution of hundreds

of applications on 16- and 64-core chips, they showed that Jigsaw could speed up execution by an average of 18 percent—with more than twofold improvements in some cases—while actually reducing energy consumption by as much as 72 percent.

*Tags: Information Technology*

## MATERIALS SCIENCE

### [Feeling Small: Fingers Can Detect Nano-Scale Wrinkles Even On a Seemingly Smooth Surface](#)

[Science Daily](#), 16SEP2013

Research by scientists in Sweden could inform the development of the sense of touch in robotics and virtual reality and could lead to such advances as touch screens for the visually impaired and other products. The study marks the first time that scientists have quantified how people feel, in terms of a physical property. [TECHNICAL ARTICLE](#)

*Tags: Materials science, Autonomous Systems & Robotics, S&T Sweden*

### [New Model Should Expedite Development of Temperature-Stable Nano-Alloys](#)

[Science Daily](#), 16SEP2013

Researchers at North Carolina State University have developed a new theoretical model that will speed the development of new nanomaterial alloys that retain their advantageous properties at elevated temperatures. This model allows anyone to design alloys in a targeted and effective way without having to resort to a trial-and-error approach. [TECHNICAL ARTICLE](#)

*Tags: Materials science, Advanced materials*

### [How slippery are water-repellent surfaces? \(w/video\)](#)

[Nanowerk](#), 13SEP2013

Researchers in Finland placed a water droplet containing magnetic nanoparticles on a water-repellent superhydrophobic surface and observed its oscillation in a magnetic field. By modelling the droplet's motion, it was possible to extract information on the friction and kinetic energy dissipation. Water-repellent superhydrophobic materials have huge potential for self-cleaning applications and microfluidics. [TECHNICAL ARTICLE](#)

*Tags: Materials science, S&T Finland*

### [Scientists make detailed map of current between insulators](#)

[PhysOrg.com](#), 13SEP2013

SLAC and Stanford scientists have mapped those currents in microscopic detail and found another surprise: Rather than flowing uniformly, the currents are stronger in some

*continued...*

places than others, like river currents shaped by underlying rock. [TECHNICAL ARTICLE](#)

*Tags: Materials science*

### [Nanotechnology researchers make glass just two atoms thick](#)

[Nanowerk, 12SEP2013](#)

The “pane” of glass, developed by researchers at Cornell University and researchers in Germany is so impossibly thin that its individual silicon and oxygen atoms are clearly visible via electron microscopy. Cornell University researchers found that it strikingly resembles a diagram drawn in 1932 by W.H. Zachariasen—a longstanding theoretical representation of the arrangement of atoms in glass.

*Tags: Materials science*

### [Airbrushing Could Facilitate Large-Scale Manufacture of Carbon Nanofibers](#)

[Science Daily, 11SEP2013](#)

Researchers at North Carolina State University used airbrushing techniques to grow vertically aligned carbon nanofibers on several different metal substrates, opening the door for incorporating these nanofibers into gene delivery devices, sensors, batteries and other technologies.

[TECHNICAL ARTICLE](#)

*Tags: Materials science*

## FEATURED RESOURCE

### [Nanowerk](#)

Nanowerk is committed to educate, inform and inspire about nanosciences, nanotechnologies and other emerging technologies. On average we run well over 100 news articles every week. [RSS](#)

## MICROELECTRONICS

### [Graphene Photodetector Integrated Into Silicon Chip](#)

[Science Daily, 16SEP2013](#)

Researchers in Austria have managed to combine a graphene photodetector with a standard silicon chip. It can transform light of all important frequencies used in telecommunications into electrical signals. [TECHNICAL ARTICLE](#)

*Tags: Microelectronics, Communications Technology, Photonics*

### [Plasmonic nanocircuits enable optics on a microchip](#)

[Nanowerk, 13SEP2013](#)

Researchers in Germany and the US demonstrate that it is possible to operate extremely compact optical circuits on the nanoscale, a size scale that makes it compatible and

potentially competitive with state-of-the-art electronic microchips, substantially reducing the limiting factor of heating loss and strongly increasing the efficiency to funnel infrared laser light into these circuits with a novel design of optical nanoantennas. [TECHNICAL ARTICLE](#)

*Tags: Microelectronics*

### [Low-Power Transistors May Boost Wearable Computer Battery Life](#)

[MIT Technology Review, 10SEP2013](#)

SuVolta, a company in California, has developed a transistor that can cut a computer chip’s power consumption in half. This will help give small, portable devices new stamina.

*Tags: Microelectronics, Information technology*

## QUANTUM SCIENCE

### [On the Road to Fault-Tolerant Quantum Computing: High Temperature Superconductivity Induced in Topological Insulator](#)

[Science Daily, 16SEP2013](#)

A team of researchers from the US DOE’s Lawrence Berkeley National Laboratory and China has reported the first demonstration of high-temperature superconductivity in the surface of a topological insulator which is a pre-requisite for fault-tolerant quantum computing, a mysterious quasiparticle known as the “Majorana zero mode.” [TECHNICAL ARTICLE](#)

*Tags: Quantum science, Government S&T*

### [Quantum entanglement only dependent upon area](#)

[EurekAlert, 15SEP2013](#)

Researchers in the UK and Poland have demonstrated that when the correlation between particles in a sample reduces exponentially with distance, the entanglement between one region and the rest of the sample only depends on the area of the boundary between them. [TECHNICAL ARTICLE](#)

*Tags: Quantum science, S&T UK*

### [Qcloud project to allow online users a taste of quantum computing](#)

[PhysOrg.com, 13SEP2013](#)

Officials in the U.K. have announced that they intend to put their two qubit processor online for use by some people on the Internet. Called the Qcloud project, the idea is to get scientists, those in academics and even the general public used to the idea of quantum computing so as to be prepared when real quantum computers arrive.

*Tags: Quantum science, S&T Policy, S&T UK*

### [Researchers demonstrate highest open-circuit voltages for quantum dot solar cells](#)

[Nanowerk, 13SEP2013](#)

Using colloidal lead sulfide (PbS) nanocrystal quantum dot (QD) substances, NRL researchers achieved an open-circuit

*continued...*

voltage of 692 millivolts using the QD bandgap of a 1.4 electron volt in QD solar cell under one-sun illumination.

*Tags: Quantum science, Government S&T*

## S&T POLICY

### [China heading to 150 gigawatts of installed wind capacity at the end of 2015](#)

[Next Big Future](#), 14SEP2013

China currently supplies roughly one-fourth of all the wind energy injected into the grid worldwide. Yet the sector faces some immense challenges, from ongoing problems with grid connection, perhaps most importantly, uncertainty about whether policymakers will do as they have done in the past to ensure the sector continues its rapid growth.

*Tags: S&T policy, S&T China*

## SENSORS

### [Chinese Researchers Make An Invisibility Cloak In 15 Minutes](#)

[MIT Technology Review](#), 10SEP2013

Researchers in China have created the first invisibility cloak designed using topology optimization. They carved it out of Teflon and it took them all of 15 minutes using a computer-controlled engraving machine. The resulting “Teflon eyelid” invisibility cloak hides a cylindrical disc of metal the size of poker chip from microwaves. [TECHNICAL ARTICLE](#)

*Tags: Sensors ■*

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