



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

[Advanced materials \(1\)](#)

[Cyber security \(4\)](#)

[Materials science \(6\)](#)

[Science without borders \(1\)](#)

[Autonomous systems & robotics \(2\)](#)

[Energy \(3\)](#)

[Microelectronics \(2\)](#)

[Sensors \(3\)](#)

[Communications technology \(3\)](#)

[Environmental science \(2\)](#)

[Neuroscience \(3\)](#)

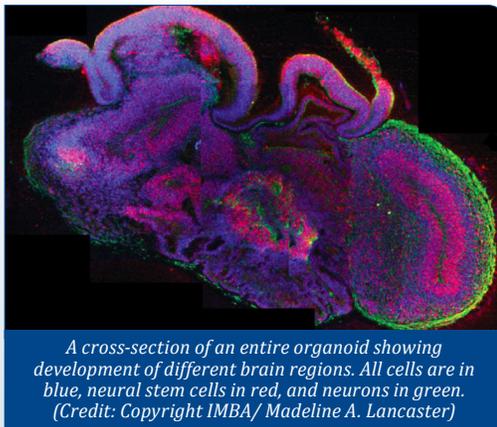
[STEM \(1\)](#)

[Information technology \(2\)](#)

[Quantum science \(3\)](#)

FEATURE ARTICLES

[‘Mini Human Brains’ Created: Scientists Grow Human Brain Tissue in 3-D Culture System](#)



A cross-section of an entire organoid showing development of different brain regions. All cells are in blue, neural stem cells in red, and neurons in green. (Credit: Copyright IMBA/ Madeline A. Lancaster)

[Science Daily, 29AUG2013](#)

Researchers in Austria fine-tuned growth conditions and provided a conducive environment; as a result, intrinsic cues from the stem cells guided the development towards different interdependent brain tissues. Using the “mini brains,” the scientists were also able to model the development of a human neuronal disorder and identify its origin—opening up routes to long hoped-for model systems of the human brain. [TECHNICAL ARTICLE](#)

Tags: Neuroscience, Biotechnology, Featured Article

[Space Laser to Prove Increased Broadband Possible](#)

[Science Daily, 28AUG2013](#)

When NASA’s Lunar Laser Communication Demonstration (LLCD) begins operation aboard the Lunar Atmosphere and Dust Environment Explorer (LADEE) it will attempt to show two-way laser communication beyond Earth is possible, expanding the possibility of transmitting huge amounts of data. This new ability, developed by researchers at MIT Lincoln Laboratory, could one day allow for 3-D High Definition video transmissions in deep space to become routine. [VIDEO](#)

Tags: Communications Technology, NASA, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[New strategically important hard metal developed](#)

[Nanowerk, 03SEP2013](#)

The material developed by researchers in Finland can be used to replace tungsten carbide. The new material also possesses excellent bullet-proofing qualities.

Tags: Advanced materials, S&T Finland

AUTONOMOUS SYSTEMS & ROBOTICS

[Video Friday: Retro Robots, Mobile Manipulation, and Mario](#)

[IEEE Spectrum, 30AUG2013](#)

Out at Sandia National Labs last June, military robots took part in a Robot Rodeo, a lively and challenging competition that draws civilian and military bomb squad teams from across the country to see who can most effectively defuse dangerous situations with the help of robots.

Tags: Autonomous systems & robotics

[NASA’S Mars Curiosity Debuts Autonomous Navigation](#)

[Science Daily, 27AUG2013](#)

Using autonomous navigation, or autonav, Curiosity can analyze images it takes during a drive to calculate a safe driving path. This enables it to proceed safely even beyond the area that the human rover drivers on Earth can evaluate ahead of time.

Tags: Autonomous systems & robotics, Government S&T, NASA

COMMUNICATIONS TECHNOLOGY

[Indoor blackspots could leave 4G revolution wanting](#)

[PhysOrg.com, 03SEP2013](#)

Unless nodes such as small-cells are deployed to improve signal penetration to indoor areas, the performance improvement under poor signal conditions is small. It has been argued that the excess interference power generated by small-cells will actually weaken performances elsewhere in the city.

Tags: Communications Technology

continued...

[BACK TO TOP](#)

[Applying terahertz waves to future technologies](#)

RIKEN Research, 30AUG2013

Following significant progress in the development of terahertz light-emitting sources and detectors, scientists are now focusing on the applications of terahertz waves, which include areas as diverse as communications, security, industry, medicine and agriculture.

Tags: Communications Technology, S&T Japan, Terahertz technology

CYBER SECURITY

[Brazilian government plans national 'anti-snooping' email system](#)

Wired UK, 03SEP2013

The new system would include encryption and have servers based in Brazil. The Government is debating whether to make it an ad-funded service.

Tags: Cyber security

[Quantum cryptography is coming to mobile phones](#)

Physics World, 02SEP2013

The first practical way of carrying out quantum cryptography using a mobile phone has been developed by researchers at Nokia and the University of Bristol in the UK. It is currently limited to banks and other organizations that can afford to have expensive and extremely sensitive quantum-optical components at both ends of a communications link. [TECHNICAL ARTICLE](#)

Tags: Cyber security

[Data Storage: Maintaining Privacy On the Cloud](#)

Science Daily, 31AUG2013

Researchers in Singapore have devised a scheme that would not only allow organizations to store data on the cloud without loss of privacy but also permit searching and sharing of the data. In their scheme, data stored on the cloud is encrypted by its owner and hence is indecipherable to anyone else—including the cloud storage provider. [TECHNICAL ARTICLE](#)

Tags: Cyber security, Big Data

['Zero knowledge' may answer computer security question](#)

PhysOrg.com, 29AUG2013

Researchers at Cornell University developed a new protocol to create what computer scientists call a "zero knowledge proof." They combine it with another notion—that it's easier to prove that a computation can be done correctly than it is to actually compute it. Instead of insecurely typing the password for your bank account you just prove to the bank that you know the password.

Tags: Cyber security

ENERGY

[Mapping the energy potential below our feet](#)

EU R&D News, 03SEP2013

THERMOMAP, an EU supported project, harmonises and analyses already existing data collections in order to calculate a value for the geothermal potential, and helps users to identify areas favourable for superficial geothermal exploitation. The Map is intended for planners, engineers, public bodies, scientists and the general public.

Tags: Energy, S&T EU

[Modular Battery Concept for Short-Distance Traffic](#)

Science Daily, 02SEP2013

The key modules demonstrated by researchers in Germany are a drive train with a high-torque electric motor, a high-voltage network, a battery management system, and a novel modular battery system with lithium-ion cells. They claim that using their system is profitable even when considering current battery costs.

Tags: Energy, S&T Germany

[Hydrogen Fuel from Sunlight: Researchers Make Unique Semiconductor/Catalyst Construct](#)

Science Daily, 29AUG2013

Researchers at the DOE's Lawrence Berkeley National Laboratory have developed a way to interface a molecular hydrogen-producing catalyst with a visible light absorbing semiconductor. With this approach, hydrogen fuel can be produced off a photocathode using sunlight. [TECHNICAL ARTICLE](#)

Tags: Energy, Government S&T

ENVIRONMENTAL SCIENCE

[Increased Greenhouse Gases and Aerosols Have Similar Effects On Rainfall](#)

Science Daily, 01SEP2013

Researchers from the University of Hawaii have provided important new insights based on results from experiments with three state-of-the-art climate models. Even though aerosols and greenhouse gases are concentrated in vastly different regions of Earth, all three models revealed similar regional effects on rainfall over the ocean. [TECHNICAL ARTICLE](#)

Tags: Environmental science, Climatology

[How plasma moves on sun's 'conveyor belt'](#)

Futurity.org, 29AUG2013

The sun's magnetic field can play havoc with communication technology. Now scientists at NASA and Stanford University have figured out one of the underlying processes of how the field forms—a finding that may help predict its behavior. [TECHNICAL ARTICLE](#)

Tags: Environmental science, Space technology

continued...

“The good thing about science is that it’s true whether or not you believe in it.”

NEIL DEGRASSE TYSON

INFORMATION TECHNOLOGY

Data Storage: Better Hard Drives Ready for Lift-Off

Science Daily, 31AUG2013

Researchers in Singapore have developed a computational algorithm for studying the properties of the slider in a hard drive that is faster than existing algorithms. Instead of taking days to finish, dynamic simulations using the new algorithm take only an hour. [TECHNICAL ARTICLE](#)

Tags: Information Technology

Nanotechnology T-Shirt to replace batteries? Towards wearable energy storage

Nanowerk, 29AUG2013

Researchers in Japan and China have demonstrated that flexible cotton threads can be used as a platform to fabricate a cable-type supercapacitor. It could lead to flexible energy storage devices that can remove traditional restriction and achieve a subversive technology that could open up a path for design innovation. [TECHNICAL ARTICLE](#)

Tags: Information Technology, Flexible electronics

MATERIALS SCIENCE

Atom-Based Analogues to Electronic Devices

Science Daily, 03SEP2013

Researchers in Germany have pushed back the boundaries of atom-based transport, creating a current by characterizing the many-body effects in the transport of the atoms along a periodic lattice. They adopted a new analytical approach before comparing it to approximate numerical simulations. [TECHNICAL ARTICLE](#)

Tags: Materials science, S&T Germany

Solar Cell Performance Improves With Ion-Conducting Polymer

Science Daily, 03SEP2013

Researchers in Sweden have demonstrated that a new quasi-liquid, polymer-based electrolyte increases a dye-sensitized solar cell’s voltage and current, and lowers resistance between its electrodes. [TECHNICAL ARTICLE](#)

Tags: Materials science, S&T Sweden, Solar energy

Magnetic Materials: Forging Ahead With a Back-To-Basics Approach

Science Daily, 31AUG2013

Researchers in Singapore have used theoretical calculations to show how the magnetic characteristics of specific materials can be controlled at the atomic level. Their results could lead to novel magnetic recording devices. [TECHNICAL ARTICLE](#)

Tags: Materials science, Information technology

Nanotechnology’s Benefits Brought Into Focus

Science Daily, 31AUG2013

Researchers in Singapore have proposed a novel approach to ‘superlens’ systems that can surpass the classical limit of focusing light. Confining light into these super intense ‘hot-spots’ could prove a boon for optical detection systems. [TECHNICAL ARTICLE](#)

Tags: Materials science, Photonics

How to get fresh water out of thin air

MIT News, 30AUG2013

A few specialized plants and insects have devised ingenious strategies to provide themselves with the water necessary for life: They pull it right out of the air, from fog that drifts in from warm oceans nearby. Researchers at MIT and Chile are seeking to mimic that trick on a much larger scale, potentially supplying significant quantities of clean, potable water in places where there are few alternatives. [TECHNICAL ARTICLE](#)

Tags: Materials science

Using a Form of ‘Ice That Burns’ to Make Potable Water from Oil and Gas Production

Science Daily, 28AUG2013

Researchers at the National Energy Technology Laboratory, West Virginia, formed hydrates from water and carbon dioxide with the gases cyclopentane and cyclohexane, which made the method work more efficiently. It removed more than 90 percent of the salt compared to 70 percent with the previous gas hydrate technique. [TECHNICAL ARTICLE](#)

Tags: Materials science

MICROELECTRONICS

Advancing graphene for post-silicon computer logic

EurekAlert, 03SEP2013

Graphene is fast but suffers from leakage currents and power dissipation because of the absence of the energy band gap. Instead of trying to change graphene, researchers at UC Riverside changed the way the information is processed in the circuits. They demonstrated that the negative differential resistance experimentally observed in graphene field-effect transistors allows for construction of viable non-Boolean computational architectures with the gap-less graphene. [TECHNICAL ARTICLE](#)

Tags: Microelectronics, Advanced materials, Materials science

continued...

[Solar energy for sensor nodes](#)

Fraunhofer Research Institute, 02SEP2013

Researchers in Germany show that tiny solar cells applied directly to a silicon chip are a potential way of efficiently and reliably powering wireless sensor networks in the future. Above all, this would simplify large-scale applications, for instance in agriculture.

Tags: [Microelectronics](#), [S&T Germany](#)

NEUROSCIENCE

[Creating a 'window' to the brain](#)

EurekAlert, 03SEP2013

Researchers at the University of California, Riverside, have developed a novel transparent skull implant that literally provides a "window" to the brain, which they hope will eventually open new treatment options for patients with life-threatening neurological disorders, such as brain cancer and traumatic brain injury.

Tags: [Neuroscience](#)

[Learning How the Brain Takes out Its Trash May Help Decode Neurological Diseases](#)

Science Daily, 29AUG2013

Researchers at the University of Michigan have identified two critical components of this cell clearing process: an essential calcium channel protein, TRPML1, that helps the so-called garbage collecting cells, called microphages or microglia, to clear out the dead cells; and alipid molecule, which helps activate TRPML1 and the process that allows the microphages to remove these dead cells. [TECHNICAL ARTICLE](#)

Tags: [Neuroscience](#)

FEATURED RESOURCE

[ARXIV](#)

arXiv, started in 1994, is an e-print service in the fields of physics, mathematics, non-linear science, computer science, quantitative biology, and more. It is owned and operated by Cornell University, funded by Cornell University Library and supporting user institutions. [RSS](#)

QUANTUM SCIENCE

[Researchers propose a new system for quantum simulation](#)

Nanowerk, 03SEP2013

Researchers in Germany show that a combined system of ultracold trapped ions and fermionic atoms could be used to emulate solid state physics. This system may outperform possibilities of existing platforms as a number of phenomena found in solid state systems are naturally

included, such as the fermionic statistics of the electrons and the electron-sound wave interactions. [TECHNICAL ARTICLE](#)

Tags: [Quantum science](#), [S&T Germany](#)

[New Component in the Quantum Electronics Toolbox: Interface Between Atoms and Superconductors](#)

Science Daily, 29AUG2013

Quantum information is carried by qubits which are very unstable. Researchers in Germany have developed a new electronic component which will help overcome this problem. The researchers' long-term goal is to process, transfer and store superposition states such as the overlapping of the binary digits zero and one. [TECHNICAL ARTICLE](#)

Tags: [Quantum science](#), [S&T Germany](#)

[Why Electrons Pass Through Very Tiny Wires Less Smoothly Than Expected: Light Shed On 20-Year-Old Mystery](#)

Science Daily, 29JUL2013

Researchers in Denmark observed that in quantum wires electrodes create a 'saddle point potential', a sort of a tiny mountain pass where the electrodes on either side control steep walls. The observations will affect electronics on a nanoscale. [TECHNICAL ARTICLE](#)

Tags: [Quantum science](#)

SCIENCE WITHOUT BORDERS

['We May Be Able to Watch Dark Energy Turn On': Unprecedented Sky Survey](#)

Science Daily, 03SEP2013

Moonless nights outside the Cerro Tololo astronomical observatory in Chile are so dark that when you look down, you can't see your feet. But you can see a hand-shaped hole with no stars in it. Over the next five years, an international team will map one-eighth of the sky in unprecedented detail. [VIDEO](#), [More information](#)

Tags: [Science without borders](#), [Astronomy](#)

SENSORS

[Breakthrough in nanotechnology sensing](#)

Nanowerk, 01SEP2013

A team of researchers from Australia and China have developed a new approach to advanced sensing that is facilitated by bringing together a specific form of nanocrystal, or 'SuperDot™' with a special kind of optical fibre that enables light to interact with tiny (nanoscale) volumes of liquid. This may enable a new approach to highly advanced sensing technologies using optical fibre. [TECHNICAL ARTICLE](#)

Tags: [Sensors](#), [S&T Australia](#), [S&T China](#)

Echolocation

e! Science News, 29AUG2013

Researchers in Germany have shown that sighted people can also learn to echolocate objects in space. They are now exploring how the coordination of self-motion and echolocation facilitates sonar-guided orientation and navigation in humans.

Tags: Sensors, S&T Germany

New Sensor Is Almost as Sensitive as a Dog's Nose

Science Daily, 29AUG2013

Researchers from the US and Germany coated the CNTs with hafnium oxide, an insulating material, before applying a layer of gold. The insulation layer increased the sensitivity of its sensor substrate by a factor of 100,000 in the molar concentration unit. TECHNICAL ARTICLE

Tags: Sensors

STEM

The STEM Crisis is a Myth: An Ongoing Discussion

IEEE Spectrum, 02SEP2013

The situation is so dismal that governments everywhere are now pouring billions of dollars each year into myriad efforts designed to boost the ranks of STEM workers. And yet, alongside such dire projections, you'll also find reports suggesting just the opposite—that there are more STEM workers than suitable jobs. Throughout the month of September, we'll provide continuing coverage and debate on STEM.

Tags: STEM ■

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This publication is authored and distributed by:

Dr. Brian Beachkofski
Director, Office of
Technical Intelligence (OTI)

Ms. Hema Viswanath
OTI Corporate Librarian