



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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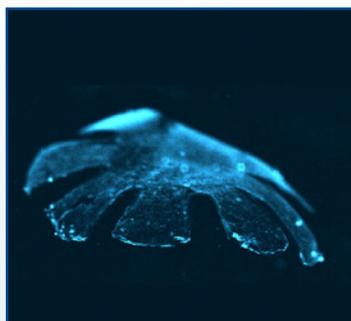
FEATURE ARTICLES

[Artificial jellyfish swims in a heartbeat](#)

[Harvard University](#),
22JUL2012

Using recent advances in marine biomechanics, materials science, and tissue engineering, a team of researchers at Harvard University and the California Institute of Technology have turned inanimate silicone and living cardiac muscle cells into a freely swimming “jellyfish.” [VIDEO](#)

Tags: Breakthrough technology, Featured Article



A still of the artificial jellyfish “swimming” in container of ocean-like salt water. Note: the color and contrast of the artificial jellyfish has been digitally enhanced to make it easier to view. (Image courtesy of Harvard University and Caltech.)

[Scientists read monkeys’ inner thoughts: Brain activity decoded while monkeys avoid obstacle to touch target](#)

[Science Daily](#), 22JUL2012

By decoding brain activity, scientists were able to “see” that two monkeys were planning to approach the same reaching task differently—even before they moved a muscle. By chance the two monkeys chosen for the study had completely different cognitive styles. One was a hyperactive type, the other was a smooth operator. The scientists had been aware that they had very different personalities, but they had no idea this difference would show up in their neural recordings.

Tags: Neuroscience, Breakthrough technology, Featured Article

[Radiation damage bigger problem in microelectronics than previously thought](#)

[Science Daily](#), 20JUL2012

The amount of damage that radiation causes in electronic materials may be at least 10 times greater

than previously thought. Researchers at Vanderbilt University developed new characterization method that uses a combination of lasers and acoustic waves that allows scientists to peer through solid materials to pinpoint the size and location of defects buried deep inside with unprecedented precision.

Tags: Microelectronics, Featured Article

S&T NEWS ARTICLES

ADVANCED MATERIALS

[Hollow iron oxide nanoparticles for lithium-ion battery applications](#)

[Nanowerk](#), 22JUL2012

A new concept of electrode fabrication based on sealing nanoparticles between layers of pure carbon nanotubes was developed. The new electrodes allow for reversible lithium-ion intercalation, which resulted in high capacity and efficiency, superior rate performance, and excellent stability (no fading over more than 500 cycles). When this novel electrode was used as a cathode, the inherent iron vacancies allowed for significantly increased performance in a lithium-ion battery. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Energy

AUTONOMOUS SYSTEMS & ROBOTICS

[Video Friday: Pretending to Learn Things at Stanford, Emys Likes Colors, and a Girlfriend for Robonaut](#)

[IEEE Spectrum](#), 20JUL2012

Instead of teaching their robotic limb to throw and punch and kick using powerful motors, researchers at the University of Edinburgh are programming elastic actuators to store up and then explosively release energy for throwing and punching and kicking.

Tags: Autonomous systems & robotics

continued...

Robot Eyes Track Ping Pong Balls

IEEE Spectrum, 19JUL2012

Using a 1,000-frames-per-second camera and a pan-tilt system researchers in Japan have built a robot eye to track a ping pong ball. The device is so fast it can always keep the ball in the center of the frame. The camera uses a custom vision chip that monitors what pixels are changing, and by doing that one thousand times per second it can keep track of fast moving objects. [VIDEO](#)

Tags: *Autonomous systems & robotics, S&T Japan*

BIG DATA**DataONE answers the call for new tools to study the Earth in this era of Big Data science**

EurekAlert, 24JUL2012

Today DataONE, the Data Observation Network for Earth, released technology capable of providing researchers around the world access to globally distributed, networked data from a single point of access and to make their own data available for innovations over the long term. Through this network, a single search interface queries data centers distributed globally.

Tags: *Big data*

10 Big Predictions About Big Data

Information Week, 23JUL2012

The Pew Internet Center asked more than 1,000 Internet “experts,” including educators, business executives, pundits, scientists, and other tech industry observers. “The Future of Big Data” survey posed a series of thought-provoking questions centered on one main theme: How will Big Data influence our lives in 2020?

Tags: *Big data, Forecasting*

BIOTECHNOLOGY**Team to develop ‘microbrain’ to improve drug testing**

Nanowerk, 24JUL2012

Take a millionth of a human brain and squeeze it into a special chamber the size of a mustard seed. Link it to a second chamber filled with cerebral spinal fluid and thread both of them with artificial blood vessels in order to create a microenvironment that makes the neurons and other brain cells behave as if they were in a living brain. Then surround the chambers with a battery of sensors that monitor how the cells respond when exposed to minute quantities of dietary toxins, disease organisms or new drugs under development. The five-year program is a cooperative effort on the part of NIH, the Defense Advanced Research Projects Agency and the FDA.

Tags: *Biotechnology, DARPA*

Harvard bioengineers to develop smart suit that improves endurance

Harvard University, 20JUL2012

Lightweight, efficient, and nonrestrictive, the proposed suit will be made from soft wearable assistive devices that integrate several novel technologies already developed at the Wyss Institute. One is a stretchable sensor that would monitor the body’s biomechanics without the need for the typical rigid components that often interfere with motion.

Tags: *Biotechnology, Military technology*

BREAKTHROUGH TECHNOLOGY**UCSB researchers achieve world’s first violet nonpolar vertical-cavity laser technology**

e! Science News, 23JUL2012

Researchers at UCSB have demonstrated working, electrically-injected nonpolar m-plane nitride VCSELs lasing at room temperature. Such devices are naturally polarization-locked along the crystallographic a-direction of the wurtzite crystal. This device could be used for a variety of applications, such as lighting, displays, sensors, and technology that requires energy efficiency and small form-factor.

Tags: *Breakthrough technology, Materials science*

Researchers produce first complete computer model of an organism

Science Daily, 22JUL2012

Researchers at Stanford University used data from more than 900 scientific papers to account for every molecular interaction that takes place in the life cycle of *Mycoplasma genitalium*, the world’s smallest free-living bacterium. Not only does the model allow researchers to address questions that aren’t practical to examine otherwise, it represents a stepping-stone toward the use of computer-aided design in bioengineering and medicine. [TECHNICAL ARTICLE](#)

Tags: *Breakthrough technology, Biotechnology*

The first printable magnetic sensor that relies on the giant magnetoresistive effect

Nanowerk Spotlight, 19JUL2012

Researchers in Germany have fabricated the first printable magnetic sensor that relies on the giant magnetoresistance (GMR) effect. Magneto-sensitive ink can be painted on any substrate—such as paper, polymers, ceramics, and glass. It retains a GMR ratio of up to 8% at ambient conditions. This value is beyond the state of the art. [TECHNICAL ARTICLE](#)

Tags: *Breakthrough technology, Sensors*

COUNTER WMD**An Anti-Chemical Weapon Paint**

MIT Technology Review, 24JUL2012

Researchers in the UK have developed a special kind of paint that can absorb dangerous chemicals. The paint’s topcoat contains silica gel, which can absorb nerve gas and

“For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled.” RICHARD FEYNMAN

prevent it from getting in, say, a tank. The undercoat of the paint is designed with the optimal amount of stickiness—enough of an adhesive to hold the topcoat in place, but weak enough that you can easily scrub away the topcoat should it become contaminated.

Tags: Counter WMD

ENERGY

[Innovation promises to cut massive power use at big data companies in a flash](#)

[Science Daily, 22JUL2012](#)

Researchers have developed a technique to allow flash memory to substitute RAM in many applications, allowing for savings in equipment costs and power consumption.

Tags: Energy, Information technology

[UCLA researchers create highly transparent solar cells for windows that generate electricity](#)

[e! Science News, 20JUL2012](#)

The UCLA team describes a new kind of polymer solar cell (PSC) that produces energy by absorbing mainly infrared light, not visible light, making the cells nearly 70% transparent to the human eye. They made the device from a photoactive plastic that converts infrared light into an electrical current.

Tags: Energy, Advanced materials

ENVIRONMENTAL SCIENCE

[Tiny ‘Firefly’ Satellite Set To Flash Straight Into Lightning and Thunderstorms](#)

[NSF News, 19JUL2012](#)

CubeSats, named for the roughly four-inch-cubed dimensions of their basic building elements, are stacked with modern, smartphone-like electronics and tiny scientific instruments. Firefly is designed to help solve the mystery of a phenomenon that’s linked with lightning: terrestrial gamma rays, or TGFs. The CubeSat will look specifically for gamma-ray flashes coming from the atmosphere, not space, conducting the first focused study of TGF activity.

Tags: Environmental science

[Why won’t the UK make the sun shine for the Olympics?](#)

[BBC News, 17JUL2012](#)

Cloud-seeding is used around the world to prevent fog at airports, stop hail damage in cities or to boost snowfall at ski resorts. The Chinese government seeded clouds ahead of the 2008 Olympics opening ceremony to create a downpour elsewhere and keep the stadium dry. This involved firing rockets packed with silver iodide crystals into rain clouds over the suburbs of Beijing.

Tags: Environmental science

GOVERNMENT S&T

[NASA successfully tests hypersonic inflatable heat shield](#)

[EurekAlert, 23JUL2012](#)

An inflation system pumped nitrogen into the IRVE-3 aeroshell until it expanded to a mushroom shape almost 10 feet in diameter. Then the aeroshell plummeted at hypersonic speeds through Earth’s atmosphere. Engineers in the Wallops control room watched as four onboard cameras confirmed the inflatable shield held its shape despite the force and high heat of reentry.

Tags: Government S&T, NASA

[The electric atmosphere: Plasma is next NASA science target](#)

[EurekAlert, 18JUL2012](#)

A new NASA mission called the Radiation Belt Storm Probes (RBSP), due to launch in August 2012, will improve our understanding of what makes plasma move in and out of Van Allen Radiation Belts wrapped around our planet. RBSP will also measure a wide range of energies from the coldest particles in the ionosphere to the most energetic, most dangerous particles. Information about how the radiation belts swell and shrink will help improve models of Earth’s magnetosphere as a whole.

Tags: Government S&T, NASA

INFORMATION TECHNOLOGY

[‘Rattle memory’, new computer memory thanks to nanotechnology](#)

[Nanowerk, 23JUL2012](#)

Using concentrated ion bundles researchers in the Netherlands have influenced the magnetic wires the bits move through, and they have successfully controlled bits at the nanometre scale and subsequently constructed a new memory. [TECHNICAL ARTICLE](#)

Tags: Information Technology

[Searching for 1,000 times the capacity of 4G wireless](#)

[EurekAlert, 20JUL2012](#)

Researchers at Polytechnic Institute of New York University have assembled a powerful consortium of government and business to advance beyond today’s fourth generation (4G) wireless technologies toward 5G cellular networks that could potentially increase cell phone capacity by more than 1,000 times.

Tags: Information Technology

continued...

New IBM Software Transforms the Digital Experience

R&D Magazine, 13JUL2012

The new software brings together the power of social networking, analytics and mobile computing to front office operations and externally to clients. As a result, organizations can gain faster insight on customer buying patterns and consumer sentiment allowing them to more quickly reach and engage their audiences.

Tags: Information Technology

CNNIC Sends World's First Email with "Internationalized Email Address"

Chinese Academy Of Sciences, 29JUN2012

Issue of the standard embodies the technical capability and influence power of China in the international Internet field. RFC6531 is the fourth IETF RFCs published by CNNIC following RFC3743, RFC4713, and RFC5336 in the field of domain name internationalization.

Tags: Information Technology, S&T China

designs, their uses lasers as waveguides, or conduits, to control the path of matter waves. One difference is that this new device works for a range of different beam "temperatures," which are characterized by the degree of transverse excitations in the beam. [TECHNICAL ARTICLE](#)

Tags: Materials science

Disorderly conduct

EurekAlert, 20JUL2012

Joint Quantum Institute (JQI) in New York examines the relationship between quantum coherence, an important aspect of certain materials kept at low temperature, and the imperfections in those materials. These findings should be useful in forging a better understanding of disorder, and in turn in developing better quantum-based devices, such as superconducting magnets.

Tags: Materials science, Quantum science

MEDICAL SCIENCES

Viruses' copying mechanism demystified, opening the door to new vaccine strategies

e! Science News, 20JUL2012

Certain kinds of viruses such as those that cause the common cold, SARS, hepatitis, and encephalitis, copy themselves using a unique mechanism, according to a team of Penn State scientists. The research is an important step toward the improvement of existing vaccines, as well as toward the design of vaccines against viruses that have eluded vaccination strategies in the past.

Tags: Medical Sciences, Biology

MICROELECTRONICS

A giant bid to etch tiny circuits

Nature News, 24JUL2012

On 9 July, Intel announced that it would invest €3.3 billion (US\$4.1 billion) in ASML in Veldhoven, the Netherlands, a leading supplier of lithography equipment to the semiconductor industry. One-quarter of the funding is earmarked for research and development of EUV equipment.

Tags: Microelectronics

Printed photonic crystal mirrors shrink on-chip lasers down to size

Nanowerk, 23JUL2012

Researchers in the US have devised a new laser for on-chip optical connections that could give computers a huge boost in speed and energy efficiency. They propose replacing layers and layers of reflectors necessary in the traditional distributed Bragg reflector laser design with two highly reflective photonic crystal mirrors. Composed of compound semiconductor quantum well materials, each mirror is held in place with silicon nanomembranes, extremely thin layers of a silicon. [TECHNICAL ARTICLE](#)

Tags: Microelectronics

FEATURED RESOURCE

Physics Spotlight (APS)

A selection of papers from the Physical Review journals. Three kinds of articles are featured: Viewpoints—commentaries written by active researchers; Focus stories—written by professional science writers; Synopses—brief editor-written summaries. [RSS](#)

MATERIALS SCIENCE

Optimizing a novel superconducting material

PhysOrg.com, 24JUL2012

Magnesium diboride (MgB₂), a recently discovered superconducting material with the highest known transition temperature (at which it becomes superconducting) has generated much enthusiasm. EU researchers initiated the Hipermag project to enhance the performance of MgB₂. Researchers successfully optimised the microstructure of precursor powders, demonstrating enhanced superconducting properties of carbon-doped nanosized precursors and wires.

Tags: Materials science, Advanced materials

Splitting Matter Waves with Light—Synopsis

American Physical Society, 22JUL2012

A new design for a matter-beam splitter developed by researchers in France uses crossed lasers to make a "fork in the road" for traveling matter waves. Like some previous

Data storage: Adopting changes

Science Daily, 22JUL2012

Phase-change semiconductors have the ability to switch back and forth between amorphous (non-crystalline solid) and crystalline phases upon heating. As such, they are used widely in data storage and computer memory applications. Researchers in Singapore have completed an in-depth analysis of GST (germanium, antimony and tellurium) and its ability to maintain stable ferromagnetism when doped with iron.

Tags: *Microelectronics, Semiconductors***Electrons get off the track—Scientists find new principle for spin transistor**

Nanowerk, 22JUL2012

Researchers in Germany have made a significant step in utilizing the electrons' spin for transistor action. If spin-based electronics prevails the new switching concept might turn out to be useful as it allows for switching the spin-polarization of an electric current on and off, tuning it continuously or reading it off electrically by simple resistance measurements. TECHNICAL ARTICLE

Tags: *Microelectronics*

NEUROSCIENCE

Study Offers New Clue on How Brain Processes Visual Information

Newswise, 23JUL2012

The process is known as selective attention and scientists have long debated how it works. But now, researchers at Wake Forest Baptist Medical Center have shown that the prefrontal cortex is involved in a previously unknown way.

Tags: *Neuroscience***Triangles Guide the Way for Live Neural Circuits in a Dish**

Science Newline, 22JUL2012

Korean scientists have used tiny stars, squares and triangles as a toolkit to create live neural circuits in a dish. They hope the shapes can be used to create a reproducible neural circuit model that could be used for learning and memory studies as well as drug screening applications. TECHNICAL ARTICLE

Tags: *Neuroscience, Biotechnology*

QUANTUM SCIENCE

UK research paves way to a scalable device for quantum information processing

e! Science News, 24JUL2012

Researchers at NPL, UK, have demonstrated for the first time a monolithic 3D ion microtrap array which could be scaled up to handle several tens of ion-based quantum bits. They show how it is possible to realise this device embedded in a semiconductor chip, and demonstrate the device's ability to confine individual ions at the nanoscale.

Tags: *Quantum science, S&T UK*

S&T POLICY

State Research and Development Expenditures Total \$1.2 Billion in FY 2009

NSF News, 19JUL2012

State agency expenditures for research and development totaled \$1.2 billion in FY 2009, a 7% increase over the FY 2007 total of \$1.1 billion, according to a new InfoBrief that reported data from the FY 2009 Survey of State Government R&D Expenditures. The InfoBrief details nationwide and state-by-state totals of R&D activities performed and funded by state government agencies. NSF Statistics Website

Tags: *S&T policy, R&D Funding*

SENSORS

Rapid diagnostic test for pathogens, contaminants

Science Daily, 22JUL2012

Researchers at Georgia Tech used nanotechnology to combine two well-known techniques and create their new diagnostic test—surface enhanced Raman spectroscopy (SERS) and thin layer chromatography (TLC). They arrayed silver nanorods at a precise angle to significantly amplify Raman signal. The silver nanorod surface allows them to use a miniscule amount of sample. The scientists were able to detect compounds such as lactic acid and albumin in highly diluted samples and in mixtures that included dyes and other chemicals. Their results suggest the same system could be used to detect pathogens and contaminants in biological mixtures.

Tags: *Sensors, Biosensing* ■

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