Volume 3, Issue 39 ■ 27SEP2013

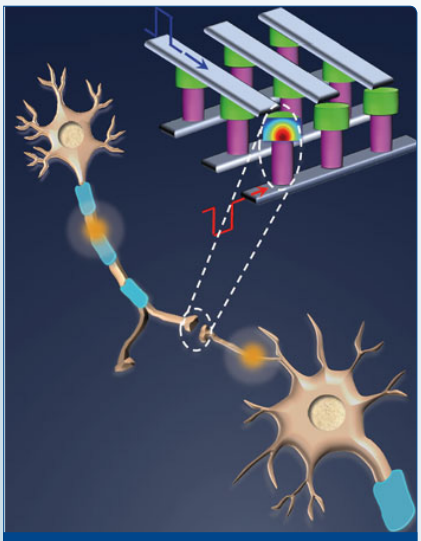
S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

Feature Articles

Synaptic electronics

Nanowerk Spotlight, 24SEP2013



Interconnection scheme of phase-change memory (PCM) synapses to reach ultrahigh density and compactness of brain is shown. In the crossbar array architecture, PCM synapses lie between postspike and prespike electrodes, inspired by biological synapses formed between presynaptic and postsynaptic neurons. The cross sections of depressed (mushroom shaped amorphous region shown in red) and potentiated synapses are shown in the schematic. (Image: Duygu Kuzum, Stanford University)

Synaptic electronics aims to build artificial synaptic devices to emulate the computation performed by biological synapses. Since the DARPA Synapse program in 2008 research activities in this field have been growing rapidly. Researchers at Stanford University have now published a comprehensive review in Nanotechnology that looks at the recent progress of synaptic electronics. In it, they focus on synaptic devices and summarize the important findings and applications published in recent years. TECHNICAL ARTICLE

Tags: Microelectronics, Featured Article

Creating electricity with caged atoms

Nanowerk, 22SEP2013

Researchers in Austria have produced a new and considerably more efficient class of thermoelectric materials for harvesting thermal energy. In countless tiny cages within the crystal, cerium atoms are enclosed. These trapped magnetic atoms are constantly rattling the bars of their cage, and this rattling seems to be responsible for the material's exceptionally favourable properties.

Tags: Advanced materials, Energy, Featured Article

Light Steered in New Directions: 2-D Material Could Lead to Shaped, Wavy, Curved, and Sharply Bending Ways to Steer Light

Science Daily, 16SEP2013

The new material developed by researchers at San Francisco State University could allow researchers to manipulate the flow and radiation of light in new ways by breaking away from the highly angular and constrained pathways for light dictated inside orderly photonic crystals. The "free-form" light guides within the materials could be especially useful in designing compact optical circuits for signal processing and telecommunications. TECHNICAL ARTICLE

Tags: Advanced materials, Communications Technology, Microelectronics, Featured Article

S&T News Articles

ADVANCED MANUFACTURING

Researchers Study Ways to Make Stronger Materials in 3-D

Science Daily, 17SEP2013

Aided by funding from NASA and using methods similar to 3-D printing, researchers at Missouri University of Science and Technology are running computer simulations of processes that could lead to stronger, more durable materials for the space agency. The process involves the use of high-powered lasers to melt small particles of powdered materials as they exit a nozzle to create three-dimensional shapes, layer by layer.

Tags: Advanced manufacturing, Government S&T

ADVANCED MATERIALS

Engineers develop a stretchable, foldable transparent electronic display (w/video)

Nanowerk, 23SEP2013

Researchers at UCLA have developed a transparent, elastic organic light-emitting device, or OLED which can be

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repeatedly stretched, folded and twisted at room temperature while still remaining lit and retaining its original shape. TECHNICAL ARTICLE

Tags: Advanced materials, Information technology

Magnetic Nanowires: Domain Walls as New Information Storage Medium

Science Daily, 23SEP2013

A team of researchers from the US and Germany have directly observed magnetization dynamics processes in magnetic nanowires and thus paved the way for further research in the field of nanomagnetism. Small magnetic domain wall structures in nanowires can be used to store information and, for example, can be used as angle sensors. Initial applications based on magnetic domain walls have been developed and are already in use in sensor technology. TECHNICAL ARTICLE

Tags: Advanced materials, Information technology

Densest array of carbon nanotubes grown to date

Nanowerk, 20SEP2013

Researchers in the UK have devised a simple technique to increase the density of nanotube forests grown on conductive supports about five times over previous methods. The high density nanotubes might one day replace some metal electronic components, leading to faster devices. TECHNICAL ARTICLE

Tags: Advanced materials, S&T UK

Promising new alloy for resistive switching memory

e! Science News, 20SEP2013

Researchers in Singapore have demonstrated how conductive nano-filaments in amorphous titanium dioxide thin films could be utilized for resistive switching device applications.

Tags: Advanced materials

Researchers make flexible, transparent e-paper from silicon

PhysOrg.com, 20SEP2013

Researchers in China have synthesized silicon nanowires and woven them into a paper that outperforms many other paper-like materials in terms of transparency and flexibility. TECHNICAL ARTICLE

Tags: Advanced materials, S&T China

Nanocrystal Catalyst Transforms Impure Hydrogen into Electricity

Science Daily, 18SEP2013

Scientists at the U.S. Department of Energy's Brookhaven National Laboratory have created a high-performing nanocatalyst, with a novel core-shell structure—ruthenium coated with platinum that resists damage from carbon monoxide as it drives the energetic reactions central to electric vehicle fuel cells and similar technologies. TECHNICAL ARTICLE

Tags: Advanced materials, Energy, Government S&T

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Robot Dragons, Drones and Beer, and Baxter Learning Magic

IEEE Spectrum, 20SEP2013

Hansen Robotics' R50 robot is "fully capable of thousands of expressions" thanks to ten motors and special Flubber skin.

Tags: Autonomous systems & robotics

Emotional Attachment to Robots Could Affect Outcome on Battlefield

Science Daily, 17SEP2013

A study at the University of Washington found that troops' relationships with robots continue to evolve as the technology changes. The scientists are now looking at how that human or animal-like look will affect soldiers' ability to make rational decisions, especially if a soldier begins to treat the robot with affection akin to a pet or partner.

Tags: Autonomous systems & robotics

BIG DATA

Bold idea for 'big data'

EurekAlert, 20SEP2013

Researchers at Rice University have created a customized, energy-efficient optical network that can feed rivers of data piling up in the labs of their fellow scientists around campus to Rice's supercomputers. The new network, called BOLD (Big data and Optical Lightpaths-Driven Networked Systems Research Infrastructure), will be a hybrid network that combines both electronic and optical switches and a type of optical switch without the moving parts.

Tags: Big data, Communications Technology

Facebook Launches Advanced AI Effort to Find Meaning in Your Posts

MIT Technology Review, 20SEP2013

A new research group within the company is working on an emerging and powerful approach to artificial intelligence known as deep learning, which uses simulated networks of brain cells to process data.

Tags: Big data

BIOTECHNOLOGY

Scientists Closer to Universal Flu Vaccine After Pandemic 'Natural Experiment'

Science Daily, 22SEP2013

The immune system produces CD8 T cells in response to usual seasonal flu. According to researchers in England, by making the body produce more of this specific type of CD8 T cell, you can protect people against symptomatic illness. This provides the blueprint for developing a universal flu vaccine. TECHNICAL ARTICLE

Tags: Biotechnology, Materials science, S&T UK

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"The best way to have a good idea is to have a lot of ideas."

LINUS PAULING

COMMUNICATIONS TECHNOLOGY

Inflatable antenna could send tiny satellites beyond Earth orbit

Physics World, 17SEP2013

A new type of inflatable antenna has been designed for CubeSats—the miniaturized spacecraft that have reduced the cost of putting scientific equipment into Earth orbit. The antenna was created by researchers in the US, who believe that their invention could lead to CubeSats being used for interplanetary missions.

Tags: Communications Technology, Space technology

ENERGY

Fusion, Anyone? Not Quite Yet, but Scientists Show Just How Close We've Come

Science Daily, 24SEP2013

A team of researchers led by Lawrence Livermore National Laboratory report that while there is at least one significant obstacle to overcome before achieving the highly stable, precisely directed implosion required for ignition, they have met many of the demanding challenges leading up to that goal since experiments began in 2010. TECHNICAL ARTICLE

Tags: Energy, Government S&T, Nuclear energy

Kitchen gadgets powered by microwave leaks

PhysOrg.com, 22SEP2013

Researchers in Japan showed that when a microwave oven is operated for 2 min, 9.98 mJ of energy was harvested which was sufficient to operate some low-power kitchen tools for a few minutes and wireless sensor nodes for 2.5 hours. TECHNICAL ARTICLE

Tags: Energy, S&T Japan

ENVIRONMENTAL SCIENCE

Global Warming Is Likely to Increase Severe Thunderstorm Conditions in U.S., Research Finds

Science Daily, 23SEP2013

Sparse historical data describing the atmospheric conditions that cause severe thunderstorms has limited scientists' ability to project the long-term effects of global warming on storm frequency. But, using a complex ensemble of physics-based climate models, researchers at Stanford University have produced the most comprehensive projections of severe storm conditions for the next century. TECHNICAL ARTICLE

Tags: Environmental science, Climatology

Human Activity Affects Vertical Structure of Atmospheric Temperature

Science Daily, 17SEP2013

Researchers from Lawrence Livermore National Laboratory found that the key features are global-scale tropospheric warming and stratospheric cooling over the 34-year satellite temperature record. Current climate models are highly unlikely to produce this distinctive signal pattern by internal variability alone, or in response to naturally forced changes in solar output and volcanic aerosol loadings. TECHNICAL ARTICLE

Tags: Environmental science, Climatology

FORECASTING

US Military Scientists Solve the Fundamental Problem of Viral Marketing

MIT Technology Review, 17SEP2013

Viral messages begin life by infecting a few individuals and then start to spread across a network. Researchers from the US Military Academy in West Point have found a way to identify a seed group that, when infected, can spread a message across an entire network. And they say it can be done quickly and easily, even on relatively large networks.

Tags: Forecasting, Government S&T

IMAGING TECHNOLOGY

Bioengineers Researching Smart Cameras and Sensors that Mimic, Exceed Human Capability

Newswise, 18SEP2013

UC, San Diego Visual Cortex on Silicon project, funded through NSF's Expeditions in Computing program, aims to create computers that not only record images but also understand visual content and situational context in the way humans do, at up to a thousand times the efficiency of current technologies.

Tags: Imaging technology, S&T Policy

INFORMATION TECHNOLOGY

Teaching computers to see—by learning to see like computers

PhysOrg.com, 19SEP2013

Researchers at MIT have created a system that, in effect, allows humans to see the world the way an object-recognition system does. The system takes an ordinary image, translates it into the mathematical representation used by an object-recognition system and then, using inventive new algorithms, translates it back into a conventional image. TECHNICAL ARTICLE

Tags: Information Technology, Artificial intelligence

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Scaling up personalized query results for next generation of search engines

EurekAlert, 18SEP2013

Researchers at North Carolina State University are identifying the context of search terms for individual users in real time and using that to determine a user's intention for a specific query at a specific time.

Tags: Information Technology

Featured Resource

Next Big Future

Coverage of science and technology having high potential for disruption, and analysis of plans, policies and technology to enable radical improvements.
RSS

MATERIALS SCIENCE

Optical Properties of a Novel Kind of Magnetism Probed

Science Daily, 23SEP2013

A team of researchers from MIT, Harvard and Boston College has shown detailed characteristics of a unique kind of magnetism found in herbertsmithite where the magnetic elements constantly fluctuate, leading to an exotic state of fluid magnetism called a "quantum spin liquid." This understanding could help solve some very complicated problems in high-temperature superconductivity, which might eventually lead to important applications.
TECHNICAL ARTICLE

Tags: Materials science

Scientists publish theory, formula to improve plastic semiconductors

Nanowerk, 23SEP2013

Researchers at Stanford have created the first theoretical framework that includes molecular-level structural inhomogeneity, seeking to understand, predict and improve the conductivity of semiconducting polymers.
TECHNICAL ARTICLE

Tags: Materials science, Semiconductors

Water-shedding surfaces can be made to last

MIT News, 20SEP2013

Making steam-condenser surfaces hydrophobic could improve the efficiency of condensation by causing the water to quickly form droplets. MIT researchers have developed a new approach to coating condenser surfaces. The new coating can be easily applied to conventional condenser materials—typically titanium, steel, copper or aluminum—in existing facilities, using iCVD.

Tags: Materials science

SLAC scientists create twisted light

SALC News, 18SEP2013

Until now, researchers created twisted light by shooting laser beams through masks or holographic gratings. But researchers from SLAC have shown they can create it with a beam of electrons, in much the same way SLAC's Linac Coherent Light Source (LCLS) X-ray laser uses electrons to generate pulses of X-ray laser light. It has the potential to generate twisted light in shorter pulses, higher intensities and a much wider range of wavelengths, including X-rays, than is currently possible. TECHNICAL ARTICLE

Tags: Materials science, DOE, Government S&T

NEUROSCIENCE

Is This My Finger? Sensory Illusion Study Provides New Insight for Body Representation Brain Disorders

Science Daily, 22SEP2013

A study by researchers in Australia gives new understanding as to how the brain decides what is part of our own body and where it is located. Contrary to previous theories which used multiple sensory inputs including touch and vision, these results demonstrate that messages coming from muscle receptors are enough to change the internal body representation. TECHNICAL ARTICLE

Tags: Neuroscience, S&T Australia

How and Where Imagination Occurs in Human Brains

Science Daily, 16SEP2013

Dartmouth researchers conclude in a new study, that a widespread neural network—the brain's "mental workspace"—consciously manipulates images, symbols, ideas and theories and gives humans the laser-like mental focus needed to solve complex problems and come up with new ideas. TECHNICAL ARTICLE

Tags: Neuroscience

PHOTONICS

Discovery of a new mechanism for wavelength conversion of light by a plastic material

PhysOrg.com, 18SEP2013

By adding various concentrations of a fluorescent molecule to the plastic base substrate, researchers in Japan found that new complexed states were formed between the base substrate and the fluorescent molecules at each concentration. In addition, they discovered a new wavelength conversion mechanism in which the initial emitted light is converted in three stages by these complexed states.
TECHNICAL ARTICLE

Tags: Photonics, S&T Japan

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QUANTUM SCIENCE

Crystal Quantum Memories for Quantum Communication

Science Daily, 18SEP2013

According to researchers in Switzerland, research into quantum entanglement—once described as 'spooky' by Albert Einstein—could revolutionise ICT over the coming years, enabling everything from ultra-fast computing to completely secure long-distance communications.

Tags: Quantum science, S&T Switzerland

S&T POLICY

NSF funds Harvard-led Science and Technology Center for Integrated Quantum Materials

NSF News, 20SEP2013

NSF recently awarded $20 million to fund a new Science and Technology Center, the Center for Integrated Quantum Materials. During the next five years, the multi-institution center will support science and education programs that explore the unique electronic behavior of quantum materials.

Tags: S&T policy, Quantum science

$50 million NSF grant to advance cyberinfrastructure for big data in life sciences

EurekAlert, 18SEP2013

The National Science Foundation has awarded $50 million to a multi-institution collaborative headquartered at the University of Arizona's BIO5 Institute to create a national cyberinfrastructure for the biological sciences.

Tags: S&T policy, Big Data

SENSORS

Nanoantennas let long light waves see in infrared

Nanowerk, 24SEP2013

Researchers at the University of Illinois at Urbana-Champaign have shown that nanostructures fabricated from highly doped semiconductors act as antennas that concentrate very long wavelength light into ultra-subwavelength volumes, and can be used to sense molecules with very weak absorption resonances. They further demonstrated their ability to control the position and strength of the antenna resonance by adjusting the nanoantenna dimensions and the semiconductor material properties.

TECHNICAL ARTICLE

Tags: Sensors

New Sensor Could Prolong the Lifespan of High-Temperature Engines

Science Daily, 18SEP2013

A temperature sensor developed by researchers in England could improve the efficiency, control and safety of high-temperature engines. The sensor minimises drift degradation of the sensor which results in faulty temperature readings and reduces the longevity of engine components.

TECHNICAL ARTICLE

Tags: Sensors, Materials science, S&T UK ■

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