Volume 4, Issue 21 ■ 23MAY2014

S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Video reveals entire organism's neurons at work

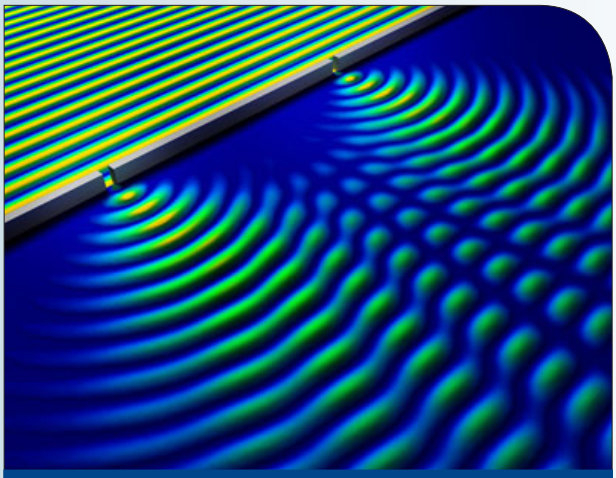
Nature News, 18MAY2014

For the first time an international team of researchers (Austria, USA) have imaged all of the neurons firing in a living organism, the nematode worm *Caenorhabditis elegans*. They show signals travel through the body in real time. TECHNICAL ARTICLE

Tags: Neuroscience, Featured Article

A glimpse into the quantum world

Nanowerk, 16MAY2014



Quantum weak measurements allow the interference patterns created when a light wave passes through a double slit to be resolved in detail. Image: 2014 RIKEN

Researchers in Japan have shown that it is possible to obtain a detailed view of the wave-like properties of a quantum system by averaging over many 'weak', nondestructive quantum measurements. TECHNICAL ARTICLE

Tags: Quantum science, S&T Japan, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Scientists use nanoparticles to control growth of materials

Nanowerk, 19MAY2014

The method developed by researchers at UCLA uses self-assembling nanoparticles that rapidly and effectively control the materials' building blocks as they form during the cooling or growth stage of the manufacturing process. The nanoparticles are made of thermodynamically stable materials and are added and dispersed using an ultrasonic dispersion method. TECHNICAL ARTICLE

Tags: Advanced manufacturing

ADVANCED MATERIALS

Professors' super waterproof surfaces cause water to bounce like a ball

Science Daily, 21MAY2014

Researchers at Brigham Young University report that surfaces with a pattern of microscopic ridges or posts, combined with a hydrophobic coating, produce an even higher level of water resistance—depending on how the water hits the surface. TECHNICAL ARTICLE

Tags: Advanced materials

Fast and curious: Electrons hurtle into the interior of a new class of quantum materials

Science Daily, 16MAY2014

Researchers at Princeton University have developed a new class of materials called "topological Dirac semimetals" in which the unique properties of the atoms combine to create quantum effects that coax electrons into acting similar to a light wave instead of like individual particles. These waves can weave around and dodge—and even move through—barriers that would typically stop most electrons. TECHNICAL ARTICLE 1, 2

Tags: Advanced materials

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Error at IBM Lab Finds New Family of Materials

New York Times, 15MAY2014

A laboratory error by researchers at IBM has led to the discovery of a new family of materials that are unusually strong and light, exhibit "self-healing" properties and can be easily reformed to make products recyclable. Their strength comes from their three-dimensional network of chemical bonds.

Tags: Advanced materials

Research and Development Forecast of Activated Carbon Market in China, 2014-2018

Report Linker, 15MAY2014

The report is an in-depth research of the market status of the activated carbon industry in China, supply and demand, export and import, and business performance of major domestic enterprises.

Tags: Advanced materials, S&T China

Advance brings 'hyperbolic metamaterials' closer to reality

Science Daily, 14MAY2014

Researchers at Purdue University have taken a step toward practical applications for 'hyperbolic metamaterials', ultra-thin crystalline films that could bring optical advances including powerful microscopes, quantum computers and high-performance solar cells. TECHNICAL ARTICLE

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

Tiny robots could conduct surveillance, search houses for soldiers

Defense Systems, 19MAY2014

A government, academia and industry program focuses on technological and scientific areas of interest that would be ultimately used to develop micro autonomous robotic systems. They would have to be able to quietly conduct several operational scenarios such as searching buildings, searching in caves or a demolished building, or conducting perimeter defense.

Tags: Autonomous systems & robotics, Military technology, Sensors

Video Friday: Fast Running Robot, Nao Debates an Ape, and Hall of Fame

IEEE Spectrum, 16MAY2014

Researchers in Brazil are developing a low-cost telepresence robot that will allow children undergoing cancer treatment to interact with parents, doctors, and other kids.

Tags: Autonomous systems & robotics

BIOTECHNOLOGY

Engineer invents a way to beam power to medical chips deep inside the body

Science Daily, 19MAY2014

The discovery by researchers at Stanford University is an engineering breakthrough that creates a new type of wireless power transfer—using roughly the same power as a cell phone—that can safely penetrate deep inside the body. The technology could provide a path toward a new type of medicine that allows physicians to treat diseases with electronics rather than drugs. TECHNICAL ARTICLE

Tags: Biotechnology

COMMUNICATIONS TECHNOLOGY

Enabling cutting edge future internet research

PhysOrg.com, 19MAY2014

The EU sponsored SMARTFIRE project aims to establish large-scale experimental facilities capable of accommodating cutting edge research on the future of the internet, and encourage international collaboration between the EU and South Korea.

Tags: Communications Technology, S&T EU

Networking the sky with new aircraft communication technology

PhysOrg.com, 14MAY2014

To meet the needs of air transportation communications, the European aviation project SANDRA (Seamless Aeronautical Networking through integration of Data links Radios and Antennas) set out to improve aircraft by means of a coherent digital architecture.

Tags: Communications Technology, S&T EU

CYBER SECURITY

Researchers crack unassailable encryption algorithm in two hours

PhysOrg.com, 20MAY2014

Researchers in Switzerland focused on a "family" of algorithms presented as candidates for the next generation of encryption keys, which made use of "supersingular curves." They proved that it would only take two hours for EPFL computers to solve a problem of this kind. Whereas it was believed that it would take 40,000 times the age of the universe for all computers on the planet to do it. TECHNICAL ARTICLE

Tags: Cyber security, S&T Switzerland

New algorithm shakes up cryptography

Science Daily, 15MAY2014

A new study by researchers in France discredits several cryptographic systems that until now were assumed

continued...

"We can judge our progress by the courage of our questions and the depth of our answers." CARL SAGAN

to provide sufficient security safeguards. Although this work is still theoretical, it is likely to have repercussions especially on the cryptographic applications of smart cards, RFID chips, etc. TECHNICAL ARTICLE

Tags: Cyber security, Mathematics, S&T France

ENERGY

Aircraft wings that change their shape in flight can help to protect the environment

PhysOrg.com, 20MAY2014

The EU project SARISTU aims to reduce kerosene consumption by six percent. Integrating flexible landing devices into aircraft wings is one step towards that target. More information

Tags: Energy, S&T EU

New lithium battery created

Science Daily, 20MAY2014

Researchers in Japan discovered that Li+ ions functioned like pure Li+ ion conductors, even though they were just doping the KI lattices. This is the reverse of the normal doping technique, in which a small amount of stabilizing element would be added to an ionic conductor abundant in Lithium. TECHNICAL ARTICLE

Tags: Energy, Battery, Materials science

Power Japan Plus announces dual carbon battery that charges 20 times faster than current lithium ion batteries

PhysOrg.com, 16MAY2014

The battery developed by a company in Japan is made of carbon instead of nickel, cobalt or manganese. Not only does that make it cheaper to make but it does away with the thermal change and hence does not need cooling systems. The carbon they use is an organic compound grown from cotton fibers. It has a lifespan of 3,000 charge/discharge cycles.

Tags: Energy, Battery, S&T Japan

Operation of longest superconducting cable worldwide started

PhysOrg.com, 14MAY2014

The cable of about 1 kilometer (0.62 miles) in length now connects two transformer stations in the city center of Essen in Germany. Compared to conventional cables, the highly efficient and space-saving superconducting cable technology transports five times more power with hardly any losses.

Tags: Energy, S&T Germany

Fiber-like Supercapacitors Could Be Woven Into Wearable Electronics

IEEE Spectrum, 13MAY2014

An international team of researchers (Singapore, China, USA) have released figures on the energy density of the novel supercapacitors by volume rather than by mass, 6.3 microwatt-hours per cubic millimeter. They demonstrated that their hybrid fiber could store energy along its entire length, providing huge amounts of accessible surface area—396 square meters per gram of hybrid fiber. TECHNICAL ARTICLE

Tags: Energy, Flexible electronics

INFORMATION TECHNOLOGY

Universal Memcomputing Machines

arXiv, 05MAY2014

Researchers at UC San Diego introduce the notion of universal memcomputing machines (UMMs): a class of brain-inspired general-purpose computing machines based on systems with memory whereby processing and storing of information occur on the same physical location. They analytically prove that the memory properties of UMMs endow them with universal computing power.

Tags: Information Technology

MICROELECTRONICS

Cutting Losses for Surface Light

American Physical Society Spotlight, 16MAY2014

Light propagating in concert with electrons along a metal surface may one day be used to turn microchips into optical processors. Researchers in France report that the loss of energy suffered by such metal-skimming light waves can be reduced if the waves are produced at a nanoscale slit in the metal film that carries the waves. TECHNICAL ARTICLE

Tags: Microelectronics, Communications Technology, S&T France

Nanowire bridging transistors open way to next-generation electronics

Science Daily, 14MAY2014

Combining atoms of semiconductor materials into nanowires and structures on top of silicon surfaces shows promise for a new generation of fast, robust electronic and photonic devices. Researchers at UC Davis have recently demonstrated three-dimensional nanowire transistors using this approach that open exciting opportunities for integrating other semiconductors, such as gallium nitride, on silicon substrates. TECHNICAL ARTICLE

Tags: Microelectronics

continued...

NEUROSCIENCE

Laser mimics biological neurons using light

Physics World, 19MAY2014

Researchers in France have shown that "micropillar" laser can be made to fire only when its input shifts by some minimum amount, just like a neuron. Successive firings of the device must also be well separated in time, which is also a crucial feature of biological neurons. TECHNICAL ARTICLE

Tags: Neuroscience, Photonics, S&T France

Studying behavior using light to control neurons

Science Daily, 15MAY2014

Researchers in Japan describe how they used optogenetics to target specific areas within the brain to control the timing of activating or inactivating neurons. Using this technique they studied the influence of an area of the brain called the nucleus accumbens and its role in behavioral flexibility, or the ability to change strategies during a task. TECHNICAL ARTICLE

Tags: Neuroscience, S&T Japan

Featured Resource

Report Linker

Provides access to the largest online collection of industry, company and country reports available. It provides full access to more than 1 million reports, published by 200,000 reliable public sources.

PHOTONICS

Physics World Focus On Optics & Lasers

Physics World, 15MAY2014

This special focus issue of Physics World explores some of the latest research in optics and lasers. It includes a report from the UK research centre that is driving a new approach to quantum computing based on integrating photonic circuits, and explores other photonic research.

Tags: Photonics

QUANTUM SCIENCE

The Future of Quantum Computing Could Depend on This Tricky Qubit

Wired, 20MAY2014

Scientists have already built qubits, but if IBM researcher's topological version—which would store information in the braided paths of particles—is realized, it has the potential to be much more stable than existing prototypes. Experts say it could become the most promising foundation on which to build a full-scale quantum computer.

Tags: Quantum science

Tricking the uncertainty principle: New measurement technique goes beyond the limits imposed by quantum physics

Science Daily, 16MAY2014

Quantum physics and the Heisenberg uncertainty principle place fundamental limits on our ability to measure. Noise that arises as a result of the quantum nature of the fields used to make those measurements imposes the "standard quantum limit." But a recent study by researchers at the California Institute of Technology provides a solution for rerouting some of that noise away from the measurement. TECHNICAL ARTICLE

Tags: Quantum science

User Friendly Photon Pairs - Viewpoint

American Physical Society Spotlight, 07MAY2014

Push a button on a small battery-powered device and out come your entangled photon pairs. A dream? Researchers in France have just brought this dream much closer to reality. While they have not demonstrated entanglement yet, the data suggest research is moving in the right direction. TECHNICAL ARTICLE

Tags: Quantum science, S&T France

S&T POLICY

China has built a prototype for a train that's 3 times faster than a plane

Science Alert (Australia), 20MAY2014

Researchers in China have already built a prototype testing platform for the near-vacuum maglev train. Scientists believe maglev trains can reach 2,900 km/h.

Tags: S&T policy, S&T China

SCIENCE WITHOUT BORDERS

Scientists discover how to turn light into matter after 80-year quest

Science Daily, 18MAY2014

Researchers in England have shown how Breit and Wheeler's theory could be proven in practice. The 'photon-photon collider' would convert light directly into matter using technology that is already available. This experiment would recreate a process that was important in the first 100 seconds of the universe and that is also seen in gamma ray bursts. TECHNICAL ARTICLE

Tags: Science without borders, S&T UK

SENSORS

Hybrid graphene biosensor breaks new record

Nanotechweb, 19MAY2014

Researchers at the University of Pennsylvania and SPAWAR Systems in San Diego have developed a new method to fabricate large arrays of graphene field effect transistors that does not sacrifice the inherent electronic properties of the carbon material. They functionalized the transistors with mu receptors to make hybrid biosensor devices that can detect naltrexone at levels of 10 pg/mL. TECHNICAL ARTICLE

Tags: Sensors, Advanced materials, Government S&T

New 'T-ray' tech converts light to sound for weapons detection, medical imaging

PhysOrg.com, 19MAY2014

Researchers at the University of Michigan demonstrated a unique terahertz detector and imaging system that could bridge the "terahertz gap" by converting the T-ray light into sound. The device that essentially listens for light waves could help open up the last frontier of the electromagnetic spectrum—the terahertz range. TECHNICAL ARTICLE

Tags: Sensors, Terahertz technology

Toronto team's robotic arm control is all in the mind

PhysOrg.com, 17MAY2014

The headset controlling a robotic arm developed by researchers in Canada is smart enough to move the arm using simple movements such as a clenched jaw or wink of the eye.The headset uses a set of 14 sensors and two references to tune into electric signals produced by the brain to detect a user's thoughts, feelings and expressions in real time.

Tags: Sensors, S&T Canada ■

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