Volume 5, Issue 12 ■ 20MAR2015

S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

This chameleon-like artificial "skin" changes color as a tiny amount of force is applied

(credit: The Optical Society/OSA)

Chameleon-like artificial 'skin' shifts color on demand

KurzweilAI, 13MAR2015

Researchers at UC Berkeley etched tiny features—smaller than a wavelength of light—onto a nanoscale silicon film which allows them to select the range of colors the material would reflect, depending on how it was flexed and bent. This new material offers intriguing possibilities for a new class of display technologies, color-shifting camouflage, and sensors. TECHNICAL ARTICLE

Tags: Advanced materials, Featured Article

Japan space scientists make wireless energy breakthrough

PhysOrg.com, 12MAR2015

Researchers in Japan used microwaves to deliver 1.8 kilowatts of power—enough to run an electric kettle—through the air with pinpoint accuracy to a receiver 170 feet away. While the distance was not huge, the technology could pave the way to eventually tap the vast amount of solar energy available in space and use it here on Earth.

Tags: Energy, S&T Japan, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

High-Speed 3-D Printing

MIT Technology Review, 16MAR2015

The new process, developed by a company in California, makes objects continuously rather than in discrete layers, making it much faster. They developed a way to make the process continuous and ensure that there are no interfaces between layers. The key is to modify the liquid so that it doesn't immediately solidify when exposed to light. They achieved this by introducing a thin layer of oxygen that temporarily blocks the reactions that produce a solid. TECHNICAL ARTICLE

Tags: Advanced manufacturing

ADVANCED MATERIALS

Graphene 'gateway' discovery opens possibilities for improved energy technologies

Science Daily, 17MAR2015

Researchers at the US Department of Energy's Oak Ridge National Laboratory show that even though there is a high energetic barrier for proton transport through graphene—if you lower that energetic barrier, you can allow protons to pass right through. This opens a new pathway for the atomic-scale engineering of graphene. TECHNICAL ARTICLE

Tags: Advanced materials, Government S&T

NRL Researchers Pattern Magnetic Graphene

NRL News, 16MAR2015

Researchers at NRL have shown that adding hydrogen to graphene on a silicon wafer makes the surface ferromagnetic. The magnetic strength could be tuned by removing hydrogen atoms with an electron beam. TECHNICAL ARTICLE

Tags: Advanced materials, Government S&T

continued...

BACK TO TOP

Symmetry matters in graphene growth

Science Daily, 16MAR2015

Researchers at Rice University discovered that the crystalline arrangement of atoms in substrates such as nickel or copper controls how islands form. They found that individual atoms follow the road map set out by the substrate. TECHNICAL ARTICLE

Tags: Advanced materials

Integrating nanoarchitectures for highly efficient electrocatalysts

Nanotechweb, 13MAR2015

Researchers in China designed and constructed functional nanoarchitectures to contribute to the development of smart electrocatalyst materials that improve energy conversion efficiency, accelerate electrocatalysis and maintain its stability simultaneously. TECHNICAL ARTICLE

Tags: Advanced materials, S&T China

Single layer graphene electrodes

Nanotechweb, 13MAR2015

An international team of researchers (China, USA) has fabricated quantum dot-light emitting diodes (QD-LEDs) employing single layer graphene as an electrode. They have better current efficiency and power efficiency than similar ITO-based devices working at a low current density. The result indicates that graphene can be used as anodes to replace indium tin oxide (ITO) in QD-LEDs. TECHNICAL ARTICLE

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

Robot capable of sorting through and folding piles of rumpled clothes

PhysOrg.com, 19MAR2015

Under an EU-funded project, CLOPEMA, researchers have developed a robot that has been shown to be capable of organising 'deformed' fabrics (i.e. sorting through a pile of crumpled clothes), and then folding each item neatly. What makes this process so complex is that clothes do not retain their shape. A new way of receiving and processing information was developed to meet the novel challenges.

Tags: Autonomous systems & robotics, S&T EU

Video Friday: Robots Push It to the Limit, Designing a Drone, and Zoomer Kitty

IEEE Spectrum, 13MAR2015

The MIT DARPA Robotic Challenge Team is trying to teach its ATLAS robot how to drive the Polaris utility vehicle (one of the tasks for the DRC Finals).

Tags: Autonomous systems & robotics

BIG DATA

Pagerank Algorithm Reveals World's All-Time Top Soccer Team

MIT News, 13MAR2015

Since Google developed the algorithm in the mid-1990s, researchers have been using it to rank nodes in other networks. They are widely used for ranking scientific papers using the network of links in the references and for elections in which everyone is a candidate and can vote for anybody else. Researchers in the Republic of Macedonia show Pagerank's utility in being able to rank the nodes in more or less any type of network. TECHNICAL ARTICLE

Tags: Big data

COMMUNICATIONS TECHNOLOGY

DARPA moves ahead on long-range 100 Gbps wireless links

Defense Systems, 16MAR2015

DARPA has issued a Broad Agency Announcement for Phases 2 and 3 of the 100G project. The goal is to hit 100 Gbps across 100 kilometers (62 miles) for an air-to-ground link and 200 kilometers (124 miles) for an air-to-air link, each within a single radio-frequency channel. BAA

Tags: Communications Technology, DARPA

Nanotechnology may double radio frequency data capacity

Nanowerk, 13MAR2015

Researchers at Columbia University invented a technology that enables full-duplex radio integrated circuits to be implemented in nanoscale CMOS to enable simultaneous transmission and reception at the same frequency in a wireless radio. By leveraging the new technology, networks can effectively double the frequency spectrum resources available for devices like smartphones and tablets.

Tags: Communications Technology

COUNTER WMD

Material cripples deadly nerve agent in minutes

Futurity, 16MAR2015

A team of researchers in the US (Northwestern University, University of Minnesota, ECBC) reports that a carefully chosen metal–organic framework material, featuring high porosity and exceptional chemical stability, is extraordinarily effective for the degradation of nerve agents and their simulants. Computer simulations show the MOF should also be effective against other easy-to-make agents, such as VX. TECHNICAL ARTICLE

Tags: Counter WMD, Government S&T

continued...

"There is no harm in doubt and skepticism, for it is through these that new discoveries are made."

RICHARD FEYNMAN

CYBER SECURITY

A cyber war is being staged in central London

Wired (UK), 13MAR2015

The competition known as the Masterclass was developed by a group of cyber experts led by BT. The competition essentially invites participants to put their skills to the test and experience a dramatised version of events faced by regular cybercrime fighting professionals.

Tags: Cyber security, S&T UK

MIT launches three new cybersecurity initiatives

MIT News, 13MAR2015

The MIT Cybersecurity Policy Initiative will pool the expertise of researchers at CSAIL, MIT Sloan, the MIT departments of political science and economics, and the Science, Technology, and Society program to better characterize the security dynamics of large networked systems, with the aim of guiding policymakers.

Tags: Cyber security

ENERGY

Half-millimeter-thick battery could be worn in a wrinkle-smoothing patch

PhysOrg.com, 16MAR2015

In the new battery designed by researchers in South Korea, 2-mm-wide electrodes are placed about 400 μm apart from each other on the same plane. They introduce interelectrode barriers along with a curvy electrode structure to avoid short-circuit. The batteries may be integrated into watch straps where they can serve as supplementary power sources to recharge personal electronic devices such as phones. TECHNICAL ARTICLE

Tags: Energy, Battery, Flexible electronics

Chinese Scientists Have Built the First Self-Propelled Liquid Metal Robot

Technology Org, 15MAR2015

The soft machine built by researchers in China can deform itself according to the space it traverses. The motor is made from galinstan—an alloy made from gallium, indium and tin (68.5%, 21.5% and 10% respectively) that has a melting point of -19 degrees Celsius, meaning it stays liquid at room temperature. The alloy utilizes aluminum as fuel and moves around on its own. TECHNICAL ARTICLE

Tags: Energy, S&T China

Fusion researchers make breakthrough: Control intense heat bursts in fusion experiments

Science Daily, 13MAR2015

A team of researchers in the US (General Atomics, DOE's Princeton Plasma Physics Laboratory) found that tiny magnetic fields applied to the device can create two distinct kinds of response, rather than just one response as previously thought. The new response produces a ripple in the magnetic field near the plasma edge, allowing more heat to leak out at just the right rate to avert the intense heat bursts. TECHNICAL ARTICLE 1, 2

Tags: Energy

Electrospray thruster makes small satellites more capable

MIT News, 11MAR2015

A company in the US has developed a commercial electrospray propulsion system made of tiny chips that provide thrust for small satellites. This technology could enable CubeSats to become more viable for various commercial and research applications, including advanced imaging and communications, where numerous satellites could provide global coverage. The module can be manufactured for significantly lower cost than today's alternatives.

Tags: Energy, Satellite technology

IMAGING TECHNOLOGY

High-end imaging: New blending techniques

Science Daily, 13MAR2015

Researchers at Vanderbilt University have achieved the first "image fusion" of mass spectrometry and microscopy. Using regression analysis, the researchers mapped each pixel of mass spectrometry data onto the corresponding spot on the microscopy image to produce a new, "predicted" image. Among other things, the technique dramatically improves diagnosis and treatment of cancer. TECHNICAL ARTICLE

Tags: Imaging technology

continued...

Newly developed system that can identify fingerprints noninvasively, without physical contact

Science Daily, 12MAR2015

Researchers in Japan have created a "Forensic Hyperspectral Imager" device based on hyperspectral imaging techniques. The device can differentiate layered fingerprints into individual prints and detect untreated latent fingerprints from surfaces such as walls and magnetic sides of railway tickets.

Tags: Imaging technology, S&T Japan

Featured Resource

Physics News

Completely automated algorithms evaluate several news parameters like the number of news sources a story appeared in, date of publication, etc. and automatically match news stories to appropriate categories based on news content. RSS

INFORMATION TECHNOLOGY

Nano piano's lullaby could mean storage breakthrough

Nanowerk, 13MAR2015

Researchers from the University of Illinois at Urbana-Champaign exploited the photographic film property exhibited by an array of novel gold, pillar-supported bowtie nanoantennas (pBNAs) to store sound and audio files. Compared with the conventional magnetic film for analog data storage, the storage capacity of pBNAs is around 5,600 times larger, indicating a vast array of potential storage uses. TECHNICAL ARTICLE

Tags: Information Technology

MATERIALS SCIENCE

Uncovering the secrets of super solar power perovskites

Science Daily, 16MAR2015

A team of researchers from the US (University of Utah, UT Dallas) has developed a technique to rapidly test the performance of different prototypes of hybrid perovskite materials using magnetic fields. They measured magnetic field-induced changes in an assortment of fabricated hybrid perovskite solar cells having different solar power conversion efficiencies. A more detailed understanding of the underlying physics should help researchers to fully optimize hybrid perovskite solar cells. TECHNICAL ARTICLE

Tags: Materials science, Energy

Viewpoint: Superconductivity with a Twist

American Physical Society Spotlight, 16MAR2015

Researchers in China report the discovery of the first superconductor based on manganese, an element whose magnetism was thought to be too strong to allow superconductivity. They found that by suppressing magnetism with a large applied pressure, manganese phosphide can become superconducting at a critical temperature of 1K. TECHNICAL ARTICLE

Tags: Materials science, S&T China

Study proposes new way to measure superconducting fluctuations

PhysOrg.com, 13MAR2015

Researchers at DOE's Argonne National Laboratory proposed an effect that mirrors resonant tunneling above Tc that is strong enough to measure and gets sharper as the temperature approaches Tc. If verified by experiment, this would be a new high-precision tool for measuring fundamental properties of superconducting fluctuations, such as their lifetime, and provide a way to measure more precisely where Tc lies for each material. TECHNICAL ARTICLE

Tags: Materials science, Government S&T

'Nano-earthquakes' hold key to smarter electronics

Science Daily, 10MAR2015

Researchers in Australia found that as the intensity of surface acoustic waves or "nano-earthquakes" changed, electronic properties of the 2D materials follow the same pattern. The waves under the surface of the 2D materials drag electrons along their path, thereby tuning the amount of light emitted by the material. As soon as the acoustic waves were removed, the material retracted back to its initial optical state. TECHNICAL ARTICLE

Tags: Materials science, S&T Australia

MICROELECTRONICS

Silicon photonics takes the next step toward a high-bandwidth future

Nanowerk, 13MAR2015

Researchers at IBM have established a method to integrate silicon photonic chips with the processor in the same package, avoiding the need for transceiver assemblies. The method is scalable and enables the simultaneous interfacing of many optical connections between a silicon photonic chip and the system. The coupling is wavelength and polarization insensitive and tolerant to alignment offsets of a few micrometers.

Tags: Microelectronics

continued...

NEUROSCIENCE

A Brain-Computer Interface That Lasts for Weeks

IEEE Spectrum, 16MAR2015

Researchers at the University of Illinois at Urbana-Champaign have developed a wearable device that can help record EEGs uninterrupted for more than 14 days. The device consists of a soft, foldable collection of gold electrodes only 300 nanometers thick and 30 micrometers wide mounted on a soft plastic film. The scientists hope to improve the speed at which people can use this device to communicate mentally. TECHNICAL ARTICLE

Tags: Neuroscience

QUANTUM SCIENCE

Data structures influence speed of quantum search in unexpected ways

PhysOrg.com, 17MAR2015

Using the quantum property of superposition, quantum computers will be able to find target items within large piles of data far faster than conventional computers ever could. Researchers at UC San Diego show that the speed of the search will likely depend on the structure of the data.

Tags: Quantum science

Nanospheres cooled with light to explore the limits of quantum physics

Science Daily, 17MAR2015

Researchers in the UK developed a new technology which could one day create quantum phenomena in objects far larger than any achieved so far. The team successfully suspended glass particles 400 nanometres across in a vacuum using an electric field, then used lasers to cool them to within a few degrees of absolute zero. These are the key prerequisites for making an object behave according to quantum principles.

Tags: Quantum science, S&T UK

How does order emerge?

PhysOrg.com, 13MAR2015

A team of international researchers (Germany, Spain) analyzed how fast order can appear in a quantum-mechanical system. By using ultracold atoms in optical lattices they succeeded in measuring the emergence of order in a clean and well controlled experiment. The present experiment can be viewed as a Quantum Simulator which will help to fundamentally advance our knowledge about such systems. TECHNICAL ARTICLE

Tags: Quantum science

Microwave Quantum Illumination

arXiv, 28FEB2015

An international team of researchers (Germany, USA, Canada, Italy, UK) describes and analyzes a system for applying quantum illumination technique at microwave frequencies, a more appropriate spectral region for target detection than the optical, due to the naturally-occurring bright thermal background in the microwave regime. The error probability of this microwave quantum-illumination system, or quantum radar, is shown to be superior to that of any classical microwave radar of equal transmitted energy. TECHNICAL ARTICLE

Tags: Quantum science, Sensors

About This Publication

To **SUBSCRIBE** or **UNSUBSCRIBE**, visit https://tin-ly.sainc.com/ASDRE. To provide feedback or ask questions, contact us at asdre-st-bulletin-reply@sainc.com. This publication is authored and distributed by:

Kristopher Gardner
Director, Office of Technical Intelligence (OTI)

Ms. Hema Viswanath
OTI Corporate Librarian