Volume 5, Issue 27 ■ 3JULY2015

S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

More transparency needed in science research, experts say

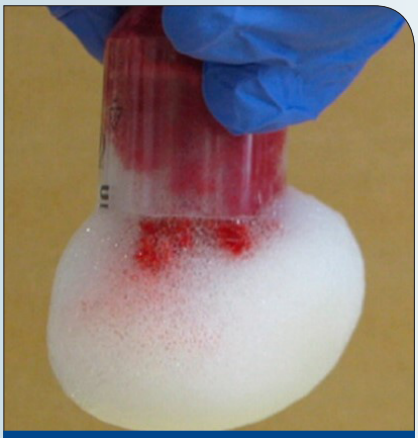
Science Daily, 25JUN2015

While transparency, openness and reproducibility are readily recognized as vital features of science and embraced by scientists as a norm and value in their work, a growing body of evidence suggests that those qualities are not necessarily evident today. A likely culprit for this disconnect is an academic reward system that insufficiently incentivizes open practices. "Transparency and Openness Promotion Guidelines" TECHNICAL ARTICLE

Tags: Science without borders, Featured article

Sprayable foam that slows bleeding could save lives

PhysOrg.com, 25JUN2015



A sprayable foam could help first responders stop bleeding from major injuries at an accident site or combat zone. Credit: American Chemical Society

A team of researchers in the US (University of Maryland, Massachusetts General Hospital) developed a sprayable foam made of modified chitosan, a biopolymer derived from the shells of shrimp and other crustaceans that is already being used in other types of non-foam wound dressings. In tests on pigs, the spray reduced blood loss by 90 percent. TECHNICAL ARTICLE

Tags: Biotechnology, Medical sciences, Featured article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Project to 3-D print houses begun

Science Daily, 26JUN2015

Researchers in Sweden are developing a technology to make full-scale 3D prints of cellulose based material. It is not a matter of small prints—the objective is to make houses.

Tags: Advanced manufacturing, S&T Sweden

ADVANCED MATERIALS

Making new materials with micro-explosions

Science Daily, 29JUN2015

By focusing lasers onto silicon buried under a clear layer of silicon dioxide, an international team of researchers (Australia, UK) has perfected a way to reliably blast tiny cavities in the solid silicon. This creates extremely high pressure around the explosion site and forms the new phases. Theory predicts these materials could have very interesting electronic properties, such as an altered band gap, and possibly superconductivity if properly doped. TECHNICAL ARTICLE

Tags: Advanced materials

This new roof material stays colder than the air around it - even in summer

Science Alert, 26JUN2015

The roofing material developed by researchers in Australia is made from stacked polymers on top of a thin silver film, and only absorbs an incredible 3 percent of sunlight. Impressively, it also radiates heat out at specific infrared wavelengths that aren't absorbed by the atmosphere - allowing it to beam the heat directly into space. TECHNICAL ARTICLE

Tags: Advanced materials, S&T Australia

Researchers stretch a thin crystal to get better solar cells

Science Daily, 25JUN2015

A team of researchers in the US (Stanford University, Texas A&M University, College Station, MIT, Rice

continued...

BACK TO TOP

University) has made a semiconductor crystal with a variable band gap. Among other potential uses, this variable semiconductor could lead to solar cells that absorb more energy from the sun by being sensitive to a broader spectrum of light. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science

Robust new process forms 3-D shapes from flat sheets of graphene

PhysOrg.com, 23JUN2015

Researchers from the University of Illinois at Urbana-Champaign demonstrate graphene integration to a variety of different microstructured geometries, including pyramids, pillars, domes, inverted pyramids, and 3D integration of gold nanoparticles/graphene hybrid structures. The flexibility and 3D nature of the structures will enable enhanced sensitivity by maximizing the effective contact area between the sensors and non-flat surfaces. TECHNICAL ARTICLE

Tags: Advanced materials

Building a better semiconductor

Science Daily, 17JUN2015

A team of researchers in the US (Michigan State University, Northwestern University, Argonne National Laboratory) found that ultrafast laser pulses shot into the material act like dopants that temporarily weaken the glue that binds charges and ions together in the materials and allow new electronic phases to spontaneously form. TECHNICAL ARTICLE

Tags: Advanced materials

Computer simulations have predicted a new phase of matter: atomically thin two-dimensional liquid.

Science Daily, 01MAY2015

Researches in Finland have conducted computer simulations that predict a liquid phase in atomically thin golden islands that patch small pores of graphene. According to the simulations, gold atoms flow and change places in the plane, while the surrounding graphene template retains the planarity of liquid membrane. TECHNICAL ARTICLE

Tags: Advanced materials, S&T Finland

AUTONOMOUS SYSTEMS & ROBOTICS

Researchers train computer to create games by watching YouTube

PhysOrg.com, 26JUN2015

A computing system developed by researchers at the Georgia Institute of Technology focuses on the gaming terrain (not the playable character) and the positioning between elements on-screen—be it pipes, blocks, coins or Goombas—and it determines the required relationship or level design rule. The system creates a template, and it is able to produce level sections that have never been seen before, do not appear random and can be traversed by the player.

Tags: Autonomous systems & robotics, Artificial intelligence

Video Friday: iCub Is Evolving, Mind-Controlled Robot, and ROS for Drones

IEEE Spectrum, 26JUN2015

Researchers in Switzerland explain how people with disabilities can control telepresence robots or a wheelchair using only mental commands.

Tags: Autonomous systems & robotics

BIG DATA

Podcast: Explaining the art behind data

MIT News, 26JUN2015

Data are rarely simple or pure and we have access to more data now than any time in history. So how can we make sense of this never-ending wave? In a new Slice of MIT podcast, MIT researchers discuss how their work and research are tackling these questions in innovative ways. Podcast - Slice of MIT, Transcript

Tags: Big data

BIOTECHNOLOGY

Fuel-free nanomotor is powered by ultrasound and magnetic fields

PhysOrg.com, 26JUN2015

Researchers at UC San Diego have demonstrated a nanomotor that can run on both magnetic and acoustic fields, making it the first magneto-acoustic hybrid fuel-free nanomotor. As magnetic and acoustic fields are biocompatible and commonly used in medicine, the fuel-free nanomotors could be especially useful for biomedical applications. TECHNICAL ARTICLE

Tags: Biotechnology

COMMUNICATIONS TECHNOLOGY

Opening a new route to photonics

Science Daily, 27JUN2015

A team of researchers in the US (UC Berkeley, Lawrence Berkeley National Laboratory) has experimentally demonstrated an adiabatic elimination scheme that effectively cuts off the cross-talk between nanowaveguides, enabling on-demand dynamical control of the coupling between two closely packed waveguides. Their approach offers an attractive route for the control of optical information in integrated nanophotonics, and provides a new way to design densely packed, power-efficient nanoscale photonic components. TECHNICAL ARTICLE

Tags: Communications technology

continued...

"The whole history of physics proves that a new discovery is quite likely lurking at the next the decimal place." F.K. RICHTMEYER

3D plasmonic antenna capable of focusing light into few nanometers

Nanowerk, 25JUN2015

Adopting the proximal focused-ion-beam milling technology, researchers in South Korea developed a three dimensional 4 nanometer wide gap-plasmon antenna. By squeezing the photons into a three dimensional nano space they were able to increase the intensity of light 400,000 times stronger than that of the incident light. Capitalizing on this, they intensified the second-harmonic signal. This technology is expected to improve the speed of data transfer and processing up to the level of terahertz, and to enlarge the storage volume per unit area on hard disks by 100 times. TECHNICAL ARTICLE

Tags: Communications technology

Frequency combs smooth out optical-fibre signals

Physics World, 25JUN2015

Researchers at UC San Diego have demonstrated a new technique to reduce the effect of noise in fibre-optic cables, by adapting signals to compensate for it in advance. They have increased the maximum power and the distance at which optical signals can be sent through the fibres. The technique could potentially be implemented in existing optical fibres that carry information all over the globe. TECHNICAL ARTICLE

Tags: Communications technology

CYBER SECURITY

Automatic computer bug repair

Science Daily, 29JUN2015

Researchers at MIT have developed a new system called CodePhage that repairs dangerous software bugs by automatically importing functionality from other, more secure applications. It doesn't require access to the source code of the applications whose functionality it is borrowing. Instead, it analyzes the applications' execution and characterizes the types of security checks they perform. As a consequence, it can import checks from applications written in programming languages other than the one in which the program it is repairing was written.

Tags: Cyber security

Ultrasonic fingerprint sensor may take smartphone security to new level

Science Daily, 29JUN2015

A team of researchers in the US (UC Davis, UC Berkeley, industry partner) has designed an ultrasonic fingerprint sensor which measures 3-D image of your finger's surface and the tissue beneath it. The chip is fabricated from two wafers—a MEMS wafer that contains the ultrasound transducers and a CMOS wafer that contains the signal processing circuitry. TECHNICAL ARTICLE

Tags: Cyber security

ENERGY

New nanogenerator harvests power from rolling tires

Science Daily, 29JUN2015

The nanogenerator developed by an international team of researchers (USA, China) relies on the triboelectric effect to harness energy from the changing electric potential between the pavement and a vehicle's wheels. The nanogenerator relies on an electrode integrated into a segment of the tire. The friction between the tire and the ground consumes about 10 percent of a vehicle's fuel. If it can be converted to energy it is an improvement in fuel efficiency. TECHNICAL ARTICLE

Tags: Energy

Scientists propose an enhanced new model of the source of a mysterious barrier to fusion known as the 'density limit'

PhysOrg.com, 29JUN2015

At issue is a problem known as the "density limit" that keeps tokamaks from operating at peak efficiency. This limit occurs when the superhot, charged plasma gas that fuels fusion reactions reaches a certain density and spirals apart in a flash of light, shutting down the reaction. Researchers at the DOE have developed a detailed model density limit and confirm previous PPPL research and could lead to steps to overcome the barrier if the model proves consistent with experimental data.

Tags: Energy, Government S&T, Nuclear energy

Design to improve material properties of sodium-ion batteries

PhysOrg.com, 25JUN2015

An international team of researchers (China, Australia) proposed a way to improve the properties of a class of electrode materials to be used in sodium-ion batteries by manipulating their electronic structure. They demonstrated that doping the structure with electrochemically inactive ions completely suppresses both transition metal charge ordering and sodium-ion ordering. TECHNICAL ARTICLE

Tags: Energy, Battery

continued...

INFORMATION TECHNOLOGY

Computers Are Getting a Dose of Common Sense

MIT Technology Review, 24JUN2015

A startup called MetaMind has developed a new, improved algorithm for processing language. MetaMind's approach combines two forms of memory with an advanced neural network fed large quantities of annotated text. The first is a kind of database of concepts and facts; the other is short-term, or "episodic."

Tags: Information Technology, Artificial intelligence

FEATURED RESOURCE

Fraunhofer Research News

Fraunhofer is Europe's largest application-oriented research organization. Their research efforts are geared entirely to people's needs: health, security, communication, energy and the environment. RSS

MATERIALS SCIENCE

Physicists shatter stubborn mystery of how glass forms

Nanowerk, 29JUN2015

Based on the basic concepts of molecular crowding and string-like co-operative movement, an international team of researchers (Canada, France) has described how glasses form at the molecular level and provided a possible solution to a problem that has stumped scientists for decades. An accurate theory becomes particularly important when trying to understand glass dynamics at the nanoscale. This finding has implications for developing and manufacturing new nanomaterials. TECHNICAL ARTICLE

Tags: Materials science

Superconductivity record bolstered by magnetic data

Nature News, 29JUN2015

Researchers in Germany have observed the common molecule hydrogen sulfide superconducting at a record-breaking 203 kelvin (–70 ˚C) when subjected to very high pressures. The result confirms preliminary findings released by the researchers late last year, and is said to be corroborated by data from several other groups.

Tags: Materials science, S&T Germany

Helium 'balloons' offer new path to control complex materials

PhysOrg.com, 26JUN2015

A team of researchers in the US (Oak Ridge National Laboratory, University of Tennessee, Louisiana State University) has developed a new method to manipulate a wide range of materials and their behavior using only a handful of helium ions. By putting a little helium into the material, they were able to control strain along a single axis which allows material properties to be tuned. TECHNICAL ARTICLE

Tags: Materials science, Advanced materials

MEDICAL SCIENCES

Diagnosing Ebola in minutes

Harvard University, 25JUN2015

Researchers at Harvard University and their collaborators have shown that a new, commercially developed rapid-diagnostic test performed at bedside was as sensitive as the conventional laboratory-based method used for clinical testing during the recent outbreak in Sierra Leone.

Tags: Medical Sciences, Biotechnology

MICROELECTRONICS

Researchers introduce new layered semiconducting materials as silicon alternative

Nanowerk, 29JUN2015

Black arsenic phosphorous is a layered 2D material developed to address the shortcomings of silicon for today's applications. An international team of researchers (US, Germany) has developed a new method to synthesize black arsenic-phosphorous without high pressure, which demands less energy and is less expensive. Electronic and optical properties of these materials can be adjusted to a range that cannot be achieved by any other 2D materials thus far. TECHNICAL ARTICLE

Tags: Microelectronics, Advanced materials

The Computer Chip That Never Forgets

IEEE Spectrum, 26JUN2015

Researchers at UCLA are working on magnetoelectric random access memory (MeRAM). They have already created small arrays of this memory, and it has recently started to attract the interest of chip manufacturers. They are also working to overhaul the von Neumann blueprint of the computer, by eliminating the long-standing distinction between logic and memory.

Tags: Microelectronics, Semiconductors

continued...

PHOTONICS

Interfering light waves produce unexpected forces

Nanowerk, 26JUN2015

An international team of researchers (Japan, USA) revealed that the waves can exert a force and torque on a small particle perpendicular to both waves. Both the force and torque are strongly dependent on the polarization of the two interfering waves, which differs from the conventional experience of waves carrying the same momentum irrespective of their polarizations. The findings pave the way for novel optical manipulations of small particles. TECHNICAL ARTICLE

Tags: Photonics

Interaction of tailored light with a single atom and individual nanostructures

PhysOrg.com, 25JUN2015

By adapting a mode of the light field to a system under study, researchers in Germany showed that light can be coupled to an ion trapped in a parabolic mirror with high efficiency. This manipulation forms the basis for many potential applications, e.g. in biophysics or quantum information processing. TECHNICAL ARTICLE 1, 2, 3

Tags: Photonics, S&T Germany

SCIENCE WITHOUT BORDERS

50 Smartest Companies 2015

MIT Technology Review, 25JUN2015

This year, when the editors of MIT Technology Review began their annual search for the smartest companies, they did not have trouble finding big ideas. To make the list, a company must have truly innovative technology and a business model that is both practical and ambitious, with the result that it has set the agenda in its field over the past 12 months.

Tags: Science without borders, Emerging technology

SENSORS

Graphene-based magnetic sensor 100 times more sensitive than an equivalent silicon device

Nanowerk, 26JUN2015

At the EU's Graphene Flagship conference, researchers in Germany reported on the sensors they developed which are based on the Hall effect. Sensor performance is defined by (1) sensitivity, which depends on the number of charge carriers, and (2) power consumption, which varies inversely with charge carrier mobility. The worst case graphene scenarios roughly match a silicon reference. In the best case scenario, the result is a huge improvement over silicon. More information

Tags: Sensors, S&T Germany ■

About This Publication

Kristopher Gardner
Director, Office of
Technical Intelligence (OTI)

Ms. Hema Viswanath
OTI Corporate Librarian