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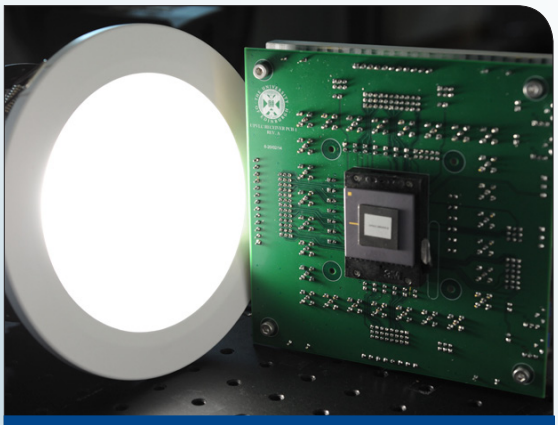
S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

FEATURE ARTICLES

Li-Fi Gets Ready to Compete With Wi-Fi

IEEE Spectrum, 20NOV2014



Light Fantastic: A CMOS digital-to-analog converter developed at the University of Edinburgh helps LEDs act as communications devices. Photo: Peter Tuffy/The University of Edinburgh

Researchers in the UK are pursuing "ultraparallel visible light communication," which would use multiple colors of light to provide high-bandwidth linkages over distances of a few meters. Such a Li-Fi system, as it's been dubbed, could supplement or in some instances replace traditional radio-based Wi-Fi.

Tags: Communications Technology, S&T UK, Featured Article

'Cloaking' device uses ordinary lenses to hide objects across continuous range of angles

PhysOrg.com, 19NOV2014

Researchers at the University of Rochester developed a combination of four standard lenses that keeps the object hidden as the viewer moves up to several degrees away from the optimal viewing position. In order to both cloak an object and leave the background undisturbed, the researchers determined the lens type and power needed, as well as the precise distance to separate the four lenses. TECHNICAL ARTICLE

Tags: Photonics, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Tomorrow's degradable electronics

PhysOrg.com, 20NOV2014

Researchers in Norway have succeeded in making components containing magnesium circuits designed to transfer energy. These are soluble in water and disappear after a few hours. Some of the circuit components are made of magnesium, silicon, or silicon with magnesium additives.

Tags: Advanced manufacturing

ADVANCED MATERIALS

Tropical inspiration for an icy problem

Science Daily, 24NOV2014

Researchers at Arizona State University mimicked the bi-layer architecture of a frog's skin combining a porous top layer with an antifreeze-infused bottom layer. The top layer is superhydrophobic, preventing freezing rain from forming ice on the surface. When ice starts to form the bottom layer kicks into action. The antifreeze underneath leaches through the porous boundary between the two layers, melting the ice away.

Tags: Advanced materials

A coating that protects against heat and oxidation

EurekAlert, 21NOV2014

Researchers in Germany have designed a coating that consists of an outer topcoat from conjoined aluminium oxide spheres which are hollow and filled with gas. When the outer side of a part is exposed to temperatures of 1000 degrees Celsius, these gas-filled spheres reduce temperatures on the part's inner side to under 600 degrees Celsius. The coating has applications in energy generation, combustion chambers, waste incinerator generators, temperature sensors, and reactors in the chemical and petrochemical industries.

Tags: Advanced materials, S&T Germany

continued...

BACK TO TOP

CP light creates chiral nanostructures

Nanotechweb, 20NOV2014

An international team of researchers (USA, Korea, Spain) report that when right- or left-handed circularly polarized light is shone onto dispersions of racemic cadmium tellurium nanoparticles, right- or left-handed twisted nanoribbons are produced. This new finding could be useful for making a variety of chiral inorganic materials and even improve how nanostructures assemble to create sophisticated mesoscale constructs. TECHNICAL ARTICLE

Tags: Advanced materials, Materials science

Electromagnetic metamaterials: Simplicity unlocks complexity

Nature, 20NOV2014

By carefully selecting only two elemental 'building block materials' at the nanoscale, it is possible to digitally design composite electromagnetic media with properties vastly different from their individual constituents and suitable for performing complex optical functions.

Tags: Advanced materials

Thin film produces new chemistry in 'nanoreactor'

Science Daily, 19NOV2014

Researchers in the Netherlands have discovered a new manganese compound that is produced by tension in the crystal structure of terbium manganese oxide. The technique they used to create this new material could open the way to new nanoscale circuits. TECHNICAL ARTICLE

Tags: Advanced materials

AUTONOMOUS SYSTEMS & ROBOTICS

Harvard Researchers Build $10 Robot That Can Teach Kids to Code

Wired, 21NOV2014

Researchers at Harvard University created a robot they call AERobot, a bot that can help teach programming and artificial intelligence to middle school kids and high schoolers. The hope is that it can help push more kids into STEM, studies involving science, technology, engineering, and math.

Tags: Autonomous systems & robotics

Video Friday: Robots at Sea, Humanoids at RoboCup, and D-RHex on Sand

IEEE Spectrum, 21NOV2014

In August, UCSF's Center for Systems & Synthetic Biology, along with the Harvard Self-Organizing Systems Research group, held a workshop to see how swarms of Kilobots could be used to model complex biological systems.

Tags: Autonomous systems & robotics

Testing if a computer has human-level intelligence: Alternative to 'Turing test' proposed

Science Daily, 19NOV2014

Researchers at Georgia Institute of Technology have created the Lovelace 2.0 Test of Artificial Creativity and Intelligence. For the test, the artificial agent passes if it develops a creative artifact from a subset of artistic genres deemed to require human-level intelligence and the artifact meets certain creative constraints given by a human evaluator. TECHNICAL ARTICLE

Tags: Autonomous systems & robotics, Artificial intelligence

BIG DATA

Measuring the Spread of Ideas through the Physical Review

American Physical Society Spotlight, 21NOV2014

In their search for memes, an international team of researchers (Switzerland, Slovenia) focused on nearly half a million titles and abstracts in the Physical Review archive from 1893 to 2009. Using standard software they showed that the "simple yet powerful" method finds both extremely rare memes as well as fairly common ones. The model patterned on principles adapted from the processes of genetic inheritance offers a "fruitful starting point" for deeper analysis of the spread of scientific ideas. TECHNICAL ARTICLE

Tags: Big data

BIOTECHNOLOGY

Research team developing injectable treatment for soldiers wounded in battle

Technology Org, 20NOV2014

A team of researchers from Texas A&M and MIT have developed a biodegradable gelatin substance that has been embedded with nano-sized silicate discs that aid in coagulation. Once injected, the material locks into place at the site of the injury and rapidly decreases the time it takes for blood to clot – in some instances by a whopping 77 percent.

Tags: Biotechnology, Military technology

COMMUNICATIONS TECHNOLOGY

End to end 5G for super, superfast mobile

Science Daily, 24NOV2014

An international team of researchers (China, Iran) has assessed the latest developments aimed at 5G systems and have proposed their own novel end-to-end (E2E) software-defined cellular network (SDCN) architecture which they say offers flexibility, scalability, agility and efficiency.

Tags: Communications Technology

continued...

"Be a yardstick of quality. Some people aren't used to an environment where excellence is expected." STEVE JOBS

Study supports free 'Super WiFi'

Science Daily, 24NOV2014

Researchers in Germany propose to turn some of the TV frequencies that will become free into common property and to use it to extend existing wireless networks instead of using the frequencies for mobile communications. TECHNICAL ARTICLE

Tags: Communications Technology, S&T Germany

Research promises innovations in secure communications technology

PhysOrg.com, 20NOV2014

Researchers in China present a portable true random number generator configuration simply based on the camera of a smartphone. The randomness of the output bit sequence has been proved with NIST tests. All necessary processing functions could be fully integrated within Android software in the near future. TECHNICAL ARTICLE

Tags: Communications Technology

Record high data accuracy rates for phase-modulated transmission

PhysOrg.com, 19NOV2014

An international team of researchers (the Netherlands, USA) set a new record for transmission down a single optical fiber: 255 terabits per second. They devised a detection scheme with an error rate 25 times lower than the fundamental limit of the best conventional detector. They did this by employing not passive detection of incoming light pulses; instead the light is split up and measured numerous times. TECHNICAL ARTICLE

Tags: Communications Technology

CYBER SECURITY

Introducing one of the most sophisticated espionage bugs ever discovered

PhysOrg.com, 11NOV2014

According to Symantec, the cyber-espionage bug, called Regin, has been making attacks for many years without being caught. Regin makes use of multiple stages to complete its attack. Once the victim is duped into loading the trojan application, by sending you an email with an infected attachment, it will download encrypted components needed for the attack. This allows the trojan to easily adapt remotely, which makes it difficult for any anti-malware software to keep up.

Tags: Cyber security

ENERGY

Energy Harvesting Nanogenerators Give 130 Volts at the Touch of a Finger

IEEE Spectrum, 21NOV2014

Researchers in South Korea improved on the triboelectric nanogenerator (TENG) developed by Georgia Tech. In a new TENG consisting of a Teflon layer and a silicate layer, they produced nanodots, nanogrates, and nanomeshes on the silica layer using block copolymer self-assembly technology. The resulting TENGs can produce up to 130 volts. TECHNICAL ARTICLE

Tags: Energy

ENVIRONMENTAL SCIENCE

Sun's magnetic field affects frequency of lightning strikes on Earth

Physics World, 19NOV2014

Researchers in the UK found that from 2001 to 2006, lightning rates over the UK increased by an average of 40–60% when the solar magnetic field was pointing towards the Sun. Exactly how the solar magnetic field causes these variations in thunderstorm activity is not clear, but researchers suspect that the changes in the shape of the Earth's magnetic field affect the cosmic rays that are channeled into the Earth's atmosphere from outer space. TECHNICAL ARTICLE

Tags: Environmental science, S&T UK

MATERIALS SCIENCE

Magnetic fields and lasers elicit graphene secret

Science Daily, 24NOV2014

An international team of researchers (Germany, France, Czech Republic, USA) studied the dynamics of electrons from graphene in a magnetic field for the first time. This led to the discovery of a seemingly paradoxical phenomenon in the material. The new discovery could be used in the future for developing a laser that can produce light with arbitrarily adjustable wavelengths in the infrared and terahertz ranges. TECHNICAL ARTICLE

Tags: Materials science, Advanced materials

continued...

Nanoantenna breakthrough for next-generation ultra-high density magnetic storage

Nanowerk, 24NOV2014

To overcome key limitations of gold used in the magnetic storage industry, researchers at Purdue University are working to replace it with titanium nitride. It offers high strength and durability at high temperatures, and its use as a nanoantenna paves the way for next-generation recording systems. TECHNICAL ARTICLE

Tags: Materials science, Advanced materials

'Mind the gap' between atomically thin materials

Science Daily, 22NOV2014

Researchers at Penn State University grew a single atomic layer of tungsten diselenide on a one- atom-thick substrate of graphene with pristine interfaces between the two layers and tried to put a voltage from the top tungsten diselenide (WSe2) layer down to the graphene layer. They attribute about 1eV resistance encountered to the gap. This energy barrier could prove useful in designing next generation electronic devices, such as vertical tunneling field effect transistors. TECHNICAL ARTICLE

Tags: Materials science

Featured Resource

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MICROELECTRONICS

Enabling biocircuits: New device could make large biological circuits practical

Science Daily, 24NOV2014

To reduce unpredictability in biological circuits, researchers at MIT developed a load driver whose effect is similar to that of load drivers used in electronic circuits: It provides a kind of buffer between the signal and the output, preventing the effects of the signaling from backing up through the system and causing delays in outputs. The addition of load driver could escalate the complexity of circuits, opening up new possible applications while ensuring that their operation is "robust and predictable." TECHNICAL ARTICLE

Tags: Microelectronics

Physicists and chemists work to improve digital memory technology

Science Daily, 24NOV2014

A junction's polarity determines its resistance to tunneling current, with one direction allowing current to flow and the other strongly reducing it. Researchers at the University of Nebraska at Lincoln found that their graphene-ammonia combination increased the disparity between these "on" and "off" conditions, a prized outcome that improves the reliability of RAM devices and allows them to read data without having to rewrite it. TECHNICAL ARTICLE

Tags: Microelectronics

PHOTONICS

Upconversion: When two wrongs make a right

Nanotechweb, 21NOV2014

An international team of researchers (China, Singapore) report that upconversion anti-Stokes processes can seem to cheat the rules, allowing emitted photons with higher energy than the energy of the incident photons. In this handy phenomenon, the energy of the incident photons can be effectively summed to make the right amount by various processes such as multistep excitation, energy transfer and photon avalanche effects.

Tags: Photonics

S&T POLICY

China's 2020 energy plans

Next Big Future, 20NOV2014

According to the plan, annual primary energy consumption is set at 4.8 billion tonnes of the standard coal equivalent until 2020. The share of natural gas will be raised to above 10 percent and that of coal will be reduced to under 62 percent. Construction of new nuclear power plants in eastern coastal areas will begin at a proper time. Installed capacity of hydro-, wind and solar power is expected to stand at 350 gigawatts, 200 gigawatts and 100 gigawatts, respectively. Energy Development Strategy Plan 2014-2020

Tags: S&T policy, S&T China

From cognition to control: Fundamental research continues to advance cooperative robots

PhysOrg.com, 20NOV2014

NSF, in partnership with the NIH, Department of Agriculture and NASA announced $31.5 million in new awards to spur the development and use of co-robots—robots that work cooperatively with people. NSF's investments in robotics explore both the technical and engineering challenges of developing co-robots and the long-term social, behavioral and economic implications of co-robots across all areas of human activities.

Tags: S&T policy, Autonomous Systems & Robotics

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SCIENCE WITHOUT BORDERS

Patent Power 2014

IEEE Spectrum, 19NOV2014

IBM continues its dominance in Computer Systems, Microsoft is way ahead in Computer Software, Johnson & Johnson continues to lead the field in Biotechnology and Pharmaceuticals, Apple in Electronics and Google in Communication/Internet Services. But elsewhere, the results were much less predictable. Interactive Patent Power

Tags: Science without borders

SENSORS

Cracking the code of the unspoken language

EU Research, 25NOV2014

Researchers in Switzerland have paved the way for the development of computer techniques that could automatically reveal meaning from body language and other visual cues, predict people's mood and help improve 'collective decision-making'.

Tags: Sensors, Artificial intelligence, S&T Switzerland

New semiconductor device could lead to better photodetectors

PhysOrg.com, 21NOV2014

Researchers at UCLA have developed a photodetector that uses roughly 300 nanometer thick coatings of perovskite rather than silicon or other common materials. As a result, the device efficiently and quickly transports signals with minimum loss. It also offers improved sensitivity under dim light. TECHNICAL ARTICLE

Tags: Sensors

New terahertz device could strengthen security

Science Daily, 21NOV2014

Researchers at Northwestern University have developed a room temperature, compact, tunable terahertz source that could lead to advances in homeland security and space exploration. It is able to detect explosives, chemical agents and dangerous biological substances from safe distances. TECHNICAL ARTICLE

Tags: Sensors, Terahertz technology ■

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