



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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## FEATURE ARTICLES

### [Reinventing wireless, pCell aims for full-speed mobile data \(w/ video\)](#)

[PhysOrg.com, 14MAR2014](#)



New mobile network technology concept called pCell. Image courtesy of Artemis Networks/Phys.org.

An American company's approach, using pWave radios, transmits signals that deliberately interfere with each other. Instead of dodging interference, pCell exploits interference, combining radio signals to synthesize tiny personal cells. Rather than hundreds of users taking turns sharing the capacity of one large cell, each user gets an unshared pCell.

*Tags: Communications Technology, Featured Article*

### [Effective thermal camouflage and invisibility device for soldiers created](#)

[Science Daily, 11MAR2014](#)

Researchers in Singapore have developed a new device which can block thermal signatures and provide illusionary camouflage at the same time. This cloaking technology is cost-effective, easily scalable, applicable to even bigger objects, and it has also overcome limitations like narrow bandwidth and polarization-dependence. The technology is ready to roll out for military applications. [TECHNICAL ARTICLE 1, 2](#)

*Tags: Materials science, Military technology, Featured Article*

## S&T NEWS ARTICLES

### ADVANCED MATERIALS

#### [Flexible electronics: Flexible carbon nanotube circuits more reliable and power efficient](#)

[Science Daily, 17MAR2014](#)

Researchers at Stanford University have developed a process to create flexible CNT chips that can tolerate power fluctuation, bringing high-performance flexible electronics closer to reality. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials, CNT, Flexible electronics*

#### [Atomically thick metal membranes](#)

[Science Daily, 14MAR2014](#)

An international team of researchers (Germany, Poland, North Korea) have shown that freestanding metal membranes consisting of a single layer of iron atoms can be stable under ambient conditions. There is significant interest in the potential of such 2D metal materials as they are expected to have exotic properties. [TECHNICAL ARTICLE](#)

*Tags: Advanced materials, Materials science*

### AUTONOMOUS SYSTEMS & ROBOTICS

#### [Video Friday: More Fake Ping Pong, Elastic Snakebots, and Watson Serves SXSW](#)

[IEEE Spectrum, 14MAR2014](#)

The next generation snakebot from CMU incorporates series elastic actuators into every joint. Appropriately enough, it's called the SEA snake. The actuators allow for torque control and compliant motions, giving the snake a rather playful gravity compensation mode.

*Tags: Autonomous systems & robotics*

### COMMUNICATIONS TECHNOLOGY

#### [High-energy photon pulses made to order](#)

[Nature News, 16MAR2014](#)

Researchers at Texas A&M have devised a way to craft pulses of gamma rays with precise shape and timing from single-photon sources. The high-energy photons could carry information in quantum communications or help to

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improve techniques that use radiation to probe materials' composition and magnetic fields.

*Tags: Communications Technology, Quantum science*

### **Nanoscale Metamaterial Optical Switches Operate at Terahertz Speeds**

[IEEE Spectrum, 14MAR2014](#)

A team of researchers from Vanderbilt University, University of Alabama-Birmingham, and Los Alamos National Laboratory has developed an ultra-small and ultra-fast optical switch made from vanadium oxide. It is much faster than similar switches that operate at gigahertz speeds, the researchers say. [TECHNICAL ARTICLE](#)

*Tags: Communications Technology, Government S&T*

### **Enabling next-generation wireless networks**

[Science Daily, 13MAR2014](#)

Researchers in Singapore have investigated different designs of silicon modulators that enable fast data conversion from electrical to optical signals. Recently they have demonstrated similar modulators with even larger bandwidths of up to 28 gigahertz, which means that they can work at even faster rates of data transmission. [TECHNICAL ARTICLE](#)

*Tags: Communications Technology*

### **Chip-scale tunable laser to enable bandwidth-on-demand in advanced optical networks**

[Science Daily, 11MAR2014](#)

Researchers in Singapore have demonstrated the smallest wavelength-tunable laser fabricated by MEMS technology. The laser features a wide tuning range which enables telecommunications providers to cost-effectively expand system capacity in advanced optical networks to support high data packets at ultra fast speed.

*Tags: Communications Technology*

## ENERGY

### **A battery that 'breathes' could power next-gen electric vehicles**

[Science Daily, 16MAR2014](#)

Researchers in Japan developed a layered approach, sandwiching a polymer electrolyte with high conductivity and a solid electrolyte in between the lithium electrode and the watery solution. The result was a unit with the potential to pack almost twice the energy storage capacity, as measured in Watt hours per kilogram (Wh/kg), as a lithium-ion battery.

*Tags: Energy, Battery, S&T Japan*

### **Harnessing everyday motion to power mobile devices**

[Science Daily, 16MAR2014](#)

Researchers at Georgia Institute of Technology have shown that a piezoelectric triboelectric nanogenerator, or "TENG," paired with two sheets of different materials together produced more power than expected. They have boosted the power output density by a factor of 100,000, with the output power density reaching 300 Watts per square meter. Now one stomp of a foot can light up a sheet with a thousand LED bulbs. [VIDEO](#)

*Tags: Energy*

### **The Key to the Next Energy Revolution?**

[Science Magazine, 13MAR2014](#)

Researchers in the United States have discovered a new and more efficient method for converting the main components in natural gas into liquids that can be further refined into either common commodity chemicals or fuels. The work opens the door to displacing oil with abundant natural gas.

*Tags: Energy, Emerging technology*

### **Solar Power When It's Raining: NRL Builds Space Satellite Module to Try**

[Naval Research Laboratory, 12MAR2014](#)

Researchers at the Naval Research Laboratory have built and tested a module to capture and transmit solar power including a 'step' variation. Assembled in satellite array, modules could beam power to an on-Earth receiver, providing sustainable, base-load power for a city or military missions.

*Tags: Energy, Government S&T, Solar energy*

### **Graphene folds itself into programmable nanocage for hydrogen storage, beating DOE 2020 goal (w/video)**

[Nanowerk, 11MAR2014](#)

Researchers at the University of Maryland have found that they can make tiny squares of graphene fold into a box, which will open and close itself in response to an electric charge. Inside the box, they've tucked hydrogen atoms with a storage density of 9.5 percent hydrogen by weight. [TECHNICAL ARTICLE](#)

*Tags: Energy, Advanced materials*

“Those [scientists] who dislike entertaining contradictory thoughts are unlikely to enrich their science with new ideas.”

MAX PLANCK

## ENVIRONMENTAL SCIENCE

### System to predict lightning under development

Science Daily, 14MAR2014

Researches at the University of Alabama in Huntsville are combining data from weather satellites with Doppler radar and numerical models in a system that might warn which specific pop-up storm clouds are likely to produce lightning and when that lightning is likely to begin and end.

Tags: *Environmental science, Climatology*

## INFORMATION TECHNOLOGY

### The next generation of electronics is a press-on tattoo

Technology Org, 18MAR2014

According to John Rogers, inventor of novel technologies that combine electronics with human biology, a kid's temporary tattoo was a great model for flexible electronics. Temporary tattoos conform to human skin without any negative implications. If we can make an electronics device that worked the same way it could open up a world of opportunities.

Tags: *Information Technology, Emerging technology, Flexible electronics*

## MATERIALS SCIENCE

### Antimony nanocrystals for batteries

Science Daily, 18MAR2014

Researchers from EU have succeeded for the first time to produce uniform antimony nanocrystals. Tested as components of laboratory batteries, these are able to store a large number of both lithium and sodium ions. Eventually they may be used as alternative anode materials in future high-energy-density batteries. TECHNICAL ARTICLE

Tags: *Materials science, Battery, S&T EU*

### Novel anofluidic membrane reveals water molecules will bounce off a liquid surface

Nanowerk, 16MAR2014

By observing water transport through membranes with pores of various sizes, researchers in Saudi Arabia have measured a water molecule's probability of condensing or bouncing off a liquid surface at the nanoscale. It gives scientists an essential understanding of the movement of water through soil, the formation of clouds and fog, and the efficiency of water-filtration devices. TECHNICAL ARTICLE

Tags: *Materials science*

### Material rivaling graphene may be mined out of rocks

Science Daily, 12MAR2014

Materials that have a layered structure, such as molybdenum disulfide, have properties just as intriguing as those of graphene. However, researchers at the University of Warsaw have shown that the phenomena occurring in the crystal network of molybdenum disulfide sheets are of a slightly different nature due to the presence of the new type of vibration in single-sheet materials that has an impact on how electrons behave.

Tags: *Materials science, Advanced materials*

### Novel magnetism discovered in iridium compound CuIr<sub>2</sub>S<sub>4</sub>

Science Daily, 12MAR2014

Researchers in Japan have discovered the first experimental evidence showing the importance of spin-orbit interactions that were previously overlooked in CuIr<sub>2</sub>S<sub>4</sub>. It opens up a new area of research with respect to spin-orbit interactions in transition metals.

Tags: *Materials science, S&T Japan*

## NEUROSCIENCE

### Suppressing unwanted memories reduces their unconscious influence on behavior

Science Daily, 18MAR2014

Researchers in the UK have shown that, contrary to what was previously assumed, suppressing unwanted memories reduces their unconscious influences on subsequent behavior. The research has shed light on how this process happens in the brain. TECHNICAL ARTICLE

Tags: *Neuroscience, S&T UK*

### Strongest evidence yet of two distinct human cognitive systems

University of Buffalo, 14MAR2014

Cognitive scientists at the University of Buffalo may have produced the strongest evidence yet that humans have separate and distinct cognitive systems with which they can categorize, classify, and conceptualize their worlds.

TECHNICAL ARTICLE

Tags: *Neuroscience*

**The Latest DIY Craze: Brain Hacking****IEEE Spectrum, 14MAR2014**

Transcranial direct current stimulation (tDCS) is a noninvasive way to jolt brain cells. tDCS doesn't require expensive equipment; all it takes is a 9-volt battery, some simple circuits, and a couple of electrodes. Consequently, it didn't take long for so-called biohackers to band together and come up with schematics for devices.

*Tags: Neuroscience***How light affects our brain's performance: Photic memory for executive brain responses****Science Daily, 10MAR2014**

A team of researchers from Belgium and France has shown that a novel photoreceptor is an essential component for relaying light information to a set of so-called non-visual centers in the brain. Continuous changes in light throughout the day also change us. The new research argues for the use and design of lighting systems to optimize cognitive performance. [TECHNICAL ARTICLE](#)

*Tags: Neuroscience***FEATURED RESOURCE****Nature News and Comment**

Provides rapid, authoritative, insightful and arresting news and interpretation of topical and coming trends affecting science, scientists and the wider public. [RSS](#)

**PHOTONICS****Nanoscale 'earthquakes' move light along a nanowire****Nanowerk, 13MAR2014**

A team of researchers from the Netherlands and Germany has succeeded in moving light from one end of a semiconducting nanowire to the other by means of surface acoustic waves, a kind of nanoscale earthquakes. The results form an important milestone for the development of semiconductor devices which convert optical signals to electrical ones and vice versa, and bear direct relevance for quantum information processing. [TECHNICAL ARTICLE](#)

*Tags: Photonics***Bending the light with a tiny chip: Silicon chip acts as a lens-free projector, may one day fit in cell phones****Science Daily, 11MAR2014**

A silicon chip developed by researchers at Caltech eliminates the need for bulky and expensive lenses and bulbs, instead it uses an integrated optical phased array to project the image electronically with only a single laser diode as light source and no mechanically moving parts. The

tiny chip projection device can have many applications—including LIDAR, robotics, geographical measurements, and mapmaking.

*Tags: Photonics***QUANTUM SCIENCE****Scientists open a new window into quantum physics with superconductivity in LEDs****EurekAlert, 18MAR2014**

The approach proposed by researchers at the University of Toronto would involve combining LEDs with a superconductor to generate entangled photons and could open up a rich spectrum of new physics as well as devices for quantum technologies, including quantum computers and quantum communication. [TECHNICAL ARTICLE](#)

*Tags: Quantum science, S&T Canada***An exotic phase to manipulate spin****Nanowerk, 14MAR2014**

A team of researchers from Japan and the USA have experimentally detected Berry's phase in a semiconductor. When the spin Berry's phase exists, novel phenomena such as spin-polarized charge flow without energy dissipation can be realized. The discovery helps move forward the field of spintronics. [TECHNICAL ARTICLE](#)

*Tags: Quantum science***Quantum physics secures new cryptography scheme****Science Daily, 12MAR2014**

An international team of researchers (Canada, UK, Singapore, Austria) has demonstrated a form of quantum cryptography that can protect people doing business with others they may not know or trust, for example, at a bank's ATM. [TECHNICAL ARTICLE](#)

*Tags: Quantum science, Communications Technology, Cryptology***More secure communications thanks to quantum physics****Science Daily, 11MAR2014**

Researchers in Germany use a light source that transmits a signal when it sends a single photon; this signal can be used to select only the individually transmitted photons for communication. They develop their systems in such a manner that they are as simple as possible and can be miniaturized.

*Tags: Quantum science, Cryptology***S&T POLICY****China's Hypersonic Glide Vehicle May Fly 10 Times Faster Than Sound****Global Security Newswire, 17MAR2014**

China's Sina Military Network provided the attributed maximum flight speed of the WU-14 glide vehicle, and added that the device is designed to hit any location on the

*continued...*

earth in 60 minutes or less, according to a Sunday article in the Times.

*Tags: S&T policy, Military technology, S&T China*

### **Billionaires With Big Ideas Are Privatizing American Science**

**New York Times, 15MAR2014**

According to a policy analysis at the American Association for the Advancement of Science, the practice of science in the 21st century is becoming shaped less by national priorities or by peer-review groups and more by the particular preferences of individuals with huge amounts of money.

*Tags: S&T policy, S&T USA*

### **U.K. to Shower Money on Three Big Science Projects**

**Science Magazine, 12MAR2014**

The U.K. government announced nearly £300 million (\$500 million) of new investment in large-scale science projects. The beneficiaries will be a new European neutron source soon to be built in Sweden, the Square Kilometre Array (SKA) radio telescope, and an exoplanet-hunting mission by the European Space Agency (ESA).

*Tags: S&T policy, S&T UK*

### **China goes back to basics on research funding**

**Nature News, 11MAR2014**

China's total expenditure on R&D has increased by 23% a year on average over the past decade. Expenditure on science and technology this year was set at US\$43.6 billion (267.4 billion yuan renminbi), an increase of 8.9% over last year. **RELATED STORY** [China: At a crossroads \(Naturejobs.com supports Firefox and Safari browsers\)](#)

*Tags: S&T policy, S&T China*

## SCIENCE WITHOUT BORDERS

### **Possible evidence for dark matter particle presented at UCLA physics symposium**

**Science Daily, 10MAR2014**

Because dark matter makes up the bulk of the mass of galaxies and is fundamental in the formation of galaxies and stars, it is essential to the origin of life in the universe and on Earth. Physicists presented several analyses that Symposium participants interpreted to imply the existence of a dark matter particle.

*Tags: Science without borders*

## SENSORS

### **Thermal vision: Graphene light detector first to span infrared spectrum**

**EurekAlert, 15MAR2014**

The first room-temperature light detector that can sense the full infrared spectrum has the potential to put heat vision technology into a contact lens. Unlike comparable mid- and far-infrared detectors currently on the market, the detector developed by researchers at the University of Michigan doesn't need bulky cooling equipment to work.

#### **TECHNICAL ARTICLE**

*Tags: Sensors ■*

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