



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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FEATURE ARTICLES

[A thin radar-infrared stealth-compatible structure: Design, fabrication, and characterization](#)

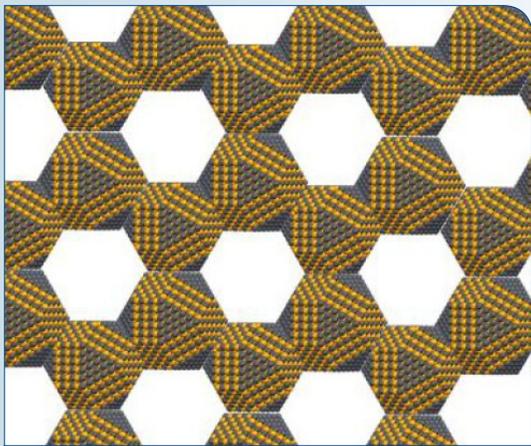
[Institute of Physics, 16FEB2014](#)

Researchers in China report the development of a thin radar-infrared stealth-compatible structure with reflectivity below -10 dB in the whole radar X wave band and infrared emissivity less than 0.3 in the infrared region of $8\ \mu\text{m}$ – $14\ \mu\text{m}$. It is only 2.1-mm thick.

Tags: Advanced materials, Military technology, S&T China, Featured Article

[Potentially revolutionary material: Scientists produce a novel form of artificial graphen](#)

[Science Daily, 14FEB2014](#)



Artificial graphene.

Credit: Image courtesy of Université du Luxembourg

structure which are emerging as a new class of systems with great potential. It opens the door to a wide variety of materials with variable nano-geometry and 'tunable' properties. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Featured Article

An international team of researchers (France, the Netherlands, Germany) have made a new breed of self-assembled semi-conducting nano-crystals with a honeycomb

S&T NEWS ARTICLES

ADVANCED MATERIALS

[New materials open door to electronics in extreme environments](#)

[PhysOrg.com, 18FEB2014](#)

A company in the UK will accelerate the commercialization of a range of devices based on high-temperature piezoelectric materials developed by researchers at Leeds University. The new materials are compatible with existing manufacturing methods for piezoelectric ceramics and therefore can be mass-produced at similar cost to current materials. It has application in aerospace, oil and gas and nuclear power industries.

Tags: Advanced materials, S&T UK

[Graphene oxide makes perfect sieve](#)

[Physics World, 17FEB2014](#)

Researchers in the UK have shown that membranes made from graphene oxide could act as perfect molecular sieves when immersed in water, blocking all molecules or ions with a hydrated size larger than $9\ \text{Å}$. The laminated nanostructures might be ideal for water filtration and desalination applications. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, Materials science, S&T UK

[Carbon nanotube fibers outperform copper in carrying electricity](#)

[Nanowerk, 14FEB2014](#)

While individual nanotubes are capable of transmitting nearly 1,000 times more current than copper, the same tubes coalesced into a fiber using other technologies fail long before reaching that capacity. But a series of tests at Rice University showed the wet-spun carbon nanotube fiber still handily beat copper, carrying up to four times as much current as a copper wire of the same mass.

[TECHNICAL ARTICLE](#)

Tags: Advanced materials

continued...

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Mimicking the touch of skin, this nanotechnology solution makes all gloves touchscreen compatible (w/video)

Nanowerk, 13FEB2014

Nanotips is a conductive polyamide liquid solution that can transform your ordinary gloves into touchscreen ones. Formulated using nanotechnology, Nanotips mimics the touch of human skin. It was designed with functionality and durability in mind making it great for all lifestyles. [VIDEO](#)

Tags: *Advanced materials*

AUTONOMOUS SYSTEMS & ROBOTICS

Video Friday: Shadow Hand, Table Tennis Death Match, and Happy Valentine's Day

IEEE Spectrum, 17FEB2014

Controlling robot with your brain is something that is becoming mainstream enough that we're actually getting close to putting it into practice. At this point, it's so easy that an undergrad can do it.

Tags: *Autonomous systems & robotics*

NASA Testing Robots for Satellite Refueling Missions

IEEE Spectrum, 13FEB2014

The next-generation Canadarm (Canadian robotic space-arms) was designed with refueling missions in mind and DEXTRE (Special Purpose Dexterous Manipulator) has been practicing for a live robotic refueling mission; the latest step is a teleoperated real fuel transfer test here on Earth.

Tags: *Autonomous systems & robotics, Space technology*

Robotic construction crew needs no foreman

Harvard University, 13FEB2014

Based on the concept stigmergy, researchers at Harvard University have created an autonomous robotic construction crew. The system needs no supervisor, no eye in the sky, and no communication: just simple robots—any number of robots—that cooperate by modifying their environment. [TECHNICAL ARTICLE](#), [VIDEO](#)

Tags: *Autonomous systems & robotics, Biomimetics*

Video: Decentralized control of multiple robots under uncertainty

PhysOrg.com, 12FEB2014

Researchers at MIT will present a new system that stitches existing control programs together to allow multiagent systems to collaborate in much more complex ways. The system factors in uncertainty and automatically plans around it. [TECHNICAL ARTICLE](#)

Tags: *Autonomous systems & robotics*

BIG DATA

IBM sets new speed record for Big Data

KurzweilAI, 15FEB2014

IBM has announced it has achieved a new data-transmission advancement that will help improve Internet backbone

speeds to 200-400 gigabits per second at extremely low power. The speed boost is based on a new lab prototype chip design that can be used to improve transfer of Big Data between clouds and data centers via fiber four times faster than current 100 Gb/s technology.

Tags: *Big data, Communications Technology, Microelectronics*

BIOTECHNOLOGY

A New Tool That Seals Bullet Wounds in Seconds With High-Tech Sponges

Wired, 18FEB2014

Inspired by expanding foams used to patch tires and walls, a company called RevMedx developed the XStat syringe, filled with scientifically advanced sponges. The sponge is made of wood fibers, coated with a coagulant derived from shrimp, and then compressed to a quarter of their original size. Once inside the body, a combination of pressure caused by their expansion and coagulant applied throughout the wound combine to staunch the blood flow.

Tags: *Biotechnology, Military technology*

It's alive! Bacteria-filled liquid crystals could improve biosensing

EurekAlert, 17FEB2014

Researchers at Kent State University and Argonne National Laboratory have developed a biomechanical hybrid, living liquid crystal which moves and reshapes itself in response to external stimuli. It also stores energy just as living organisms do to drive its internal motion. And it possesses highly desirable optical properties. [TECHNICAL ARTICLE](#)

Tags: *Biotechnology*

Harvesting light, the single-molecule way: Molecular mechanism of light harvesting may illuminate path forward to future solar cells

Science Daily, 16FEB2014

Researchers at Stanford University have gained new insights into one of the molecular mechanisms behind light harvesting, which enables photosynthetic organisms to thrive, even as weather conditions change from full sunlight to deep cloud cover. The work could help improve the design and efficiency of devices like solar cells in the future.

Tags: *Biotechnology, Solar energy*

Brain process takes paper shape: Paper-based device mimics electrochemical signalling in human brain

Science Daily, 12FEB2014

Researchers in China have designed thin-film transistor to replicate the junction between two neurons, known as a biological synapse. It could become a key component in the development of artificial neural networks, which could be utilized in a range of fields from robotics to computer processing. [TECHNICAL ARTICLE](#)

Tags: *Biotechnology, S&T China*

continued...

“Be less curious about people and more curious about ideas.” MARIE CURIE

COMMUNICATIONS TECHNOLOGY

Researchers build the first circuit with stretchable optical interconnections

Nanowerk, 18FEB2014

Researchers in Belgium report progress on the first optical circuit that uses interconnections that are not only bendable, but also stretchable. These new interconnections, made of a rubbery transparent material called PDMS (poly-dimethylsiloxane), guide light along their path even when stretched up to 30% and when bent around an object the diameter of a human finger. [TECHNICAL ARTICLE](#)

Tags: *Communications Technology, Breakthrough technology*

World first 79 GHz radar transmitter in 28nm CMOS

Nanowerk, 18FEB2014

Researchers in Belgium have developed the world's first 79 GHz radar transmitter implemented in plain digital 28nm CMOS. With an output power above 10dBm, the transmitter front-end paves the way towards full radar-on-chip solutions for automotive and smart environment applications.

Tags: *Communications Technology*

CYBER SECURITY

Cyberattack by Breaking and Entering

American Physical Society Spotlight, 18FEB2014

Quantum cryptography promises secure communication by alerting users when their data has been spied on. But an eavesdropper might be able to bypass this security by tampering not with the data, but with the data-reading equipment. As an example of this strong-arm tactic, an international team of researchers (Norway, Sweden, Malaysia, Canada) report that a high-powered laser light can be used to damage photo-detectors, thus allowing a fake signal to be swapped into the communication line. [TECHNICAL ARTICLE](#)

Tags: *Cyber security*

ENERGY

Solar-induced hybrid fuel cell produces electricity directly from biomass

Science Daily, 18FEB2014

Researchers at the Georgia Institute of Technology have developed a new type of low-temperature fuel cell that directly converts biomass to electricity with assistance from a catalyst activated by solar or thermal energy. [TECHNICAL ARTICLE](#)

Tags: *Energy, Materials science*

A Battery With Liquid Electrodes Can Be Recharged or Refilled

MIT Technology Review, 17FEB2014

Illinois Institute of Technology researchers, in collaboration with Argonne National Laboratory, have demonstrated a small “half-cell” battery that uses one fluid electrode and one solid one. They plan to build a prototype that uses liquids for both the positive and negative electrodes. In the new battery, the fluid electrodes would be stored in tanks and pumped through a relatively small device to interact and generate electricity.

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

New ‘pomegranate-inspired’ design solves problems for lithium-ion batteries

Nanowerk, 16FEB2014

Researchers at Stanford University and the Department of Energy's SLAC National Accelerator Laboratory have shown that pomegranate-inspired anode operates at 97 percent capacity even after 1,000 cycles of charging and discharging. This puts it well within the desired range for commercial operation. [TECHNICAL ARTICLE](#)

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

Laser fusion passes milestone

PhysOrg.com, 12FEB2014

Using ultra-powerful laser to crush tiny pellets of deuterium-tritium fuel, researchers at the Lawrence Livermore National Laboratory have produced more energy from fusion reactions than was deposited in the fuel. Although still far from the long-sought-after goal of “ignition”, the latest results are nevertheless an important step on the road to realizing fusion energy.

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

EXPLOSIVES

Smart Mortar Rounds Make Good Spies

IEEE Spectrum, 18FEB2014

A defense company in Singapore has developed a round called SPARCS, or Soldier Parachute Aerial Reconnaissance Camera System which climbs 150 meters, then deploys a small camera that gently falls from the sky via parachute while transmitting images to a ground unit. The photos are then stitched into a bigger and higher resolution photo. It's the kind of thing a drone is usually called in for, but a mortar round is smaller, more expendable, and does the job with an immediacy that's hard to match.

Tags: *Explosives, Military technology*

FORECASTING

Can Twitter Predict Major Events Such As Mass Protests?

MIT Technology Review, 18FEB2014

The idea that the Twitter stream is a window into the future is persuasive. But is it true? There's no question that the evidence is there to be found in the social media in retrospect. The bigger question is whether it's possible to pick out this evidence in advance. Until then, it would surely be wise to be circumspect about the predictive powers of Twitter and other forms of social media.

TECHNICAL ARTICLE

Tags: Forecasting

FEATURED RESOURCE

Edge

To arrive at the edge of the world's knowledge, seek out the most complex and sophisticated minds, put them in a room together, and have them ask each other the questions they are asking themselves. [RSS](#)

MATERIALS SCIENCE

Light-induced degradation in amorphous silicon thin film solar cells

Science Daily, 13FEB2014

Researchers in Germany determined that defects in amorphous silicon actually come in two types: those that are uniformly distributed and those that are concentrated in clusters on internal surfaces of microvoids which form within the material during the solar cell manufacturing process. They demonstrated that microvoids are partly responsible for reducing solar cell efficiency by some 10 to 15 percent as soon as you start using them. TECHNICAL ARTICLE

ARTICLE

Tags: Materials science, S&T Germany, Solar energy

Simulating the magnetic properties of nanostructures could help to design electronic memories with increased storage capacity

Science Daily, 13FEB2014

Researchers in Singapore have modeled the changes in the characteristics of magnetic materials as devices are reduced in size to the nanoscale. They used the finite element method to simulate a simple cylindrical nanodevice in all three dimensions. By calculating the energy levels of the device in an external magnetic field, the team could predict the FMR signal for devices of varying sizes. TECHNICAL ARTICLE

Tags: Materials science

Physicists reveal novel magnetoelectric effect

Science Daily, 12FEB2014

An international team of researchers led by the University of Arkansas has shown that a novel magnetoelectric effect could provide a route for using multiferroic materials for the application of RAM in computers and other devices.

TECHNICAL ARTICLE

Tags: Materials science

MICROELECTRONICS

Silicon-germanium chip sets new speed record

Nanowerk, 18FEB2014

An international team of researchers (USA, Germany) operated a silicon-germanium transistor at 798 gigahertz fMAX, exceeding the previous speed record for silicon-germanium chips by about 200 GHz. According to the researchers, although these operating speeds were achieved at extremely cold temperatures, the research suggests that record speeds at room temperature aren't far off.

Tags: Microelectronics

NEUROSCIENCE

What makes memories last? Prion-like proteins help create long-term memories

Science Daily, 12FEB2014

Researchers at the University of Kansas have shown that certain prion-like proteins can be precisely controlled so that they are generated only in a specific time and place. These prion-like proteins are not involved in disease processes; rather, they are essential for creating and maintaining long-term memories. TECHNICAL ARTICLE

Tags: Neuroscience

PHOTONICS

Leeds researchers build world's most powerful terahertz laser chip

EurekAlert, 17FEB2014

Researches in the UK have demonstrated Terahertz frequency quantum cascade lasers emitting peak powers of >1 W from a single facet in the pulsed mode. The active region is based on a bound-to-continuum transition with a one-well injector, and is embedded into a surface-plasmon waveguide. The lasers emit at a frequency of ~3.4 THz and have a maximum operating temperature of 123 K.

TECHNICAL ARTICLE

Tags: Photonics, S&T UK, Terahertz technology

The ultimate miniaturization of lamps: a single-molecule LED

Nanowerk, 13FEB2014

Researchers in France have constructed a device formed from a single polythiophene wire placed between the tip

of a scanning tunneling microscope and a gold surface. It emits light only when the current passes in a certain direction. The experiment sheds light on the interactions between electrons and photons at the smallest scales. It represents yet another step towards creating components for a molecular computer in the future. [TECHNICAL ARTICLE](#)

Tags: Photonics, S&T France

QUANTUM SCIENCE

[Quantum communication scheme provides guaranteed security without quantum memories](#)

[PhysOrg.com](#), 17FEB2014

All QDS (Quantum Digital Signature) schemes, required for quantum communication, proposed so far require advanced quantum memories capable of storing millions of qubits for months or even years. But today's state-of-the-art quantum memories cannot store information for longer than a few minutes. Collaborators from the UK and Germany have proposed a QDS scheme that does not require any quantum memory, making the scheme feasible with current technology. [TECHNICAL ARTICLE](#)

Tags: Quantum science, Communications Technology

[Stirring-up atomtronics in a quantum circuit](#)
[Nanowerk](#), 12FEB2014

Using a superfluid atomtronic circuit, researchers at the University of Maryland have demonstrated a tool that is critical to electronics: hysteresis. This is the first time that hysteresis has been observed in an ultracold atomic gas. Controlling this hysteresis opens up new possibilities for building a practical atomtronic device. [TECHNICAL ARTICLE](#)

Tags: Quantum science

S&T POLICY

[Thinking it through: Scientists seek to unlock mysteries of the brain](#)

[Science Daily](#), 16FEB2014

Under the EU Human Brain Project researchers work to uncover the circuitry of human cognition, identify the genetic roots of disease, unlock the power of Big Data for diagnosis, build a new generation of computing hardware inspired by the brain, and perform revolutionary experiments on a realistic model of the brain.

Tags: S&T policy, Neuroscience, S&T EU

SCIENCE WITHOUT BORDERS

[50 Smartest Companies 2014](#)

[MIT Technology Review](#), 18FEB2014

MIT Technology Review didn't count patents or PhDs; instead, we asked whether a company had made strides in the past year that will define its field. The biggest of these strides happened at Illumina, which is driving down the price of DNA sequencing to levels that will change the practice of medicine. We also found dramatic developments on the Web, in batteries, and even in agricultural technologies. [The List](#)

Tags: Science without borders, Disruptive technology, Emerging technology

SENSORS

[Technology decodes more information from single photons](#)

[Science Daily](#), 12FEB2014

Using superconducting nanowire single-photon detectors researchers from NIST and JPL have designed a detector array that can extract more information than usual from single particles of light. The technology could be useful in optical communications in space. [TECHNICAL ARTICLE](#)

Tags: Sensors, Government S&T ■

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Dr. Brian Beachkofski
Director, Office of
Technical Intelligence (OTI)

Ms. Hema Viswanath
OTI Corporate Librarian