



# S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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## FEATURE ARTICLES

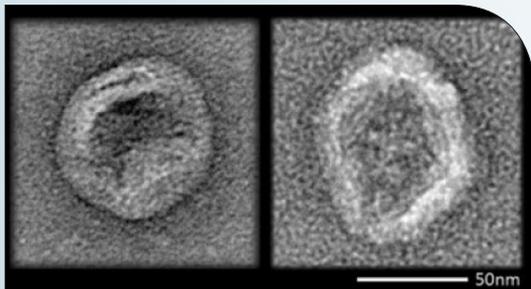
### [Cloaked DNA nanodevices survive pilot mission](#)

[Science Daily, 22APR2014](#)

By mimicking a viral strategy, researchers at Harvard University have created the first cloaked DNA nanodevice that survives the body's immune defenses. Their success opens the door to smart DNA nanorobots that use logic to spot cancerous tissue and manufacture drugs on the spot to cripple it, as well as artificial

microscopic containers called protocells that detect pathogens in food or toxic chemicals in drinking water.

[TECHNICAL ARTICLE](#)



An enveloped virus (left) coats itself with lipid as part of its life cycle. New lipid-coated DNA nanodevices (right) closely resemble those viruses and evade the immune defenses of mice. Credit: Steven Perrault/Harvard's Wyss Institute

[Tags: Biotechnology, Featured Article](#)

### [Diamond Teleporters Herald New Era of Quantum Routing](#)

[MIT Technology Review, 22APR2014](#)

Researchers in the Netherlands have taken a significant step toward quantum routing with the first demonstration of diamond teleporters that can act as nodes in a quantum network. These results establish diamond spin qubits as a prime candidate for the realization of quantum networks for quantum communication and network-based quantum computing. [TECHNICAL ARTICLE](#)

[Tags: Quantum science, Featured Article](#)

## ADVANCED MANUFACTURING

### [Journal article reveals how to make graphene in your blender](#)

[Science Alert \(Australia\), 22APR2014](#)

Researchers in Ireland have described how they took half a litre of water, 10-25mLs of detergent, 20-50g of graphite powder (found in pencil lead) and blended it all in a 400 watt kitchen blender for 10-30 minutes. The result is a large number of tiny graphene flakes suspended in the water. [TECHNICAL ARTICLE](#)

[Tags: Advanced manufacturing](#)

### [Microrobots, Working Together, Build with Metal, Glass, and Electronics \(w/video\)](#)

[MIT Technology Review, 16APR2014](#)

Researchers at SRI International have built an army of magnetically steered workers to test the idea that "microrobots" could be a better way to assemble electronics components, or to build other small structures.

[Tags: Advanced manufacturing](#)

## ADVANCED MATERIALS

### [A new approach to nanoengineering the materials of the future](#)

[Nanowerk, 22APR2014](#)

An international team of researchers (USA, Taiwan, Canada, China) have synthesized a new class of macromolecules that "self-assemble" into various ordered structures with feature sizes smaller than 10 nanometers. The resulting materials are unique because they bridge the gap between small molecule surfactants and traditional block copolymers and thus possess an interesting "duality" in their self-assembly behaviors. [TECHNICAL ARTICLE](#)

[Tags: Advanced materials](#)

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### **Nanomaterial outsmarts ions: Novel types of electronic components made of graphene**

Science Daily, 22APR2014

In order to create a nano-sieve a particularly large number of electrons must be removed from the atoms. Researchers in Germany and Austria report that such highly charged ions either lose a surprisingly large amount of energy or almost no energy at all as they pass through a membrane that measures merely one nanometer in thickness. The discovery is an important step towards developing novel types of electronic components made of graphene. [TECHNICAL ARTICLE 1, 2, 3](#)

Tags: *Advanced materials, S&T Germany*

### **High-temperature plasmonics eyed for solar, computer innovation**

PhysOrg.com, 21APR2014

Researchers at Purdue University report that “plasmonic metamaterials” that operate at high temperatures could radically improve solar cell performance and bring advanced computer data storage technology that uses heat to record information on a magnetic disk.

Tags: *Advanced materials, Materials science*

### **‘Exotic’ material is like a switch when super thin**

Science Daily, 18APR2014

Using molecular-beam epitaxy, researchers at Cornell University and Brookhaven National Laboratory synthesized atomically thin samples of the lanthanum nickelate and discovered that the material changes abruptly from a metal to an insulator when its thickness is reduced to below 1 nanometer. When that threshold is crossed, its conductivity switches off like a light, a characteristic that could prove useful in nanoscale switches or transistors. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Government S&T, Materials science*

### **High-Performance, Low-Cost Ultracapacitors Built with Graphene and Carbon Nanotubes**

Newswise, 18APR2014

By combining the powers of two single-atom-thick carbon structures, researchers at George Washington University have created a new ultracapacitor that is both high performance and low cost. The combination device’s specific capacitance was three times higher than the specific capacitance of a device made from carbon nanotubes alone. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

### **Better thermal-imaging lens from waste sulfur**

Science Daily, 17APR2014

Researchers at the University of Arizona have discovered a chemical process which can transform waste sulfur into lightweight plastic lenses that have a high refractive index

and are transparent to mid-range infrared light. The lenses may have applications in thermal imaging devices and sulfur-lithium batteries. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

### **Clothes That Self-Decontaminate; NRL Material May Also Purify Biofuel**

Naval Research Laboratory, 17APR2014

Researchers at the US Naval Research Laboratory are making materials that capture entire classes of contaminants, then break them down into something harmless. The technology is stable and can be used for clothing, air filters, or even coated on windows and vehicles.

Tags: *Advanced materials, Government S&T*

### **Making new materials an atomic layer at a time**

Science Daily, 16APR2014

A team of university researchers in the US used chemical vapor deposition to grow a layer of quasi-free-standing epitaxial graphene (QFEG) on a silicon carbide substrate, followed by a layer of molybdenum disulfide. The layered material’s efficiency at converting photons to electrons was 100 times higher than MoS<sub>2</sub> alone. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials*

### **Repeated self-healing now possible in composite materials**

Science Daily, 15APR2014

Researchers at the University of Illinois at Urbana-Champaign created 3D vascular networks—patterns of microchannels filled with healing chemistries—that thread through a fiber-reinforced composite. When damage occurs, the networks within the material break apart and allow the healing chemistries to mix and polymerize, autonomously healing the material. [TECHNICAL ARTICLE](#)

Tags: *Advanced materials, Materials science*

## AUTONOMOUS SYSTEMS & ROBOTICS

### **Video Friday: youBots and Drones, Dash in a Box, and a New ASIMO?**

IEEE Spectrum, 18APR2014

A group in Germany demonstrates the capabilities of a monocular pose tracking system. [TECHNICAL ARTICLE](#)

Tags: *Autonomous systems & robotics*

### **World First: Neuron UCAV flying in formation with Rafale, Falcon 7X**

Defense Update, 13APR2014

On March 20, 2014, Dassault Aviation organized a formation flight of the nEUROn unmanned combat air vehicle (UCAV) with a Rafale fighter and a Falcon 7X business jet. This was the first time in the world that a combat drone flew in formation with other aircraft. The

“It is the tension between creativity and skepticism that has produced the stunning and unexpected findings of science.” **CARL SAGAN**

entire operation lasted 1 hour and 50 minutes and took the patrol out over the Mediterranean to a range of several hundred kilometers. [VIDEO](#)

*Tags: Autonomous systems & robotics, S&T EU*

## BIOTECHNOLOGY

### [‘Blood lab’ inside a mobile phone could detect cancer](#)

[Science Daily, 22APR2014](#)

Researchers in the UK are in the early stages of an ‘e-health technology’ project aimed at developing a mobile phone app that can examine blood sample images and diagnose cancer. It would work by taking a magnified image of a blood slide via a microscopic lens attached to the smart phone, which the app would then be able to screen for evidence of leukemia.

*Tags: Biotechnology, S&T UK*

### [Scientists have found a potential cure for Ebola](#)

[Science Alert \(Australia\), 22APR2014](#)

Researchers in the US have discovered a molecule, named BCX4430, which looks a lot like the “A” that makes up DNA: adenosine. Adenosine is one of four base pairs in DNA, and is also used in the genomes of RNA-based viruses, such as Ebola. BCX4430 blocks virus growth and reproduction and stops the virus in its tracks.

*Tags: Biotechnology, Biology, Government S&T*

### [Biosensor bandage collects vital signs, health indicators from sweat](#)

[Defense Systems, 18APR2014](#)

Researchers at the Air Force Research Laboratory are developing a device that could give airmen and others quick feedback on their vital signs, hydration levels, stress levels and other health information. The bandage would contain small biosensors that provide a non-invasive assessment of the same kind of information usually obtained from a blood test or medical scan.

*Tags: Biotechnology, Government S&T*

### [Virus structure inspires novel understanding of onion-like carbon nanoparticles](#)

[Science Daily, 10APR2014](#)

Researchers in the UK have developed new mathematical tools to better understand the implications of this high degree of symmetry in shapes of virus particles which are highly symmetrical and look like tiny footballs. The group pioneered a mathematical theory that reveals unprecedented insights into how different components of a virus mutually constrain each other’s structures.

*Tags: Biotechnology, Biology, S&T UK*

## BREAKTHROUGH TECHNOLOGY

### [10 Breakthrough Technologies 2014](#)

[MIT Technology Review, 22APR2014](#)

Technology news is full of incremental developments, but few of them are true milestones. Here we’re citing 10 that are. These advances from the past year all solve thorny problems or create powerful new ways of using technology. They are breakthroughs that will matter for years to come.

*Tags: Breakthrough technology, Emerging technology*

## COMMUNICATIONS TECHNOLOGY

### [Jacket works like a mobile phone](#)

[Science Daily, 22APR2014](#)

Researchers in Finland developed a jacket and installed wires and sensors in the jacket, together with battery-driven circuitry controlling sensors and speakers fitted into one of the pockets. Instead of a phone screen, a display was sewn into the jacket sleeve showing a line of rolling text. A person receiving a message feels a small vibration in his or her collar.

*Tags: Communications Technology, S&T Finland*

## INFORMATION TECHNOLOGY

### [Information storage for the next generation of plastic computers: Efficient conversion from magnetic storage to light is key](#)

[Science Daily, 16APR2014](#)

Researchers at the University of Iowa successfully accomplished information transduction between a magnet and an organic light-emitting diode at room temperature and without electrical current flow between the magnet and the organic device. The research brings the devices that substitute flexible plastic for silicon chips one step closer to reality. [TECHNICAL ARTICLE](#)

*Tags: Information Technology*

## MATERIALS SCIENCE

### [Filters made of graphene—the thinnest feasible membrane](#)

[Nanowerk 4/23/2014](#)

Researchers in Switzerland have produced a stable porous membrane with a thickness of just two carbon atoms. The membrane is light, flexible, able to withstand pressure gradients of up to 2 atmospheres, and more breathable than Goretex. It may be used for a range of different purposes, including waterproof clothing and filter impurities from fluids. [TECHNICAL ARTICLE](#)

*Tags: Materials science, Advanced materials, S&T Switzerland*

*continued...*

**Scientists capture ultrafast snapshots of light-driven superconductivity**

Science Daily, 16APR2014

Researchers (DOE's Brookhaven National Laboratory, Germany) triggered superconductivity in a copper-oxide material and immediately took x-ray snapshots of its atomic and electronic structure as superconductivity emerged. They discovered that so-called "charge stripes" of increased electrical charge melted away as superconductivity appeared. The new understanding could help pave the way for room-temperature superconductivity.

**TECHNICAL ARTICLE***Tags: Materials science, Government S&T, S&T Germany***FEATURED RESOURCE****arXiv**

arXiv is an e-print service in the fields of physics, mathematics, non-linear science, computer science, quantitative biology, and more. It is owned and operated by Cornell University, funded by Cornell University Library and supporting user institutions. **RSS**

**MICROELECTRONICS****A small connection with big implications: Wiring up carbon-based electronics**

Science Daily, 16APR2014

A good connection between carbon-based materials and external metallic leads is of major importance in nanodevice performance. A team of researchers from Spain and France has taken an important step through studying contacts of carbon nanostructures with atoms of different chemical natures. **TECHNICAL ARTICLE**

*Tags: Microelectronics, Advanced materials***NEUROSCIENCE****Speed-reading apps may impair reading comprehension by limiting ability to backtrack**

Science Daily, 22APR2014

Researchers at the University of California in San Diego found that our ability to control the timing and sequence of how we intake information about the text is important for comprehension. Our brains control how our eyes move through the text—ensuring that we get the right information at the right time. **TECHNICAL ARTICLE**

*Tags: Neuroscience***PHOTONICS****Light goes one way on a chip**

Nature, 16APR2014

A device developed by researchers at the University of St. Louis controls light so that it travels in just one direction. It could be used in high-speed computers that carry signals using light rather than electric charges.

*Tags: Photonics***QUANTUM SCIENCE****Flipping the switch**

Harvard University, 22APR2014

Researchers at Harvard University have succeeded in creating quantum switches that can be turned on and off using a single photon, a technological achievement that could pave the way for creating highly secure quantum networks. **TECHNICAL ARTICLE**

*Tags: Quantum science***Quantum simulators developed to study inaccessible physical systems**

Science Daily, 22APR2014

An international team of researchers (China, USA, Spain) is working on the design of several quantum simulators so they can study the dynamics of complex physical systems. Quantum simulators recreate the behaviour on a microscopic scale of biological and quantum systems and even of particles moving at the speed of light. The exact knowledge of these systems will lead to applications ranging from more efficient photovoltaic cells to more specific drugs.

**TECHNICAL ARTICLE 1, 2***Tags: Quantum science, Advanced materials***Superconducting quantum interference devices: Grasp of SQUIDs dynamics facilitates eavesdropping**

Science Daily, 22APR2014

Researchers at the US Navy Research Laboratory in San Diego have focused on finding an analytical approximation to the theoretical equations that govern the dynamics of an array of SQUIDs. Its applications are mainly in the military sector, including SQUID array-based low-noise amplifiers and antennas. **TECHNICAL ARTICLE**

*Tags: Quantum science, Government S&T, Military technology***Quantum turbulence: New key to unlocking the mysteries of physics?**

Science Daily, 21APR2014

The recent discovery of the Higgs boson has confirmed theories about the origin of mass and, with it, offered the potential to explain other scientific mysteries. But, scientists are continually studying other, less-understood forces that may also shed light on matters not yet uncovered. Among these is quantum turbulence. **TECHNICAL ARTICLE**

*Tags: Quantum science**continued...*

## Quantum computing? Progress in the fight against quantum dissipation

Science Daily, 16APR2014

In an experiment, researchers at Yale University demonstrated that a type of superconducting quantum bit can be immune to dissipation in the presence of a quasiparticle—a microscopic entity that normally saps the energy of the qubit. The results open new frontiers in areas related to quantum information and quantum measurements. TECHNICAL ARTICLE

Tags: *Quantum science*

## SENSORS

### Pocket-sized anthrax detector created

Science Daily, 17APR2014

A credit-card-sized anthrax detection cartridge developed at DOE's Sandia National Laboratory requires no battery or electric power to operate. It's hardy against wide temperature variation. The device amplifies the B. anthracis so it can detect as few as 100 spores instead of the typical 1-10 million required for detection.

Tags: *Sensors, Government S&T*

## Computer software analyzing facial expressions accurately predicts student test performance

Science Daily, 16APR2014

According to a study by the University of California at San Diego, real-time engagement detection technology that processes facial expressions can perform with accuracy comparable to that of human observers. The study used automatic expression recognition technology to analyze students' facial expressions on a frame-by-frame basis and estimate their engagement level. TECHNICAL ARTICLE

Tags: *Sensors* ■

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