



S&T NEWS BULLETIN

THE LATEST IN SCIENCE AND TECHNOLOGY RESEARCH NEWS

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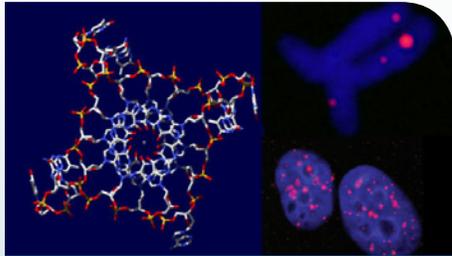
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FEATURE ARTICLES



Researchers have shown that four-stranded 'quadruple helix' DNA structures -- known as G-quadruplexes -- exist within the human genome. (Credit: Jean-Paul Rodriguez and Giulia Biffi)

'Quadruple helix' DNA discovered in human cells

Science Daily, 20JAN2013

On the 60th Anniversary of the discovery of "double

helix", Cambridge researchers have published another article demonstrating that four-stranded "quadruple helix" DNA structures—known as G-quadruplexes—also exist within the human genome. [TECHNICAL ARTICLE](#)

Tags: Breakthrough technology, Biology, S&T UK, Featured Article

Setting Ground Rules for Quantum Circuits

American Physical Society, 20JAN2013

A new theoretical work uses a simplification related to the symmetry of the device to calculate the electronic energy levels in a previously studied circuit. This approach could guide the development of more complex quantum circuits in the future. [TECHNICAL ARTICLE](#)

Tags: Quantum science, Featured Article

S&T NEWS ARTICLES

ADVANCED MANUFACTURING

Self-assembling silica microwires may herald new generation of integrated optical devices

Nanowerk, 23JAN2013

By carefully controlling the shape of water droplets with an ultraviolet laser, a team of researchers from Australia and France has found a way to coax silica nanoparticles to self-assemble into much more highly uniform silica wires. Silica microwires, if they could be manufactured or self-assembled in place, have the potential to operate as optical interconnects. They also could achieve new functionality by

adding different chemicals that can only be introduced by self-assembly. [TECHNICAL ARTICLE](#)

Tags: Advanced manufacturing, Communications Technology, S&T Australia, S&T France

ADVANCED MATERIALS

Twisted carbon nanotube yarns with unique mechanical properties

Nanowerk Spotlight, 22JAN2013

Researchers in China have found that carbon nanotubes can be self-assembled into a stable double-helix structure by a controlled over-twisting process, and this novel structure has unique mechanical properties. The new material may open the way for a wide range of structural and functional applications, including composites, intelligent fabrics, catalyst supports, and sensors. [TECHNICAL ARTICLE](#)

Tags: Advanced materials, S&T China

Researchers keep electronic devices cool with nanotechnology

R&D Magazine, 21JAN2013

By finding out how molecules behave in ultrasmall devices, researchers in Singapore have achieved a ten-fold increase in switching efficiency by changing just one carbon atom. These devices could provide new ways to combat overheating in mobile phones and laptops, and could also aid in electrical stimulation of tissue repair for wound healing.

Tags: Advanced materials, Materials science

Nanometer-scale optical positioning and focusing

Foresight Institute, 20JAN2013

Stanford University researchers have designed an innovative light aperture that allows them to optically trap smaller objects than ever before—potentially just a few atoms in size. They have shown theoretically that light passed through their novel aperture would stably trap objects as small as 2 nanometers. [TECHNICAL ARTICLE](#)

Tags: Advanced materials

continued...

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A nanocoating that most liquids won't wet (w/video)

Nanowerk, 19JAN2013

A nanoscale coating that's at least 95 percent air repels the broadest range of liquids of any material in its class, causing them to bounce off the treated surface, according to the University of Michigan engineering researchers who developed it. In addition to super stain-resistant clothes, the coating could lead to breathable garments to protect soldiers and scientists from chemicals, and advanced waterproof paints that dramatically reduce drag on ships.

TECHNICAL ARTICLE

Tags: *Advanced materials, Materials science***Magnets where less is more**

Nanowerk, 19JAN2013

Researchers in Japan have discovered a magnet which becomes weaker as the number of electrons increases. The new magnet, made from bismuth telluride to which the magnetic material manganese is added, belongs to a new class of materials known as topological insulators. In these materials, electrons on the surface behave very differently from those in the rest of the material. The work has implications for both fundamental science as well as future energy-saving technologies. TECHNICAL ARTICLE

Tags: *Advanced materials, Materials science***AUTONOMOUS SYSTEMS & ROBOTICS****Video Friday: One Moose, One Hundred Kilobots, and Robots Refueling Satellites**

IEEE Spectrum, 18JAN2013

Rethink put together this little montage of the robot setting up containers with a vacuum gripper, sorting parts, loading gears into partitioned boxes, re-orienting objects and packing boxes, and loading/unloading a conveyor.

Tags: *Autonomous systems & robotics***BIOTECHNOLOGY****Odd biochemistry yields lethal bacterial protein**

e! Science News, 22JAN2013

Researchers at the University of Illinois found that a single enzyme helps form distinctly different, three-dimensional ring structures in protein, one of which had never been observed before. The new findings should help scientists find new ways to target the enterococcal cytolysin protein, a "virulence factor" that is associated with acute infection in humans.

Tags: *Biotechnology***Developing Microbial Cell Factories by Employing Synthetic Small Regulatory RNAs**

Science Newsline, 21JAN2013

Researchers in Korea created novel RNAs that can regulate the translation of multiple messenger RNAs (mRNA), consequently varying the expression levels of multiple genes at the same time. The new strategy is expected to facilitate the efficient development of microbial cell factories capable of producing chemicals, fuels and materials from renewable biomass.

Tags: *Biotechnology***BREAKTHROUGH TECHNOLOGY****Chinese Physicists Build "Ghost" Cloaking Device**

MIT Technology Review, 22JAN2013

Conventional illusion cloaks rely on a two stage process. The first is a kind of invisibility stage which distorts incoming light to remove the scattering effect of the cloaked object. The second stage then distorts the scattered light to make it look as if it has been scattered off another object. Researchers in China have achieved a slightly different effect which they call a "ghost cloak" by doing away with the first stage. TECHNICAL ARTICLE

Tags: *Breakthrough technology, Military technology, S&T China***ENERGY****Belgium plans artificial island to store wind power**

KurzweilAI, 22JAN2013

Belgium is planning to build a doughnut-shaped island in the North Sea that will store wind energy by pumping water out of a hollow in the middle. The island, which would also work as an offshore substation to transform the voltage of the electricity generated by wind turbines, could take five or more years to plan and build.

Tags: *Energy, Wind energy***Thin Film Solar Gets a Boost from a New Record Efficiency**

MIT Technology Review, 22JAN2013

Researchers in Switzerland demonstrated solar cells with an efficiency of 20.4 percent, which is far better than the roughly 13 percent efficiency of flexible CIGS cells used in commercial applications such as solar rooftop shingles. It's also better than the typical silicon solar cells, which are roughly 16 percent efficient.

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

“There is no adequate defense, except stupidity, against the impact of a new idea.”

PERCY WILLIAMS BRIDGMAN

ENVIRONMENTAL SCIENCE

'Rock dissolving' method of geoengineering to mitigate climate change would not be easy

Science Daily, 21JAN2013

Researchers in Germany have calculated that if three gigatons of olivine were deposited into the oceans each year, it could compensate for only around nine per cent of present day anthropogenic CO2 emissions. [TECHNICAL ARTICLE](#)

Tags: Environmental science, Climatology, S&T Germany

FOREIGN S&T

China's first Resistive Magnet successfully tested at CAS Institute in Hefei

China NOST News, 21JAN2013

The magnet successfully reached a magnetic field of 26.5 tesla with 10 megawatt/20000-A DC current input. The CAS laboratory was appointed by the Chinese government to construct four national resistive magnets and a hybrid magnet. The project aims to build a 40T hybrid magnet, a series of high power resistive magnets for multiple uses and superconducting magnets. 20MW, high power and high stability power supply and 20MW de-ionized water cooling system will be built for the resistive magnets.

Tags: Foreign S&T, S&T China

China's top 10 science and technology progress of 2012

China NOST News, 21JAN2013

Chinese Academy of Sciences and Chinese Academy of Engineering unveiled the top ten science and technology progress of China for the year 2012.

Tags: Foreign S&T, S&T China

Polymer sieve divides gases by size

Futurity.org, 21JAN2013

Polymer's molecular structure is very contorted so that it cannot fill space efficiently, therefore leaving gaps for small gas molecules to move through quickly. However, the transport of larger gas molecules is hindered by the polymer's extreme rigidity so that it acts as an efficient molecular sieve. Gas separation is crucial for many industrial processes, including obtaining nitrogen or oxygen from air and purifying natural gas or hydrogen. [TECHNICAL ARTICLE](#)

Tags: Foreign S&T, S&T UK

GOVERNMENT S&T

Falling Up: DARPA To Launch Just-In-Time Payloads From Bottom Of Sea

DARPA News, 21JAN2013

The UFP (Upward Falling Payloads) concept centers on developing deployable, unmanned, distributed systems that lie on the deep-ocean floor in special containers for years at a time. These deep-sea nodes would then be woken up remotely when needed and recalled to the surface. In other words, they "fall upward."

Tags: Government S&T, DARPA

New \$28M Center Will Develop Computers of 2025

Newswise, 20JAN2013

The Center for Future Architectures Research (C-FAR) opens today and involves 14 other major research institutions. C-FAR aims to harness the power and boost the reliability of the tiniest transistors that will emerge over the next decade. C-FAR is one of six new centers announced today by the Semiconductor Research Corporation, DARPA and other major firms.

Tags: Government S&T, Information technology

IMAGING TECHNOLOGY

Researchers Develop Integrated Dual-mode Active And Passive Infrared Camera

Science Newline, 20JAN2013

Using the unique band-structure engineering capabilities of type-II superlattices, researchers at Northwestern University have developed a new structure incorporating two different superlattices with different layer spacings, thus enabling detection with a cutoff wavelength of either 2.2µm (active mode) or 4.5µm (passive mode). This new device can simply switch from passive to active mode by a very small change in bias. [TECHNICAL ARTICLE](#)

Tags: Imaging technology

INFORMATION TECHNOLOGY

Cisco Futurists Plan For Internet Of Everything

Information Week, 22JAN2013

Cisco foresees connected devices, pervasive sensing and big data will drive need for data scientists to bring order to information overload.

Tags: Information Technology

Data storage: Reflections turned upside down

Nanowerk, 19JAN2013

Researchers in Singapore found that materials made of the chemical elements iron and tellurium can change their optical reflectivity depending on their crystalline state. They demonstrated that the change can be induced simply and reversibly by heating the material. This switchable reflectivity provides a practical way for managing data in a small area. [TECHNICAL ARTICLE](#)

Tags: *Information Technology*

FEATURED RESOURCE**Nature Video**

For selected articles and letters Nature presents streaming videos featuring interviews with scientists behind the research and analysis from Nature editors.

MATERIALS SCIENCE**Quantum Chaos on Display**

American Physical Society Spotlight, 22JAN2013

A system proposed by researchers in Sweden, would allow comprehensive investigation of the physics of quantum chaos and the recent demonstrations of spin-orbit-coupled gases of bosons, suggest that a realization of their ideas may soon be within reach. Their approach might then help address a key unresolved question: What drives—at the quantum mechanical level—the process of thermalization?

[TECHNICAL ARTICLE](#)

Tags: *Materials science, S&T Sweden*

Cotton with special coating collects water from fogs in desert

Science Daily, 21JAN2013

Researchers in Hong Kong have developed a special treatment for cotton fabric that allows the cotton to absorb exceptional amounts of water from misty air, 340% of its own weight. The cotton releases the collected water by itself, as it gets warmer. This property makes the coated cotton materials a potential solution to provide water to the desert regions, for example for agricultural purposes.

[TECHNICAL ARTICLE](#)

Tags: *Materials science*

Rare earth oxides make water-repellent surfaces that last

MIT News, 20JAN2013

Durable materials such as metals and ceramics rendered hydrophobic by polymeric modifiers deteriorate in harsh environments. Researchers at MIT have shown that a class of ceramics comprising the entire lanthanide oxide series, ranging from ceria to lutecia, is intrinsically hydrophobic. Their hydrophobicity is attributed to the unique electronic structure, which inhibits hydrogen bonding with interfacial water molecules. [TECHNICAL ARTICLE](#)

Tags: *Materials science*

MICROELECTRONICS**UT Dallas Researchers Awarded \$4.3 Million To Create Next-Generation Technologies**

Newswise, 22JAN2013

Two teams of researchers from the University of Texas at Dallas have been chosen to help a \$194 million national network create technologies of the next generation. One team will evaluate materials to replace silicon in integrated circuits, with the goal of creating faster electronics that use dramatically less power. The other team will help design a computer architecture that allows the many types of computers used in everyday life to seamlessly communicate with one another.

Tags: *Microelectronics*

PHOTONICS**Pushing the limits of broadband**

Nanowerk, 19JAN2013

The inability to efficiently fabricate photodetectors directly onto silicon chips has hindered faster broadband speeds. Using thin films of germanium and silicon, researchers in Singapore have developed an ultrafast photodetector that may overcome this problem. [TECHNICAL ARTICLE](#)

Tags: *Photonics*

QUANTUM SCIENCE**Quantum states between order and disorder**

Nanowerk, 23JAN2013

Ultra cold atom clouds with a high degree of order approach a disordered thermal equilibrium. During this transition they spend some time in an astonishingly stable intermediate state. With a new European Research Council Grant researchers in Austria will now dig deeper into the physics of non-equilibrium phenomena in many-particle quantum systems.

Tags: *Quantum science, S&T EU*

S&T POLICY

Nanotechnology in Australia—companies, research, and degree programs**Nanowerk, 23JAN2013**

There are 51 companies in Australia involved in nanotechnology-related business activities. In addition, there are 74 nanotechnology and nanoscience-related research and community organizations. Among universities, there are 19 academic nanotechnology degree programs.

*Tags: S&T policy, S&T Australia***Japan's stimulus package showers science with cash****Nature News, 22JAN2013**

The supplementary budget provides billions of yen for key fields and significant boosts for many big scientific facilities—including ¥8.4 billion for data links between the K supercomputer and Japan's universities. Among the many other winners are the SPring-8 synchrotron, international fusion energy project ITER, and the Japanese space agency. But the biggest beneficiary of the stimulus is stem-cell research, ¥21.4 billion.

Tags: S&T policy, R&D Funding, S&T Japan

SENSORS

Image sensors out of a spray can**Nanowerk, 22JAN2013**

Researchers in Germany have developed a new generation of image sensors that are more sensitive to light than the conventional silicon versions, with the added bonus of being simple and cheap to produce. They consist of electrically conductive plastics, which are sprayed on to the sensor surface in an ultra-thin layer. **TECHNICAL ARTICLE**

*Tags: Sensors, S&T Germany***Nearly perfect, ultrathin invisibility cloak could have wide practical applications****PhysOrg.com, 20JAN2013**

Researchers in China have created a dc invisibility cloak made of a metamaterial that not only shields an object almost perfectly, but also the thinnest cloak ever constructed, reaching the ultimate limit of thinness for artificial materials. It could open the doors to practical applications. **TECHNICAL ARTICLE**

*Tags: Sensors, Military technology, S&T China***Novel Sensor Provides Bigger Picture****Science Newsline, 20JAN2013**

Duke University engineers have developed a novel sensor that is more efficient, versatile and cheaper for potential use in such applications as airport security scanners and collision avoidance systems for aircraft, cars or maritime vessels.

*Tags: Sensors***Researchers create method for more sensitive electrochemical sensors****EurekaAlert, 20JAN2013**

High sensitivity was achieved by precisely designing the nanohybrid and correlating the available metal ions with analyte concentration. They used tiny magnetic particles encapsulated in inert coating of silicon dioxide to make core-shell nanostructures with favorable magnetic properties of metallic iron while preventing them from oxidation or significant degradation.

*Tags: Sensors ■***ABOUT THIS PUBLICATION**

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