

TECHNOLOGY ROUNDUP

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Tech News

Indigenous Technology

Pakistan: Bioanalyzer: An Efficient Tool for Sequence Retrieval, Analysis and Manipulation

“Bioanalyzer” is a user-friendly bioinformatics toolkit to support bioinformatics lab work. It has powerful features of sequence analysis (i-e. DNA sequence, RNA Sequence, Protein Sequence) and 3D Protein Modelling with excellent Graphical view.

The functionalities included in the software are Database Parsing, in silico central dogma analysis tools, sequence and structure alignment, Sequence Calculations, Format Conversion, In silico mutations, 3D protein Modelling, Primer Designing and many other features that are never assembled together. It has a simple Graphic User Interface (GUI) in which user can provide information and presses submit button and resulted information can be visualized in output area. It provides detail description of the tools available to enhance the knowledge of the user about the usage of the system.

This software can help researchers of bioinformatics and computational biology to analyze their data in more efficient and better way. It can be used in biological research institutes and can help researchers in drug designing, primer designing and sequence analysis.

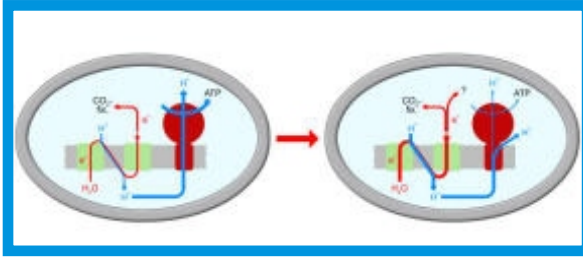
Courtesy to

Sobia Idrees, Shahid Nadeem, Hassan Tariq

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Stress Protection: How Blue-Green Algae Hoard Energy



The researchers at the Ruhr-University found that under normal conditions, cyanobacteria, also termed blue-green algae, build up energy reserves that allow them to survive under stress such as long periods of darkness. They do this by means of a molecular switch in an enzyme. By removing this switch, researchers now show that it is possible to use the excess energy of the bacteria for biotechnological purposes such as hydrogen production, without the bacteria suffering.

The energy-rich molecule ATP serves as a store for the energy gained through photosynthesis in plants. It is built up, and where necessary broken down again, by the enzyme ATPase. To guard the bacterium against stress situations with too much or too little light, the ATPase of the cyanobacteria has a small area which acts like a switch. It prevents the ATP from being broken down prematurely in the dark, when no photosynthesis takes place. The bacterium thus creates a store of energy which helps it through stress phases. However, this switch also slows the rate of photosynthetic electron transport with the water splitting in light.

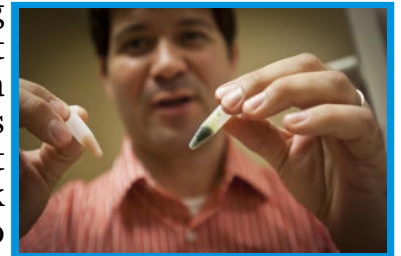
In the experiment the researchers removed the switch area of the ATPase in cyanobacteria by means of genetic engineering. They expected that the bacteria would suffer much more afterwards and that they would become much slower, but that was not the case. The bacteria grew just as usual under laboratory conditions -- without light stress. However, they create lower ATP energy reserves, so they cannot survive very long dark periods as well as the wild type. On the other hand, the excess energy in light, which otherwise went into the reserves, is now available for biotechnological use.

Prof. Roger estimated that this should make it possible to use at least 50% of the energy gained from light-driven water splitting for other processes in the future, e.g. for solar-powered biological hydrogen production through cyanobacterial mass cultures in photobioreactors," estimates Prof. Roegner."

www.ruhr-uni-bochum.de

New Process could Lead to Production of Hydrogen using Bioengineered Microorganisms

Many kinds of algae and cyanobacteria, common water-dwelling microorganisms, are capable of using energy from sunlight to split water molecules and release hydrogen, which holds promise as a clean and carbon-free fuel for the future. One reason of this approach has not yet been harnessed for fuel production is that under ordinary circumstances, hydrogen production takes a back seat to the production of compounds that the organisms use to support their own growth.



Shuguang Zhang, associate director of MIT's Center for Biomedical Engineering, together with researchers have found a way to use bioengineered proteins to flip this preference, allowing more hydrogen to be produced.

The algae are really not interested in producing hydrogen, they want to produce sugar, says the sugar is what they need for their own survival, and the hydrogen is just a byproduct. But a

multitasking enzyme, introduced into the liquid where the algae are at work, both suppresses the sugar production and redirects the organisms energies into hydrogen production. Yacoby said adding the bioengineered enzyme increases the rate of algal hydrogen production by about 400 percent. He explained the sugar production is suppressed but not eliminated, because if it went to zero, it would kill the organism.

The research demonstrates for the first time how the two processes carried out by algae compete with each other; it also shows how that competition could be modified to favor hydrogen production in a laboratory environment. Zhang and Yacoby plan to continue developing the system to increase its efficiency of hydrogen production.

Zhang said it is one step closer to an industrial process. First, you have to understand the science which has been achieved through this experimental work. Zhang said that now, developing it further through refinements to produce a viable commercial system for hydrogen fuel manufacturing is a matter of time and money.

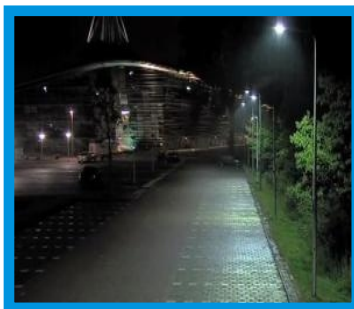
The researchers say ultimately, such a system could be used to produce hydrogen on a large scale using water and sunlight. The hydrogen could be used directly to generate electricity in a fuel cell or to power a vehicle, or could be combined with carbon dioxide to make methane or other fuels in a renewable, carbon-neutral way.

Yacoby said in the long run, the only viable way to produce renewable energy is to use the sun, to make electricity or in a biochemical reaction to produce hydrogen. There is no one solution, he adds, but rather many different approaches depending on the location and the end uses.

This particular approach is simple enough that it has promise not just in industrialized countries, but in developing countries as well as a source of inexpensive fuel. The algae needed for the process exist everywhere on Earth, and there are no toxic materials involved in any part of the process.

<http://www.mit.edu>

Intelligent Street Lighting Saves 80% Energy



Delft University of Technology (TU Delft) is currently testing an intelligent street lighting system on its campus, which uses up to 80% less electricity than the current systems and is also cheaper to maintain. The system consists of street lights with LED lighting, motion sensors and wireless communication. This enables the installation to dim the lights when there are no cars, cyclists or pedestrians in the vicinity. Wireless communication between the street lights and a control room is also possible. The system was developed by TU Delft alumnus Management of Technology, Chintan Shah, with the concept for

improving energy efficiency.

The network of street lighting emits over 1.6 million tons of CO₂ a year. The lights are always on at full power, regardless of whether there is anyone in the area. Compared with the current street-lighting system, Chintan Shah's intelligent system can reduce energy consumption and CO₂ emission by up to 80%, is cheaper to maintain and can also help solve the problem of light pollution.

Shah's system consists of electronic gear that can be added to any dimmable street light. The system comprises street lights with LED lighting, motion sensors and wireless communication. At first glance, it looks a lot like a widely available type of garden light with a motion sensor, but there

are significant differences. In Shah's system, all surrounding street lights light up if anyone approaches. And the lights never go out completely; they are dimmed to approx. 20% of the standard power. Passers-by move in a safe circle of light as it were. An added bonus is the fact that the lights automatically communicate any failures to the control room. This makes maintenance cheaper and more efficient than it is now.

The aim of the pilot on the TU Delft campus is to thoroughly test and fine-tune the system, to prevent swaying branches or passing cats from switching the lights to full power, for instance. Shah is working with his TU Delft spin-off company Tvilight on the market introduction of the system, which he expects to be profitable within 3-5 years. Shah said that this technology differs in certain aspects from the existing systems of other companies and all of this new technology has been patented. TU Delft is also curious to know the results of the pilot. Professor of Wind Energy, Gijs van Kuik, is actively involved in making the campus more sustainable: This is a promising opportunity to save energy on street lighting.

<http://home.tudelft.nl>

Forklift Trucks that Run on a Green Charge

The first forklift trucks in Europe that will run on fuel cells and with hydrogen in their tanks are on the way to the market.

The SINTEF scientist points out that a forklift truck fitted with fuel cells and operating two eight-hour shifts a day reduces CO₂ emissions by the equivalent of eight private cars.

Steffen Møller-Holst is a participant in the project's development phase, which will bring the green European truck to its final goal. Under its bodywork, the truck houses a miniature power station in the shape of a fuel cell that runs on hydrogen, and which delivers power to its electric motor. All that the truck emits in operation is water vapour.

A hydrogen-driven forklift truck running on fuel cells combines the advantages of diesel and battery-driven vehicles. The hydrogen-based technology means rapid refuelling, just like diesel, while it is also energy-efficient and every bit as environmentally friendly as a battery truck.

The truck's power system has been developed in the course of a joint European effort run by the European Union.

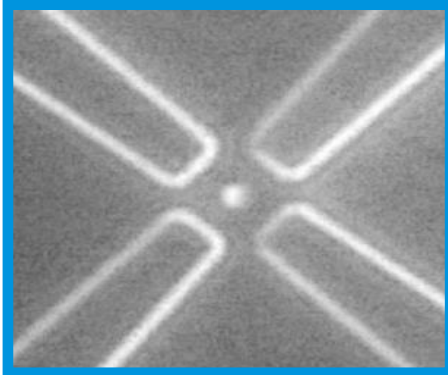
SINTEF is to perform laboratory tests that will explore how much fuel cell performance falls by over time. At the same time, SINTEF will systematize and analyze feedback from the trials of the 30 demonstration trucks. The knowledge gained in this process will be used to improve the control system and optimize operation, which will ensure that the fuel cell will have a life-cycle that meets the commercial requirements of the market.

The Danish company H2 Logic AS has been responsible for developing the trucks' fuel-cell technology. These large forklift trucks in the joint European project have been designed to carry heavy loads.

<http://www.ieeeusa.org>



Particle Trap Paves way for Personalized Medicine



Sequencing DNA base pairs the individual molecules that make up DNA is key for medical researchers working toward personalized medicine. Being able to isolate, study and sequence these DNA molecules would allow scientists to tailor diagnostic testing, therapies and treatments based on each patient's individual genetic makeup.

But being able to isolate individual molecules like DNA base pairs, which are just two nanometers across or about $1/50,000^{\text{th}}$ the diameter of a human hair is incredibly expensive and difficult to control. In addition, devising a way to trap DNA molecules in their natural aqueous environment

further complicates things. Scientists have spent the past decade struggling to isolate and trap individual DNA molecules in an aqueous solution by trying to thread it through a tiny hole the size of DNA, called a "nanopore," which is exceedingly difficult to make and control.

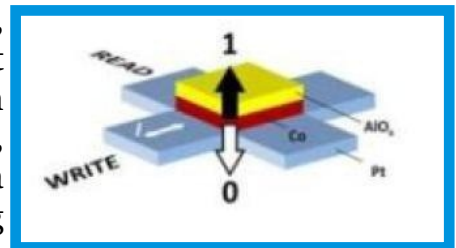
A team led by Yale University researchers has proven that isolating individual charged particles, like DNA molecules, is indeed possible using a method called Paul trapping, which uses oscillating electric fields to confine the particles to a space only nanometers in size. The technique is named for Wolfgang Paul, who won the Nobel Prize for the discovery. Until now, scientists have only been able to use Paul traps for particles in a vacuum, but the Yale team was able to confine a charged test particle in this case, a polystyrene bead to an accuracy of just 10 nanometers in aqueous solutions between quadruple microelectrodes that supplied the electric field.

Their device can be contained on a single chip and is simple and inexpensive to manufacture. The idea would be that doctors could take a tiny drop of blood from patients and be able to run diagnostic tests on it right there in their office, instead of sending it away to a lab where testing can take days and is expensive. In addition to diagnostics, this "lab-on-a-chip" would have a wide range of applications, Guan said, such as being able to analyze how individual cells respond to different stimulation. While there are several other techniques for cell-manipulation available now, such as optical tweezers, the Yale team's approach actually works better as the size of the targets gets smaller, contrary to other approaches.

www.yale.edu

Computers: The Art of Magnetic Writing

Computer files that allow us to watch videos, store pictures, and edit all kinds of media formats are nothing else but streams of bits of digital data zeros and ones. Modern computing technology is based on our ability to write, store, and retrieve digital information as efficiently as possible. In a computer hard disk, this is achieved in practice by writing information on a thin magnetic layer, where magnetic domains pointing "up" represent a "1" and magnetic domains pointing down represent a "0."



The size of these magnetic domains has now reached a few tens of nanometers, allowing us to store a terabyte of data in the space of just about 4 square centimeters. Miniaturization, however, has created numerous problems that physicists and engineers worldwide struggle to solve at the pace demanded by an ever growing information technology industry. The process of writing information on tiny magnetic bits one by one, as fast as possible, and with little energy consumption, represents one of the biggest hurdles in this field.

A team of scientists from the Catalan Institute of Nanotechnology, ICREA, and Universitat Autònoma de Barcelona, Mihai Miron, Kevin Garello, and Pietro Gambardella, in collaboration with Gilles Gaudin and colleagues working at SPINTEC in Grenoble, France, have discovered a new method to write magnetic data that fulfills all of these requirements. Magnetic writing is currently performed using magnetic fields produced by wires and coils, a methodology suffering severe limitations in scalability and energy efficiency. The new technique eliminates the need for cumbersome magnetic fields and provides extremely simple and reversible writing of memory elements by injecting an electric current parallel to the plane of a magnetic bit. The key to this effect lies in engineering asymmetric interfaces at the top and bottom of the magnetic layer, which induces an electric field across the material, in this case a cobalt film less than one nanometer thick sandwiched between platinum and aluminum oxide. Due to subtle relativistic effects, electrons traversing the Co layer effectively see the material's electric field as a magnetic field, which in turn twists their magnetization. Depending on the intensity of the current and the direction of the magnetization, one can induce an effective magnetic field, intrinsic to the material that is strong enough to reverse the magnetization.

The research team showed that this method works reliably at room temperature using current pulses that last less than 10 ns in magnetic bits as small as 200 x 200 square nanometers, while further miniaturization and faster switching appear easily within reach. Although there is currently no theory describing this effect, this work has many interesting applications for the magnetic recording industry, and in particular for the realization of magnetic random access memories, so-called MRAMs. By replacing standard RAMs, which need to be refreshed every few milliseconds, non-volatile MRAMs would allow instant power up of a computer and also save a substantial amount of energy.

An additional advantage of the discovery reported here is that current-induced magnetic writing is more efficient in "hard" magnetic layers than in "soft" ones. This is somehow counterintuitive, as soft magnetic materials are by definition the easier to switch using external magnetic fields, but very practical since hard magnets can be miniaturized to nanometer dimensions without losing their magnetic properties. This would allow the information storage density to be increased without compromising the ability to write it. The results of this work have also led to three patent applications dealing with the fabrication of magnetic storage and logic devices.

www.nanocat.org

Forthcoming Tech Events

Advanced Gas Chromatography

12-14 October, 2011

Berlin, Germany

www.analytica-world.com

5th European Solar Thermal Energy Conference

20-21 October, 2011

Marseille, France

www.estec2011.eu

China International Pharmaceutical Machinery Exposition

29 October-1 November, 2011

QINGDAO, China

www.cipm-expo.com

International Conference on Solid Waste Management and Exhibition

9-11 November, 2011

Kolkata, India

www.environbusiness.com

Tech & Trade Offers

Pipe Line Laying

Specifications:

- High pressure cross country pipeline
- Plant piping work.
- Upgrading existing pipelines.
- Cathodic protection activities.

Company Contact

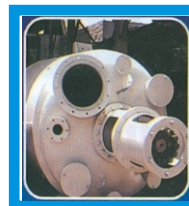
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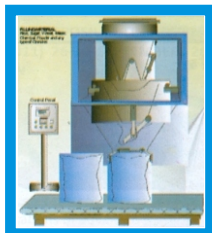
www.asiaengineers.com



Auto Bag Filling System

Specifications:

Machine type: Weighing
Control type: PLC based
Packing weight: 5-50 Kg.
Accuracy: ± 20 grams
Machine speed: 10-12 Bag/min
Power supply: 220 VAC
Pneumatic supply: 4-6 bar

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