

TECHNOLOGY ROUNDUP

A NEWS BULLETIN FROM
Technology Information Section (TIS)
Pakistan Scientific & Technological Information Centre



Sep-Oct, 2012

Vol. 4, No. 5

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Forthcoming Tech Events

- Conference on Life Science and Technology 2013
- 3rd International Conference on Life Science and Technology (ICLST 2013)
- Oil Spill & Ecosystem Science Conference
- India Rubber Expo
- Arab Health
- 2nd International Conference on Applied Physics and Mathematics (ICAPM 2013)
- Annual International conference on Optoelectronics, Photonics & Applied Physics (OPAP)
- International Conference on Nuclear Data for Science and Technology.

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Tech News

Indigenous Technology

New Screening Technique for Salt Tolerance in Maize (*Zea mays* L.) Seedlings

An efficient and simple mass screening technique for selection of maize hybrids for salt tolerance has been developed. Genetic variation for salt tolerance was assessed in hybrid maize (*zea mays* L.) using solution-culture technique. The study was conducted in solution culture exposed to four salinity levels (control, 40, 80 and 120 mM NaCl). Seven days old maize seedlings were transplanted in thermopool sheet in iron tubs containing 1/2 strength Hoagland nutrient solutions and salinized with common salt (NaCl). The experiment was conducted in the rain protected wire house of Stress Physiology Laboratory of NAIB, Faisalabad, Pakistan. Ten maize hybrids were used for screening against four salinity levels. Seedling for each hybrid was compared for their growth under saline conditions as a percentage of the control values. Considerable variations were observed in the root, shoot, length and biomass of different hybrids at different salinity levels. The leaf sample analyzed for inorganic osmolytes (sodium, potassium and calcium) showed that hybrid pioneer32B33 and Pioneer30Y87 have high biomass, root, shoot, fresh weight and high K⁺/Na⁺ ratio and showed best salt tolerance performance at all salinity levels on overall basis.

Courtesy

Pakistan Journal of Botany, 2010 42(1): 141-154 refs 44

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Treatment with Purple Corn for Type 2 Diabetes & Kidney Disease

Diabetic nephropathy is one of the most serious complications related to diabetes, often leading to end stage kidney disease. Purple corn grown in Peru and Chile is a relative of blue corn is rich in anthocyanins (also known as flavonoids), which are reported to have anti-diabetic properties. Scientists from the Department of Food and Nutrition and Department of Biochemistry at Hallym University, Korea investigated the cellular and molecular activity of purple corn anthocyanins (PCA) to determine whether and how it affects the development of diabetic nephropathy (DN). Their findings suggest that PCA inhibits multiple pathways involved in the development of DN, which may help in developing therapies aimed at type 2 diabetes and kidney disease.

The study comprises of two parts. In the first part, an *in vitro* experiment was carried out to investigate the effects of PCA on human endothelial cells cultured under hyperglycemic kidney conditions. The cultured cells were exposed to 1-20 µg/ml of PCA for six hours (control cells were not exposed), then assessed for level of monocyte-endothelial cell adhesion, a major factor in the development of diabetic glomerulosclerosis.

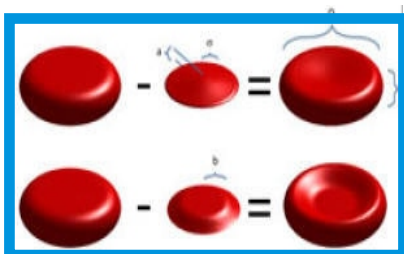
In the second part, an *in vivo* study was carried out to find out the effects of PCA on kidney tissue in diabetic mice. The diabetic and control mice were dosed with PCA for eight weeks, then changes in kidney tissue were assessed and immunohistological analyses were performed. Kidney tissue was further analyzed for levels of inflammatory chemokines, which are key components in DN.

Researchers found that in human endothelial cells cultured in hyperglycemic kidney conditions, induction of endothelial cell adhesion molecules decreased in a dose-dependent manner with PCA exposure, meaning that the PCA likely interfered with cell-cell adhesion in glomeruli. PCA also appeared to interfere with leukocyte recruitment and adhesion to glomerular endothelial cells. While in diabetic mice, PCA exposure slowed mesangial expansion and interrupted the cellular signaling pathway that may instigate glomerular adhesion and infiltration of inflammatory cells responsible for diabetic glomerulosclerosis. Finally, PCA inhibited levels of macrophage inflammatory protein-2 and monocyte chemoattractant protein-1 in kidney tissue, demonstrating that it may inhibit macrophage infiltration, which is closely related to renal inflammation.

The research results showed that the anthocyanins may be the main biofunctional compound in purple corn that protect against mesangial activation of monocytes and infiltration of macrophages in glomeruli, the two major contributors to DN. It was also found that renoprotection by PCA against mesangial activation may be specific therapies targeting diabetes-associated diabetic glomerulosclerosis and renal inflammation. Therefore, PCA supplementation may be an important strategy in preventing renal vascular disease in type 2 diabetes. PCA may have a potential to act as reno-protective agent, treating diabetes-associated glomerulosclerosis.

WWW.ScienceDaily.com

New Healthy Cell Signature Technique for Faster and Accurate Blood Tests



Researchers from the University of Illinois at Urbana-Champaign (UIUC) have pioneered a technique that will allow doctors to ascertain the healthy shape of red blood cells in just a few seconds, by analyzing the light scattered off hundreds of cells at a time.

Misshapen red blood cells (RBCs) are a sign of serious illnesses, such as malaria and sickle cell anemia. Until recently, the only way to assess whether a person's RBCs were of the correct shape was to look at them individually under a microscope which is a time

consuming process for pathologists.

A healthy RBC looks like a disc with a depression called a dimple in the top and bottom. Stressed RBCs often have deeper dimples than healthy ones, giving the cells a deflated look; others may have shallow dimples or no dimples at all. The researchers found that if they shone light on a sample of blood and analyzed the light scattering off that sample, they would get a pattern that is a sort of signature produced by the way light interacts with itself in a three-dimensional space which would be different from the pattern collected from blood containing mostly misshapen cells. But these light-cell interactions were too complicated to analyze with the usual mathematical tools. So researchers made use of the Born approximation, a mathematical rule that can be used when the object of interest is small and transparent.

By running Fourier Transform Light Scattering (FTLS), a method developed by the same group three years ago, on individual RBCs, the scientists found that the pattern changed significantly with the diameter and dimple width of the cells. Using this information, the researchers applied the Born approximation to their findings and calculated what the appropriate scattering signature for healthy cells should be. They then used this new "healthy cell signature" to identify the correct morphology of cells in a blood smear. The new technique may allow for faster, accurate blood tests that could help doctors to diagnose various types of anemia, and could be especially useful in resource-poor areas of the world.

WWW.ScienceDaily.com

Biofuel Process for Improving Energy Recovery Using Agricultural Waste



A new biofuel production process created by researchers of Michigan State University, USA produced energy more than 20 times higher than existing methods.

The results, published in the current issue of Environmental Science and Technology, showcase a novel way to use microbes (First bacterium) to produce biofuel and hydrogen, all while consuming agricultural wastes.

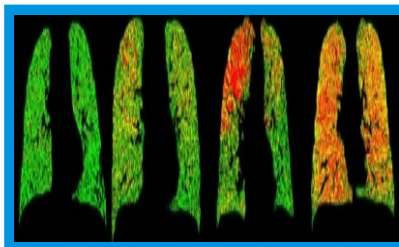
The scientists have developed bioelectrochemical systems known as microbial electrolysis cells, or MECs, using bacteria to breakdown and ferment agricultural waste into ethanol. The process is unique because it employs a second bacterium, which, when added to the mix, removes all the waste fermentation by products or nonethanol materials while generating electricity.

Similar microbial fuel cells have been investigated before. However, maximum energy recoveries from corn stover, a common feedstock for biofuels, hover was around 3.5 percent. While through this process despite the energy invested in chemical pretreatment of the corn stover, averaged 35 to 40 percent energy recovery is just from the fermentation process. This is because the fermentative bacterium was carefully selected to degrade and ferment agricultural wastes into ethanol efficiently and to produce by products that could be metabolized by the electricity-producing bacterium. By removing the waste products of fermentation, the growth and metabolism of the fermentative bacterium also was stimulated.

The second bacterium, *Geobacter sulfurreducens*, generates electricity. The electricity, however, isn't harvested as an output. It is used to generate hydrogen in the MEC to increase the energy recovery process even more. When the MEC generates hydrogen, it actually doubles the energy recoveries and increased energy recovery to 73 percent. So the potential is definitely there to make this platform attractive for processing agricultural wastes.

WWW.Sciencedaily.com

Imaging Lungs Technique for Diagnosis and Treatment of Lung Disease (COPD)



A team of researchers from the University of Michigan Medical School, USA reported a technique called parametric response mapping, or PRM. They used PRM to analyze computed tomography, or CT, scans of the lungs of patients with chronic obstructive pulmonary disease, known as COPD.

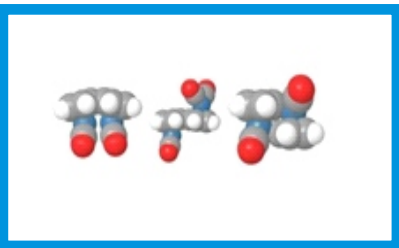
The researchers reported that the PRM technique for analyzing CT scans allows them to better distinguish between early-stage damage to the small airways of the lungs, and more severe damage known as emphysema. They've also shown that the overall severity of a patient's disease, as measured with PRM, matches closely with the patient's performance on standard lung tests based on breathing ability.

COPD limits a patient's breathing ability, causing shortness of breath, coughing, wheezing and reduced ability to exercise, walk and do other things. Over time, many COPD patients become disabled as their disease worsens. Most often associated with smoking, COPD can also result from long-term exposure to dust, and certain gases and chemicals. The researchers with the PRM technique would be able to tell sub-types of COPD apart, distinguishing functional small airway disease from emphysema and normal lung function. They believe this offers a new path to more precise diagnosis and treatment planning, and a useful tool for precisely assessing the impact of new medications and other treatments. The PRM technique allows researchers to identify COPD specific changes in three-dimensional lung regions over time. In the last decade, CT scan techniques for imaging COPD have improved steadily, but PRM is the

missing link giving the researchers a robust way to see small airway disease and personalize treatment. Originally developed to show the response of brain tumors to treatment, For PRM technique, the researchers use powerful computer techniques to overlay the CT scan taken during a full inhalation with an image taken during a full exhalation. The overlaid, or registered, CT images share the same geometric space, so that the lung tissue in the inflated and deflated lungs aligns. The density of healthy lung tissue will change more between the two images than the density of diseased lung, allowing researchers to create a three-dimensional "map" of the patient's lungs. PRM assign colors to each small 3-D area, called a voxel, according to the difference in signal changes within each of the areas between the two scans. Green means healthy, yellow means a reduced ability to push air out of the small sacs, and red means severely reduced ability. The PRM technique is a step forward in being able to better sub-classify patients with COPD so that targeted therapies can be developed

WWW.Sciencedaily.com

Synthetic Molecule Stores Solar Energy for Several Years and could Generate Heat on Demand



Many researchers believe that using the sun as the energy source offers the best opportunities for developing a sustainable energy system. One challenge in this area is to find efficient storage methods for saving the captured energy and transporting it to other locations.

Researchers at Chalmers University of Technology in Sweden have made progress in developing an "all-in-one" system for the capture, storage and use of solar energy. The method is known as the thermochemical process. It attracted a lot of interest during the 1980s, but researchers at that time were unable to resolve the issue. Two years ago, a group of American researchers demonstrated that the method is theoretically possible. Chalmers researchers working with researchers from UC Berkeley in California have now progressed from theory to practical devices.

The research team has created a demonstration unit made up of three components: a solar collector, a catalytic reactor and a heat exchanger. The three components are connected in a micro fluidic system. The designed molecule, fulvalene diruthenium, which has high energy density, is the heart of the system. The molecule's structure is changed in the solar collector with the aid of sunlight. The catalyst enables the molecular to regain its original state, releasing heat in the process. The molecule can be transported and stored for several years without loss, as all heat is bound in a stable chemical compound. This means that the system can be reused many times over.

Technology Roundup

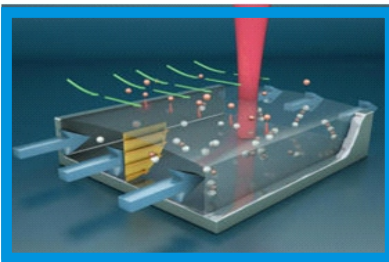
The Chalmers researchers have therefore been able to prove that the theory works in practice. The ongoing challenges revolve around making the system more efficient, with greater increases in temperature. Another difficulty with solar energy is adapting the technology to large-scale application and integrating it into existing energy production.

The researchers have built the first demonstration unit but their next step will be to improve the materials and processes involved in solar energy storage to make it cheaper and more efficient. If they could develop better and cheaper materials there is nothing to prevent them applying the concept on a larger scale. They hope that they can help develop systems which fit into an energy system where use of renewable energy is expanding as there is an increasing need for energy storage.

One benefit of this new method is that it provides a holistic solution for solar energy. Many other solar energy systems require several different technologies to be interlinked for the energy to reach the end user. In this system, energy storage is built in from the start, which means that solar energy can be easily stored until needed, for example at night or in the winter. In the long term, this technology can be considered an alternative to thermal solar energy storage in water.

[Http://www.chalmers.se](http://www.chalmers.se)

Nanotech Device Mimics Dog's Nose to Detect Explosives



Researchers (mechanical engineers & chemists) at University of California, Santa Barbara (UCSB) have developed a portable, accurate, and highly sensitive devices that sniff out vapors from explosives and other substances could become as commonplace as smoke detectors in public places. It uses micro fluidic nanotechnology to mimic the biological mechanism behind canine scent receptors. The device is both highly sensitive to trace amounts of certain vapor molecules, and able to tell a specific substance apart from similar molecules.

Dogs are still the gold standard for scent detection of explosives. But like a person, a dog can have a good day or a bad day, get tired or distracted. But the scientists have developed a device with the same or better sensitivity as a dog's nose that feeds into a computer to report exactly what kind of molecule it's detecting.

The key to this technology is in the merging of principles from mechanical engineering and chemistry. The device can detect airborne molecules of a chemical called 2,4-dinitrotoluene, the primary vapor emanating from TNT-based explosives. The human nose cannot detect such minute amounts of a substance, but "sniffer" dogs have long been used to track these types of molecules. The technology is inspired by the biological design and micro scale size of the canine olfactory mucus layer, which absorbs and then concentrates airborne molecules.

The device is capable of real-time detection and identification of certain types of molecules at concentrations of 1 ppb or below. Its specificity and sensitivity are unparalleled. The technology has been patented and exclusively licensed to Spectra Fluidics, a company that Piorek co-founded with private investors.

Packaged on a fingerprint-sized silicon microchip and fabricated at UCSB's state-of-the-art cleanroom facility, the underlying technology combines free-surface microfluidics and surface-enhanced Raman spectroscopy (SERS) to capture and identify molecules. A microscale channel of liquid absorbs and concentrates the molecules by up to six orders of magnitude. Once the vapor molecules are absorbed into the microchannel, they interact with nanoparticles that amplify their spectral signature when excited by laser light. A computer database of spectral signatures identifies what kind of molecule has been captured

"The device consists of two parts. There's a microchannel, which is like a tiny river that we use to trap the molecules and present them to the other part, a mini spectrometer powered by a laser that detects them. These microchannels are twenty times smaller than the thickness of a human hair

The technology could be used to detect a very wide variety of molecules and the applications could extend to certain disease diagnosis or narcotics detection also.

[Http://engineering.ucsb.edu](http://engineering.ucsb.edu)

Forthcoming Tech Events

Conference on Life Science and Technology 2013

5 - 7 January, 2013

Hong Kong, China

[Http://www.zapaday.com](http://www.zapaday.com)

3rd International Conference on Life Science and Technology (ICLST 2013)

19- 20 January, 2013

Dubai, United Arab Emirates

[Website: http://www.iclst.org/](http://www.iclst.org/)

Oil Spill & Ecosystem Science Conference

21-23 January, 2013

New Orleans, Louisiana

gulfresearchinitiative.org/

India Rubber Expo

22 - 24 January, 2013

Bombay Exhibition Center (BEC)

Mumbai, India

indiarubberexpo.in/

Arab Health

28 - 31 January, 2013

Dubai, United Arab Emirates

www.biztradeshows.com

2nd International Conference on Applied Physics and Mathematics (ICAPM 2013)

2 - 3 February, 2013

Hongkong.

www.icapm.org/

Annual International Conference on Optoelectronics, Photonics & Applied Physics (OPAP)

4 - 5 February, 2013

Singapore.

www.physics-conf.org

International Conference on Nuclear Data for Science and Technology

4 - 8 March, 2013

New York, USA.

WWW.bnl.gov/

Tech & Trade Offers

Battery Charging Appliances

This module is suitable for medium to large domestic use, mobile caravans etc. These are for 12V applications ranging from 40W to 135W. These modules have a very good quality and more protective designs, having rugged junction box, robust for extreme conditions and having long term performance warranties.

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sharjeel@akhtar.com

Website: www.akhtar solar.com

Metal Lamps

A less expensive range of lamps is available with 6 " UL listed power cord, on/ off switch, polarized plug and 15W bulb. 950 ~ 1050 ionic/ Treatment area is 64 square feet .Electricity consumption is 30 Watt.

Company Contact:

Indus Valley Crafts

Mr. Masroor Saeed (Director/CEO/General Manager)

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Phone: 92-61-6781458

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Address: 103 Hadrat Ullah Block, Mustafa Town, Lahore, Pakistan

Website: <http://indusvalleycrafts.com>

About PASTIC

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Technology Information Service Section of PASTIC works exclusively for support and promotion of technological information on trade and industry in the country. "Technology Roundup" is a news bulletin that provides latest and innovative technology news, forthcoming events, etc. It also promotes products, technologies and services globally in sectors such as Agro-Industry, Bio-Technology, Building Material, Business, Chemicals, Electronics, Energy, Fisheries, Food Processing, Machinery, Packaging, Mining Pharmaceuticals and Textiles.

