

TECHNOLOGY ROUNDUP

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Forthcoming Tech Events

- **International Conference on Food Engineering and Biotechnology (ICFEB 2011)**
- **POOGEE 9th International Exhibition for Energy Industry**
- **Technology Exhibition: Food & Agriculture Sectors (2011)**
- **Eurasia Business and Economics Society (EBES) 2011**
- **Medifest 2011**

Tech News

Indigenous Technology

Syn-Gas Nano Catalyst-Step towards Production of Fuel from Coal Gas

Pakistan is the seventh in the list of top 20 countries of the world having lignite coal reserves of 185 billion tons out of which 3.3 billion tons is in proven/measured category while 11 billions are indicated as reserves. In global electricity generation share of coal has exceeded 37%. Thar Coal of Pakistan is one of the largest coal reserves in the world having a total reserve of 850 Trillion Cubic feet which can possibly enable us to produce enough electricity to power the whole country.



Nano Scientists of National Centre for Physics, Quaid-i-Azam University Campus, Islamabad have developed a lab. scale nano catalyst and testing system which converts syn gas to Ethylene and Propylene- a building block for the production of diesel. A step towards the production of fuel from coal gas (Syn Gas).



The syn gas conversion technology “Fischer Tropsch Synthesis” was developed during the Second World War by two German Scientists Fischer and Tropsch. It is produced by reacting carbon (constituent of coal) with air or oxygen and water ($\text{CO} + \text{H}_2$). It is one of the most important technologies and Sasol plant in South Africa is the only commercially operational plant in the world. The main component of this technology is the catalyst which is not only expensive but also most important and tedious part of the whole process

This discovery of this nano catalyst and testing system has opened up a new era of R & D in the country. This lab scale catalyst can help not only to use the developed infrastructure for the production of other industrial nano catalyst but also help directly to overcome the present country energy crisis.

Submission of US patent is in progress at present.

Courtesy to
Dr. Syed Tajamul Hussain
National Centre for Physics , Islamabad

Fish Robot as an Alternative Marine Propulsion System of the Future



The team of Darmstadt researchers analyzed fish's motions to develop a prototype fish robot. The fish robot, dubbed “Smoky,” consists of a “skeleton” composed of ten segments enshrouded in an elastic skin that are free to move relative to one another and caused to undergo snaking motions similar to those of fish by waterproof actuators. Including its tail fin, the fish robot, which is a 5:1 scale model of a gilt-head sea

bream, is 1.50 meters long.

The researchers said that use of their fish robot for ship propulsion will help prevent shoreline erosion and the undermining of submarine installations caused by ships screws. The fish robot's “soft” drive action should also prevent the churning up of sea beds and riverbeds and its effects on marine plants and aquatic-animal populations.

www.tu-darmstadt.de

First Practical Nanogenerator Produces Electricity with Pinch of the Fingers

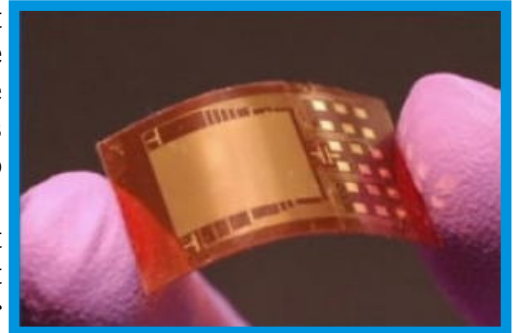
Scientists at Georgia Institute of Technology have developed first commercially viable nanogenerator, a flexible chip that can use body movements a finger pinch now enroute to a pulse beat in the future to generate electricity. They described boosting the device's power output by thousands times and its voltage by 150 times to finally move it out of the lab and toward everyday life.

Lead scientist Zhong Lin Wang said that this development represents a milestone toward producing portable electronics that can be powered by body movements without the use of batteries or electrical outlets.

Wang and colleagues demonstrated commercial feasibility of the latest nanogenerator by using it to power an LED light and a liquid crystal display like those widely used in many electronic devices, such as calculators and computers. The power came from squeezing the nanogenerator between two fingers. The key to the technology is zinc oxide (ZnO) nanowires. ZnO nanowires are piezoelectric they can generate an electric current when strained or flexed. That movement can be virtually any body movement, such as walking, a heartbeat, or blood flowing through the body. The nanowires can also generate electricity in response to wind, rolling tires, or many other kinds of movement.

The diameter of a ZnO nanowire is so small that 500 of the wires can fit inside the width of a single human hair. Wang's group found a way to capture and combine the electrical charges from millions of the nanoscale zinc oxide wires. They also developed an efficient way to deposit the nanowires onto flexible polymer chips, each about a quarter the size of a postage stamp. Five nanogenerators stacked together produce about 1 micro Ampere output current at 3 volts about the same voltage generated by two regular AA batteries (about 1.5 volts each).

Additional nanowires and more nanogenerators, stacked together, could produce enough energy for powering larger electronics, such as an iPod or charging a cell phone.



Wang said the next step is to further improve the output power of the nanogenerator and find a company to produce the nanogenerator.

www.acs.org

Advancement in Making Biodegradable Plastics from Waste Chicken Feathers



In a scientific advancement literally plucked from the waste heap, scientists at the Institute of Agriculture & Natural Resources at the University of Nebraska-Lincoln have described a key step toward using the billions of pounds of waste chicken feathers produced each year to make one of the more important kinds of plastic.

The researcher Yiqi Yang told that by using this technique, they are the first to demonstrate that they can make chicken-feather-based thermoplastics stable in water while still

maintaining strong mechanical properties.

Thermoplastics are one of two major groups of plastics, and include nylon, polyethylene, polystyrene, polyvinyl chloride, and dozens of other kinds. They are used to make thousands of consumer and industrial products ranging from toothbrush bristles to soda pop bottles to car bumpers. Thermoplastics got that name because they need heat (or chemicals) to harden from a liquid into a final shape, and can be melted and remolded time and again. The other group, thermosetting plastics, hardens once and can not be remelted again.

Yang pointed out that both kinds of plastics are made mainly from ingredients obtained from oil or natural gas. Because of concerns about petroleum supplies, prices, and sustainability, dozens of scientific teams are working to find alternative ingredients. One major goal is to use agricultural waste and other renewable resources to make bioplastics that have an additional advantage of being biodegradable once discarded into the environment.

Yang said they are trying to develop plastics from renewable resources to replace those derived from petroleum products. Utilizing current wastes as alternative sources for materials are one of the best approaches toward a more sustainable and more environmentally responsible society.

Chicken feathers are an excellent prospect, because they are inexpensive and abundant. Few shoppers think about it, but every shrink-wrapped broiler in the supermarket cooler leaves behind a few ounces of feathers. Annually there are more than 3 billion pounds of waste chicken feathers in the United States alone. These feathers can be processed into a low-grade animal feed, but that adds little value to the feathers and may also cause diseases in the animals. All too often, they become a waste disposal/environmental pollution headache, incinerated or stored in landfills.

Yang explained that chicken feathers are made mainly of keratin, a tough protein also found in hair, hoofs, horns, and wool that can lend strength and durability to plastics. The mechanical properties of feather films outperform other biobased products, such as modified starch or plant proteins.

To develop the new water-resistant thermoplastic, Yang and colleagues processed chicken feathers with chemicals, including methyl acrylate, a colorless liquid found in nail polish that undergoes polymerization. That is the process used in producing plastics in which molecules link together one by

one into huge chains. This process resulted in films of what Yang's group terms "feather-g-poly(methyl acrylate)" plastic. It had excellent properties as a thermoplastic, was substantially stronger and more resistant to tearing than plastics made from soy protein or starch, and as a first among chicken-feather plastics had good resistance to water.

www.acs.org.com

Scientists Steer Car with the Power of Thought

The computer scientists at AutoNOMOS innovation labs of Freie University Berlin have developed a system of steering a car with thoughts. Using new commercially available sensors to measure brain waves sensors for recording electroencephalograms (EEG) the scientists are able to distinguish the bioelectrical wave patterns for control commands such as "left," "right," "accelerate" or "brake" in a test subject.

They then succeeded in developing an interface to connect the sensors to their otherwise purely computer-controlled vehicle, so that it can now be "controlled" via thoughts. Driving by thought control was tested on the site of the former Tempelhof Airport.

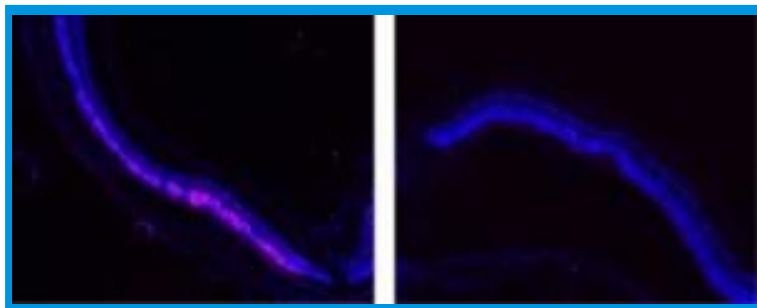
The scientists first used the sensors for measuring brain waves in such a way that a person can move a virtual cube in different directions with the power of his or her thoughts. The test subject thinks of four situations that are associated with driving, for example, "turn left" or "accelerate." In this way the person trained the computer to interpret bioelectrical wave patterns emitted from his or her brain and to link them to a command that could later be used to control the car. The computer scientists connected the measuring device with the steering, accelerator, and brakes of a computer-controlled vehicle, which made it possible for the subject to influence the movement of the car just using his or her thoughts.

With the EEG experiments they investigate hybrid control approaches, i.e., those in which people work with machines.

www.fu-berlin.de



Gene Therapy Prevents Retinal Degeneration



A study from researchers at Tufts University School of Medicine and the Sackler School of Graduate Biomedical Sciences at Tufts demonstrates that non-viral gene therapy can delay the onset of some forms of eye disease and preserve vision. The team developed nanoparticles to deliver therapeutic genes to the retina and found that treated mice temporarily retained more eyesight than

controls.

The work shows that it is possible to attain therapeutic results using non-viral gene delivery methods, specifically, nanoparticles. Nanoparticles, which are small enough to penetrate cells and stable enough to protect DNA, are capable of preventing retinal cell death and preserving vision.

The most common approach to gene therapy involves using a virus to deliver DNA to cells. While viruses are very efficient carriers, they can prompt immune responses that may lead to inflammation, cancer, or even death. Non-viral methods offer a safer alternative, but until now, efficiency has been a significant barrier.

In a model simulating the progression of human retinal degeneration, the researchers treated mice with nanoparticles carrying a gene for GDNF (Glial Cell Line-Derived Neurotrophic Factor), a protein known to protect the photoreceptor cells in the eye. Retinas treated with the GDNF-carrying nanoparticles showed significantly less photoreceptor cell death than controls. Preservation of these cells resulted in significantly better eyesight in the treatment group seven days after treatment, compared to controls.

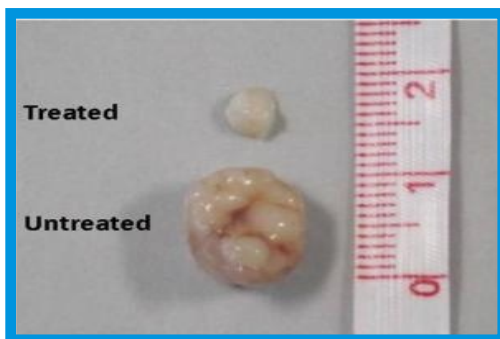
The protection conferred by the GDNF-carrying nanoparticles was temporary, as tests fourteen days after treatment showed no difference in eyesight between treated mice and controls.

The next step in this research is to prolong this protection by adding elements to the DNA that permit its retention in the cell. Bringing forth a more potent and enduring result will move closer to clinical application of non-viral gene therapy.

AMD, which results in a loss of sharp, central vision, is the number one cause of visual impairment among age 60 and older.

www.tufts.edu

Scientists bring Cancer Cells back under Control



Breast cancer is diagnosed in about 1.4 million women throughout the world every year, with half a million dying from the disease. A common cause of cancer is when cells are altered or mutated and the body's tumour suppressor genes are switched off.

Scientists at The University of Nottingham have brought cancer cells back under normal control by reactivating their cancer suppressor genes. The discovery could form a powerful new technology platform for the treatment of cancer of the breast and other cancers.

Dr Cinzia Allegrucci from the School of Veterinary Science and Medicine and Dr Andrew Johnson in the Centre for Genetics and Genomics reactivated tumour suppressor genes and stopped the cancer from growing by treating them with Axolotl oocyte extract. After 60 days there was still no evidence of cancerous growth.

Cancers occur when the mechanisms that control normal cell division are mutated. The process of cell division is controlled by specific genes and these are turned "on" or "off" depending on their function. Among the most important of these genes are tumour suppressor genes. These genes repress the development of cancers and normally act as a control point in the cell division cycle. Therefore, the

switching off of tumour suppressor genes is a common cause of cancers, including breast cancer.

Dr Allegrucci, said that the on/off switch in genes is controlled by the modification of proteins that are bound to the DNA in a cell so called epigenetic modifications. Tumour suppressor genes in many breast cancers are switched off by epigenetic marks, which is the underlying cause of tumours. They sought to reverse this process, activating the tumour suppressor genes, in hope of stopping cancerous cell divisions.

Dr Johnson said that by doing this they use novel technology that makes use of the eggs of the axolotl salamander. Over the years it has shown that humans evolved from animals that closely resemble axolotls, and because of this the proteins in axolotls are very similar to those in humans. Axolotl oocytes which are the eggs prior to ovulation, are packed with molecules that have very powerful epigenetic modifying activity. Previously Johnson's lab showed that extracts prepared from these oocytes have powerful capacity to change epigenetic marks on the DNA of human cells.

In a breakthrough, they showed it is important to use oocytes from the ovary, because if the oocytes are ovulated their activities are lost. By treating cancer cells with extracts made from axolotl oocytes they could reverse the epigenetic marks on tumour suppressor genes, causing these genes to reactivate, and thereby stopping the cancerous cell growth

The identification of the proteins responsible for this tumour reversing activity in axolotl oocytes is a major goal of future research which could form a powerful new technology platform for the treatment of cancers from the breast, and other tissues

www.nottingham.ac.uk

Bomb Disposal Robot

The University of Greenwich has joined forces with a Kent-based company to create a light weight, remote-operated vehicle that can be controlled by a wireless device from a distance of several hundred meters.

The innovative robot, which can climb stairs and even open doors, will be used by soldiers on bomb disposal missions.

Experts from the Department of Computer & Communications Engineering are working on the project alongside NIC Instruments Limited of Folkston, manufacturers of security search and bomb disposal equipment.

Much lighter and more flexible than traditional bomb disposal units, the robot is easier for soldiers to carry and use when out in the field. It has cameras on board, which relay images back to the operator via the hand-held control, and includes a versatile gripper which can carry and manipulate delicate items.

The robot also includes nuclear, biological and chemical weapons sensors.

Measuring just 72cm by 35cm, the robot weighs 48 kilogrammes and can move at speeds of up to eight miles per hour.

www.gre.ac.uk



Forthcoming Tech Events

International Conference on Food Engineering and Biotechnology (ICFEB 2011)

7-9 May, 2011
Bangkok, Thailand
<http://www.icfeb.org>

POOGEE 9TH International Exhibition for Energy Industry

17-19 May, 2011
Karachi, Pakistan
www.pogee.com.pk

Technology Exhibition: Food & Agriculture Sectors (2011)

21st May, 2011.
Lahore, Pakistan
www.pastic.gov.pk

Eurasia Business and Economics Society (EBES) 2011

1-3 June, 2011
Istanbul, Turkey
<http://www.ebesweb.org>

Medifest 2011

7-9 June, 2011
Cape Town, South Africa.
www.vantagemedifest.com

Tech & Trade Offers

Steam Generators (Boilers)



This industrial type steam generator is a forced circulation water tube boilers. Unlike the conventional 3-pass steam boilers (fire/smoke tube boiler), the water in the steam generators contains a very small water and steam volume (content of the pressure vessel inside the tube). The steam generators are delivered in the range 100 - 1,000 kg/h steam at 3 bar and all the way up to 10 bars (for special applications). These complete units are easy to install and does not require any special foundation, but can be place directly on a concrete floor.

Company Contact:

Address: Plot # 20 Street # 3 Sector F
Manzoor Colony, Karachi, Pakistan
Phone: +92 213 538 5553
FAX: +92 213 538 3350
Cell No: +92 321 227 2717
www.masterengineering.com.pk

Telecom Power Solutions



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Company Contact:

Address: 809 - Ravi Block near Khrak Stop, Multan Road Lahore. Pakistan.
Phone: +92-42-37490497
Cell No: +92-321-8801111 & +92-322-8091111
www.newtech.pk

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