

# TECHNOLOGY ROUNDUP

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



Sep-Oct, 2010

Vol. 2, No. 5

## Editorial Board

*Patron/Executive Editor*  
**Dr. Manzoor Hussain Soomro**  
Director General, PASTIC

*Editors*  
**Ms. Nageen Ainuddin**  
**Mr. M. Aqil Khan**  
**Dr. Saima Tanveer**  
**Ms. Saima Majeed**

*Composer*  
**Ms. Shazia Parveen**

## Tech News Headlines

- Crime Solving made Digital through mobile phone.
- Genetic Code 20: Novel Artificial Proteins for Industry and Science
- Next Generation CT Scanner Views Whole Organs in a Second
- Virus-Built Battery could Power Cars & Electronic Devices
- Highly Directional Terahertz Laser: Semiconductor Suitable for Security Screening, Chemical Sensing and Astronomy
- Engineered Tobacco Plants have more Potential as a Biofuel
- 'Smart' Polymer Reduces Radioactive Waste at Nuclear Power Plants

## Tech & Trade Offers

- VRp (precision PWM voltage regulator)



- Akhter PV Modules



## Forthcoming Tech Events

- The Middle East Chemical Summit
- MTAP 2010 (6th International Machine Tools & Automation Exhibition Incorporating Automotive Technology)
- 4th Annual Uniqsis Flow Chemistry Symposium
- Saudi MediHealth
- Health Asia
- ITIF Asia (International Trade & Industrial Machinery Show)

### *Tech News*

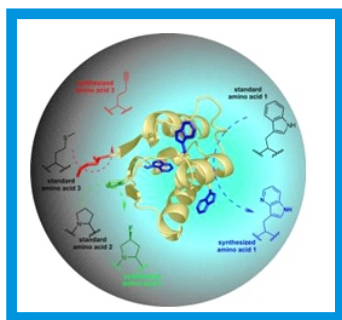
#### *Crime Solving made Digital through mobile phone*

Researchers at Purdue University in West Lafayette, Indiana designed a device to extract the memory of a mobile phone for crime scene evidence that help to catch the criminals. Solving crimes is not easy but this new technology may help cops get one step ahead of the bad guys. The phone's memory card is placed in the device where computer software extracts and decodes the information revealing call history, text messages, emails, images, video and the calendar. This information is then used by police as evidence in crimes.

At nearly every crime scene cell phones, computers or PDAs are found by police in USA. A lot of times, these evidences take police to next step in the investigative lead and will tell who this person has been in touch with or who they have been emailing or texting. Cyber forensic researchers developed a device called a flasher box used for extracting a full memory of mobile phone and transfer it to a computer. The phone's memory card is removed and plugged into flasher box and computer software extracts the phone's coded information and decodes the information to reveal the phone's call history, text messages, e-mails, calendar, images and videos. This information is then used by cops as clues to solve crimes. It is an inside look into that person, much more than just a fingerprint. The technology also helps victims of serious crimes by finding clues from computers to show who last contacted the victim and last visited Web sites or e-mails. It's a way of helping to find the perpetrator or the suspect. Researchers are now developing a first-responder digital evidence collection kit to gather evidence immediately at the scene of a crime. In addition to computers, cyber forensics specialists can also recover information from cellular phones, mp3 players, CDs, DVDs and more. Approximately 80 to 90 percent of legal cases today involve some sort of digital evidence in the United States of America.

[www.aip.org](http://www.aip.org)

#### *Genetic Code 20: Novel Artificial Proteins for Industry and Science*



The creation of synthetic proteins plays an important role for economy and science. By the integration of artificial amino acids in proteins (genetic code engineering), their already existing qualities can be systematically improved allowing new biological features to arise. Scientists at the Max Planck Institute of Biochemistry (MPIB) in Martinsried near Munich, Germany, have succeeded in taking another important step in this research area. For the first time, they were able to integrate three different synthetic amino acids into one protein in a single experiment.

The translation of information during the production of proteins (protein synthesis) is determined by the genetic code. 20 amino acids form the standard set of which proteins are built. In natural conditions, however, several hundred amino acids can be found and, of course, new amino acids can also be produced in the laboratory. With regard to their properties, they differ from the 20 standard amino acids, and by their integration in proteins, specific structural and biological characteristics of proteins can be systematically changed. So far, only one type of synthetic amino acid could be inserted into a protein during a single experiment in a residue-specific manner; thus, only one property of a protein could be modified at once. The research group of Molecular Biotechnology at the MPIB, has now made important methodical progress in the area of genetic code engineering. They are able to substitute three

different natural amino acids by synthetic ones at the same time in a single experiment. The research area of genetic code engineering and code extension has with this result reached a new development phase. This method could be of great importance, particularly for the industry because the production of artificial proteins by genetic code engineering which demonstrates a solid basis for the development of new technologies. During integration, synthetic amino acids confer their characteristics to proteins. Thus, the development will allow the synthesis of totally new classes of products, whose chemical synthesis has not been possible so far by conventional protein engineering using only the 20 standard amino acids. This method, in the future will make possible to tailor industrial relevant proteins with novel properties: for example proteins containing medical components.

[www.mpg.de](http://www.mpg.de)

### *Next Generation CT Scanner Views Whole Organs in a Second*

Next generation CT scanners Aquilion one has been launched by UT Southwestern Medical Centre in North Texas which allows doctors to image an entire organ in less than a second or track blood flow through the brain or to a tumor all with less radiation exposure to patients. Aquilion One dynamic volume computed tomography (CT) can create a detailed 3-D movie of an organ in real time that makes it particularly useful for quickly diagnosing strokes and heart attacks, for example, where diagnostic speed can be a critical factor in survival and recovery. Because of this machine's technology radiologists anticipate better visualization in neurology, trauma, whole body, lung, cardiac, vascular and pediatric studies. Other applications include providing distinctive capabilities in orthopedic and joint studies, diagnosing renal function, and even vocal-cord analysis.



For patients, the new technology can mean less time in a scanner and less exposure to radiation. Since dose has been a concern in the medical literature for a long time and people have been very concerned about it. One of the great things about this is that you can do a scan with about half the radiation dose and half the contrast media, so the dose is less and the image is better. Other scanners piece together strips of images to compile a complete picture, using four-, 16-, 32- or 64-slice machines. Aquilion One, manufactured by Toshiba, exposes patients to less radiation because one strip covers a larger area, therefore requiring fewer swaths overall and less time. The result can be as much as 80 percent less radiation in some cases, according to published research.

Aquilion One uses 320 high-resolution X-ray detectors in each rotation. What takes 12 to 15 seconds for other scanners to complete takes only about a third of a second for the 320-slice machine. It can take images continuously or intermittently, allowing doctors to see the heart pumping, or blood or medication working through the vascular system.

One of the most exciting things about this technology is the real-time ability to image changing anatomy that enables the doctors to image physiology such as blood flow in parts of the brain, but now one can image the entire brain faster and more safely. The faster speed may also mean less required contrast materials and can also benefit patients who have difficulty remaining still, such as children, the elderly and trauma patients. Using Aquilion One, UT Southwestern physicians said they will be able to accurately diagnose a stroke or heart attack in about 20 minutes, as well as be able to gauge tissue damage. Currently, doctors often perform a battery of tests to confirm a heart attack an EKG, CT angiography, nuclear testing and catheterization, which can take hours or even days.

Other clinical applications include patients who can not get an MRI due to the presence of a pacemaker, or vocal-cord analysis capturing a patient phonating. The machine provides added flexibility in properly positioning patients with trauma or disabilities, and is sturdy enough to accommodate obese patients. UT Southwestern physicians also anticipate the Aquilion One device will be valuable in many of the medical centre's unique research projects. For example, the ability to move backward and forward in time through the images may help researchers to visualize better the effects of tissue damage or vascular flow.

<http://www.swmed.edu/>

### Virus-Built Battery could Power Cars & Electronic Devices



For the first time, USA researchers have genetically engineered viruses that build both the positively and negatively charged ends of a lithium-ion battery. The new virus-produced batteries have the same energy capacity and power performance as state-of-the-art rechargeable batteries being considered to power plug-in hybrid cars, and they could also be used to power a range of personal electronic devices. The new batteries could be manufactured with a cheap and environmentally benign process. The synthesis takes place at and below room

temperature and requires no harmful organic solvents, and the materials that go into the battery are non-toxic.

In a traditional lithium-ion battery, lithium ions flow between a negatively charged anode, usually graphite, and the positively charged cathode, usually cobalt oxide or lithium iron phosphate. Three years ago, an MIT team reported that it had engineered viruses that could build an anode by coating themselves with cobalt oxide and gold and self-assembling to form a nanowire. In the latest work, the team focused on building a highly powerful cathode to pair up with the anode. Cathodes are more difficult to build than anodes because they must be highly conducting to be a fast electrode, however, most candidate materials for cathodes are highly insulating (non-conductive). To achieve that, the researchers of MIT genetically engineered viruses that first coat themselves with iron phosphate, then grab hold of carbon nanotubes to create a network of highly conductive material.

Because the viruses recognize and bind specifically to certain materials (carbon nanotubes in this case), each iron phosphate nanowire can be electrically "wired" to conducting carbon nanotube networks. Electrons can travel along the carbon nanotube networks, percolating throughout the electrodes to the iron phosphate and transferring energy in a very short time. Since the viruses are a common bacteriophage, which infect bacteria but are harmless to humans. The team found that incorporating carbon nanotubes increases the cathode's conductivity without adding too much weight to the battery. In lab tests, batteries with the new cathode material could be charged and discharged at least 100 times without losing any capacitance that is fewer charge cycles than currently available lithium-ion batteries. The prototype is packaged as a typical coin cell battery, but the technology allows for the assembly of very light weight, flexible and conformable batteries that can take the shape of their container., MIT President Susan Hockfield took the prototype battery to a press briefing at the White House where she and U.S. President Barack Obama spoke about the need for federal funding to advance new clean-energy technologies. Now that the researchers have demonstrated they can wire virus batteries at the nanoscale, they intend to pursue even better batteries using materials with higher voltage and capacitance, such as manganese phosphate and nickel phosphate, once that next generation is ready, the technology could go into commercial production. The research was funded by the Army Research Office Institute of the

Institute of Collaborative Technologies, and the National Science Foundation through the Materials Research Science and Engineering Centres program.

[web.mit.edu](http://web.mit.edu)

### Highly Directional Terahertz Laser: Semiconductor Suitable for Security Screening, Chemical Sensing and Astronomy

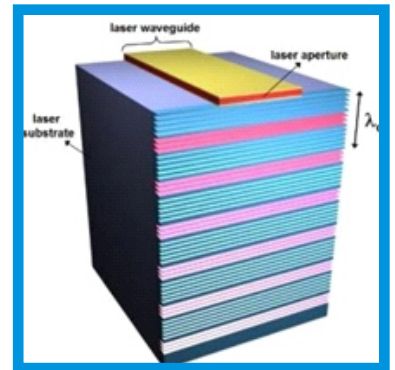
A collaborative team of applied scientists from Harvard University and the University of Leeds have demonstrated a new terahertz (THz) semiconductor laser that emits beams with a much smaller divergence than conventional THz laser sources. This new technology opens the door to a wide range of applications in terahertz science and technology and Harvard university has filed a broad patent on the invention.

Terahertz rays (T-rays) can penetrate efficiently through paper, clothing, plastic, and many other materials, making them ideal for detecting concealed weapons and biological agents, imaging tumors without harmful side effects, and spotting defects, such as cracks, within materials. THz radiation is also used for high-sensitivity detection of tiny concentrations of interstellar chemicals.

Existing THz semiconductor lasers are not suitable for many of these applications because their beam is widely divergent similar to how light is emitted from a lamp. However by creating an artificial optical structure on the facet of the laser, researchers are able to generate highly collimated (i.e., tightly bound) rays from the device. This leads to the efficient collection and high concentration of power without the need for conventional, expensive, and bulky lenses. Specifically, to get around the conventional limitations, the researchers sculpted an array of sub-wavelength-wide grooves, dubbed a metamaterial, directly on the facet of quantum cascade lasers. The devices emit at a frequency of 3 THz (or a wavelength of one hundred microns), in the invisible part of the spectrum known as the far-infrared. The researchers are able to reduce the divergence angle of the beam emerging from these semiconductor lasers dramatically, whilst maintaining the high output optical power of identical un patterned devices. This type of laser could be used by customs officials to detect illicit substances and by pharmaceutical manufacturers to check the quality of drugs being produced and stored.

The use of metamaterials, artificial materials engineered to provide properties which may not be readily available in Nature, was critical to the researchers' successful demonstration. While metamaterials have potential use in novel applications such as cloaking, negative refraction and high resolution imaging, their use in semiconductor devices has been very limited to date. In this case, the metamaterial serves a dual function: strongly confining the THz light emerging from the device to the laser facet and collimating the beam, The ability of metamaterials to confine strongly THz waves to surfaces makes it possible to manipulate them efficiently for applications such as sensing and THz optical circuits.

[www.harvard.edu](http://www.harvard.edu)



### Engineered Tobacco Plants have more Potential as a Biofuel

Researchers from the Biotechnology Foundation Laboratories at Thomas Jefferson University UK have identified a way to increase the oil in tobacco plant leaves, which may be the next step in using the plants for biofuel. Tobacco can generate biofuel more efficiently than other agricultural crops. However, most of the oil is typically found in the seeds. Tobacco seeds are composed of about 40 percent oil per dry weight. Although the seed oil has been tested for use as fuel for diesel engines, tobacco plants yield a modest amount of seeds, at only about 600 kg of seeds per acre. Researchers sought to find ways to engineer tobacco plants, so that their leaves expressed the oil.



Tobacco is very attractive as a biofuel because the idea is to use plants that are not used in food production. The researchers have found ways to genetically engineer the plants so that their leaves express more oil. In some instances, the modified plants produced 20-fold more oil in the leaves. Typical tobacco plant leaves contain 1.7 percent to 4 percent of oil per dry weight. The plants were engineered to overexpress one of two genes: the diacylglycerol acyltransferase (DGAT) gene or the leafy cotyledon 2 (LEC2) gene. The DGAT gene modification led to about 5.8 percent of oil per dry weight in the leaves, which is about two-fold the amount of oil produced normally. The LEC2 gene modification led to 6.8 percent of oil per dry weight. Based on these data, tobacco represents an attractive and promising 'energy plant' platform, and could also serve as a model for the utilization of other high-biomass plants for biofuel production.

<http://www.jeffersonhospital.org>

### New 'Smart' Polymer Reduces Radioactive Waste at Nuclear Power Plants



Scientists in Germany and India are reporting development of a new polymer that reduces the amount of radioactive waste produced during routine operation of nuclear reactors. The structural materials such as carbon steel in power plants' water cooling systems form deposits of metal oxides when they interact with coolants. In nuclear power plants, these oxides trap radioactive ions, leading to buildups of radioactivity that require costly cleanups of reactor surfaces. Cobalt, present in some alloys used in the reactors' water systems, is a major contributor toward this problem because of its long half-life. In the present study the researchers created an adsorbent material

that unlike conventional ion-exchange resins that are frequently used in reactors is selective for cobalt but has the unique ability of disregarding iron-based ions. The polymer's high selectivity increases its appeal, the researchers add, for use in decontamination processes in reactors that utilize a variety of structural materials.

[www.acs.org](http://www.acs.org)

### ***Forthcoming Tech Events***

#### **The Middle East Chemical Summit**

10-13 October, 2010

Manama, Bahrain.

[www.wraconferences.com](http://www.wraconferences.com)

#### **MTAP 2010 (6th International Machine Tools & Automation Exhibition Incorporating Automotive Technology)**

Karachi, Pakistan.

11 - 13 November, 2010

[www.machinetoolpakistan.com](http://www.machinetoolpakistan.com)

#### **4th Annual Uniqsis Flow Chemistry Symposium**

16 - 17 November, 2010

Cambridge, MA, USA.

[www.scientificupdate.co.uk](http://www.scientificupdate.co.uk)

#### **Saudi MediHealth**

28 - 30 November

Dammam, Eastern Province, Saudi Arabia.

[www.saudimedihealth.com](http://www.saudimedihealth.com)

#### **Health Asia**

22 - 24 March 2011

Karachi, Pakistan.

[www.health-asia.com](http://www.health-asia.com)

#### **ITIF Asia (International Trade & Industrial Machinery Show)**

28 - 30 March 2011

Karachi, Pakistan

[www.itifasia.com](http://www.itifasia.com)

### ***Tech & Trade Offers***

#### **VRp (precision PWM voltage regulator)**

(2-7.5 kwatt, single-phase 120 vac models & 2-22.5 kwatt, three-phase 120/208 vac models)

(2-15 kwatt, single-phase 230 vac models & 6-45 watt, three-phase 230/400 vac models)

- Complete cycle correction in 20n mili seconds.
- Operating AC input voltage range 150-315 with output of 188-275 respectively (for 230 vac).



- No Moving parts.
- Soft start
- Automatic Bypass.

### **Company Contact**

#### **RAMCON**

Syed Ajmal Shah Gillani [Business Develop Manger]

House # 13, St-60, F-6/3, Islamabad, Pakistan

Phone: 0092-51-2273073, 2824634

Fax: 0092-51-22730036

Mobile: 0092-307-5007766, 0092-302-5500760

E-mail: ashah@ramconpk.com

Ajmal2u@hotmail.com

[www.ramconpk.com](http://www.ramconpk.com)

## Akhter PV Modules

Akhter solar modules are a versatile solution for stand-alone power systems, home light system, solar display, telecommunication and water pumps. Due to higher system voltages Akhter solar modules are also suitable for grid connected photovoltaic applications.

- Quality, protective Design
- Horizontal or vertical position
- Robust for extreme conditions
- Long term performance warranties.

### **Company Contact:**

#### **Akhter Solar LTD.**

Mr. Sharjeel Ahmed Sulehri [Manager Sales]

405, Poonch House Complex Saddar, Rawalpindi

Phone: 0092-51-5111221

Mobile: 0092-321-8552534

Fax: 0092-51-5515835

E-mail: sulehri@isb.netsolir.com

[www.akhtersolar.com](http://www.akhtersolar.com)



## About PASTIC

PASTIC serves as a gateway for Scientific & Technological Information for R&D by catering to the information needs of researchers, entrepreneurs, Industrialists, educationists, policy makers and planners through anticipatory and responsive information services.

Technology Information Services Section, 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, forth coming 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 and Mining Pharmaceuticals and Textiles.