

TECHNOLOGY ROUNDUP

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Tech News Headlines

- Self Compacting Concrete: Use of Waste Marble Powder as Filler Material
- M-Health Service for Train Passengers using Mobile GPS System: An ArchiMate Service Layer Model
- Blood Sugar and Brain Cancer are Linked
- PNY Technologies step up at Computex 2017
- Environmental monitoring with Robotic Fish
- A New way to Target Drug-resistant Bacteria
- Nanoparticles and Magnets offer new, efficient Method of removing Oil from Water
- Bioengineered Human Livers Mimic Natural Development

Forthcoming Tech Events

- National Exhibition on IT Computer Tools for Science and Education
- International Conference on Science, Technology, Engineering & Management
- International Multi-Disciplinary Research Conference
- International Conference on Agricultural and Food Science
- International Energy Program Evaluation Conference
- International Conference on Communication and Network Technology
- International Conference on Management, Engineering, Science & Technology
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Indigenous Technology

Self Compacting Concrete: Use of Waste Marble Powder as Filler Material

The objective of this study was to investigate the effectiveness of waste marble powder (WMP) in Self compacting concrete (SCC) and to get the most favorable amount of WMP that can be effectively used in developing SCC.

Self compacting concrete (SCC) is a type of concrete which can flow and spread through reinforcement and narrow sections which fills the empty spaces completely without any mechanical vibration. This type of concrete requires large quantity of powder, for which either fine pozzolanic (e.g. fly ash, ground granulated blast furnace slag and silica fume etc) or non-pozzolanic additions (crushed limestone or sand stone etc) are used. The composition of this blend of cement and filler material is significant in SCC, as high amount of cement with lower water content may cause autogenous shrinkage. Therefore, the use of non-pozzolans material with cement needs to be investigated. The concrete industry is among the largest consumer of raw materials. Limestone fillers are generally used in concrete. As marble stone is of limestone origin i.e. marble is formed by metamorphism of limestone. The effect of addition of non-pozzolans powder waste from marble industry is studied for its suitability in SCC. This was done keeping in view the requirement of fines in SCC and to find an effective utilization of waste marble powder (WMP). For this, five different SCC mixes were prepared, one without WMP and four other with varying amounts of WMP. These mixes in fresh state were tested for their flowability, passing-ability and segregation resistance. Hardened concrete was tested for compressive and flexural strengths.

It was found that the locally available WMP can be effectively used as filler in developing SCC. Furthermore, it can be concluded that the addition of WMP up to 15% by cement weight can lead to a desirable SSC properties.

Source:

Asif Hameed , Asad-ullah Qazi , Safeer Abbas and Abdul Rehman. Self Compacting Concrete: Use of Waste Marble Powder as Filler Material. Pakistan Journal of Engineering and Applied Sciences 2016 18 (January): 1-10

Indigenous Technology

M-Health Service for Train Passengers using Mobile GPS System: An ArchiMate Service Layer Model

Enterprise Architecture (EA) is an instrument that is employed to describe the organization's structure, business layout and operations within the IT (Information Technology) environment. Different types of organizations extensively employed EA for aligning their business and operations with IT resources. EA may also be employed in non-organizational setting such as service providing agencies; rescue, medical emergency and education services. This paper suggests an EAF (Enterprise Architecture Framework) for non-organizational setting by critically analyzing the top four EAs.

The paper also proposes a new M-Health service model based on the mobile GPS (Global Positioning System) for train/ rail passengers by employing the ArchiMate modeling language and compares the proposed model with existing service providers. The level-1 of proposed model provides health service remotely through mobile phone and tracks the patient, doctor and ambulance location through the GPS system. The level-2 of proposed model explains how to find nearest doctor/ambulance and redirect them to patient location. The structure aspect holds one collaboration element (doctor/ambulance). The passive structure contains a service object (Healthcare service at train location/physically examines, shifts to hospital for further investigation) and behavior structure includes functions (redirect the ambulance/doctor function and physical examination function)

Source:

Muhammad Sajid, Kamran Ahsan, And Muhammad Sarim. Mehran University Research Journal of Engineering & Technology. 2017 36 (1): 21-32

Blood Sugar and Brain Cancer are Linked

A new research finds the surprising relationship between blood sugar and brain tumors and could help in knowing about the development of some of the brain tumors. A study from "The Ohio State University," has found that gliomas are less commonly appeared with the diabetes. The discovery was built on previous Ohio State research showing that high blood sugar appears to reduce a person's risk of a noncancerous brain tumor called meningioma. Both studies were led by Judith Schwartzbaum, an Associate Professor of Epidemiology and a Researcher in Ohio State's Comprehensive Cancer Center. The new glioma study appears in the journal Scientific Reports.

"Diabetes and elevated blood sugar increase the risk of cancer at several sites including the colon, breast and bladder. But in this case, these rare malignant brain tumors are more common among people who have normal levels of blood glucose than those with high blood sugar or diabetes," Schwartzbaum said. "Our research raises questions that, when answered, will lead to a better understanding of the mechanisms involved in glioma development," she said. Glioma is one of the most common types of cancerous tumors originating in the brain. It begins in the cells that surround nerve cells and help them function. The disease is typically diagnosed in middle age. At present, there is no treatment that ensures long-term survival, but several potential options are being studied.



The Scientific Report paper included data from two large long-term studies. One, called AMORIS, included 528,580 Swedes. The second, Me-Can, consisted of 269,365 Austrians and Swedes. In all, 812 participants developed gliomas. Schwartzbaum and her collaborators evaluated blood sugar and diabetes data and its relationship to subsequent development of brain cancer and found that those with elevated blood sugar and diabetes had a lower risk of developing glioma. "This really prompts the question, 'Why is the association between blood glucose levels and brain cancer the opposite of that for several other cancerous tumors?'" she said.

The researchers found that this relationship was strongest within a year of cancer diagnosis. "This may suggest that the tumor itself affects blood glucose levels or that elevated blood sugar or diabetes may paradoxically be associated with a protective factor that reduces brain tumor risk," Schwartzbaum said. "For example, insulin-like growth factor is associated with glioma recurrence and is found in lower levels in people with diabetes than those who don't have the disease."

The brain accounts for only about 2 percent of body weight, but consumes about 20 percent of the body's available glucose, Schwartzbaum said. Research on restrictive diets and their effect on brain cancer development has shown mixed results and more work is needed to determine if there's something about the sugar/tumor relationship that can be modified in a way that's beneficial to brain cancer patients.

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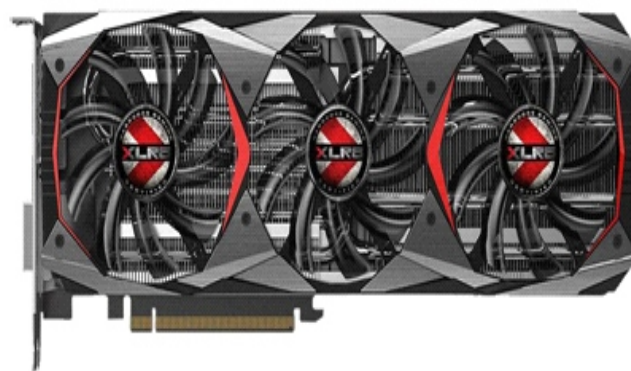
PNY Technologies step up at Computex 2017

PNY continues making its mark by showcasing its latest innovations at the Computex Taipei 2017. PNY has their newly-announced GeForce GTX 1080 Ti XLR8 Gaming OC put on display as the star of the show, along with their products ranging from flash drives, memory cards, GeForce gaming series, and other IT peripherals. On joining the Grand Computex, Calvin Yang, Asia Sales Sr. Director, PNY Technologies Asia Pacific Ltd., had this to say: "We want to have an opportunity to find a partner in Asia in the beginning." "We also want to share our products, and invite our partners to Computex to show the partnership."

GeForce GTX 1080 Ti XLR8 Gaming OC is powered by NVIDIA's flagship Pascal GPU packed with extreme next-gen 11 Gbps GDDR5X memory, and 11GB frame buffer. Factory overclocked by PNY, offering a boost speed of 1645 MHz, the PNY GeForce GTX 1080 Ti XLR8 Gaming OC is designed with XLR8 triple fan cooler. GeForce GTX 1080 Ti features 3584 NVIDIA CUDA cores and 12 billion transistors. This is the year of SSDs, according to Yang, along with gaming systems, and VR. On that front, the future of external storages took over this year's Computex including PNY CS1131, PNY CS900, and their CS1311 2.5" SATA III SSD which holds up to 960GB of data which adopts 3D TLC NAND, and powered by USB 3.0.



PNY Titan Turbo 3.0, available in 8GB-64GB capacities, has a thin, but tough metal finish. Titan Turbo 3.0 is powered by USB 3.0, and is made of 3D NAND Flash. PNY Elite Type-C USB 3.1 Flash Drive has SuperSpeed technology of up to 115MB/second. Elite Type-C USB 3.1 Flash Drives are



available in 32GB, 64GB, 128GB capacities. Yang has been with PNY for 15 years starting from graphic cards, CDs, DVDs, CR-ROMs, flash disks, flash drives, and more. However, he says that it is all just the beginning. "This year, the major product that we will show is all about gaming I say it's a good time for gaming," says Yang.

www.technology.mb.com.ph

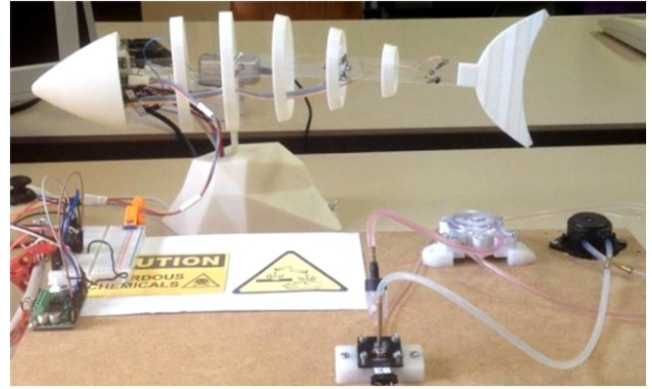
Environmental Monitoring with Robotic Fish

Researchers are developing a bio-inspired robot equipped with special chemical sensors able to detect the pH of water. Researchers from Bio-inspired Systems Lab at CAR UPM-CSIC, a joint centre between Universidad Politécnica de Madrid and the Spanish National Research Council, in collaboration with researchers from the Chemical Department of University of Florence (Italy) developing a bio-inspired robot equipped with special chemical sensors able to detect the pH of water. A group of researchers from Centre for Automation and Robotics (CAR CSIC-UPM) in collaboration with researchers from University of Florence are designing autonomous underwater vehicle with biosensors to monitor water quality. These robots, that mimic a swimming fish in order to minimize the fish disturbance and stress, can detect in-situ real-time anomalies and this is suitable to control environmental conditions in fish farms.

Aquaculture has become the fastest growing animal food sector in the world. Today, the production of fish, crustaceans and shellfish supplies around fifty percentages of all fish that is consumed by humans globally. In order to keep aquaculture systems at an optimal level and to avoid physiological stress and disease of fish, water quality and adequate nutrition must be monitored and controlled. In order to tackle this problem, researchers are developing an autonomous underwater vehicle with biosensor to provide real-time and on-site monitoring of water quality in fish farms. In order to minimize the inconveniences and possible stress in fish, the developed robot is bio-mimetic, that is, that mimics both its appearance and its functioning. In addition to providing water data, the robotic fish is also able to modify the way they swim according to the water conditions with the purpose of, for example, to detect and highlight the areas of concentration. Because water acidity directly affect other indicators both water quality and fish health, researchers have developed a special electrochemical pH sensor

based on polyaniline film electrochemically deposited on the graphite screen-printed electrode surface.

The overall length of the fish is 30 cm without including the tail. The prototype adopts shape memory alloys actuators that bend a continuous flexible structure (the backbone of the robot fish), made of polycarbonate of 1 mm thickness. An additional structure of ribs was employed to support the latex-based skin. Claudio Rossi, one of the developer of this bio-inspired fish said, "thanks to this system that provides early information on environmental change, we can control the parameters of water quality and improve management decisions of fish farms, and consequently, the wellness of these animals."



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A new way to Target Drug-resistant Bacteria

Antibiotics are an essential component of modern clinical care, used to prevent and treat bacterial infections. However, the dependence on antibiotics and their widespread misuse has led to bacterial pathogens evolving resistance to an ever-wider range of treatment options. The emergence of multi-drug resistant bacteria has brought a marked increase in the number of untreatable infections, and tackling this problem constitutes one of the major global challenges facing humanity. A new class of compounds that inhibit bacterial DNA gyrase has been discovered by a team of researchers. The team, including scientists from the Norwich-based John Innes Centre, GSK and Sanofi, have reported a class of compounds that target bacteria in a unique way, and show activity against some drug-resistant strains in the laboratory.

This research, carried out by scientists from Professor Tony Maxwell's group at the John Innes Centre and partners in the pharmaceutical industry, was reported in Proceedings of the National Academy of Sciences (PNAS). Professor Dale Sanders, Director of the John Innes Centre, said, "This discovery highlights the impact of partnership work between leading pharmaceutical companies and our innovative plant and microbial scientists." The collaborative research was facilitated by the ENABLE (European Gram-negative Antibacterial Engine) consortium, part of the EU-funded Innovative Medicines Initiative's 'New Drugs for Bad Bugs' (ND4BB) programme. The new research reveals that the compounds



inhibit a bacterial enzyme called DNA gyrase in a different manner to other known gyrase inhibitors. Professor Maxwell, a project leader in Biological Chemistry at the John Innes Centre, explained: "Bacterial chromosomes are tightly coiled, but for bacterial cells to replicate these coils must 'unwind' so that the DNA code can be accessed and copied. DNA gyrase creates a cut in the DNA, which allows it to uncoil before the cut ends are reconnected. This creates the opportunity for DNA-replicating enzymes to access the DNA. "Inhibiting DNA gyrase is lethal for the bacterium because it can no longer replicate its DNA."

Compounds that act on DNA gyrase are not new; in fact, a common and extremely effective class of existing antibiotics called 'fluoroquinolones' is among a number antibiotics that do exactly that. However, most of the

antibiotics which act against DNA gyrase work in a similar way, meaning that when bacteria evolve resistance to one, they may also be resistant to the others of the same class. But the newly discovered compounds inhibit DNA gyrase in a completely different way. Postdoctoral scientist Dr Thomas Germe explained: "Unfortunately, many dangerous bacteria have already developed resistance to fluoroquinolones, so these may not be successful in treating some resistant infections." After screening a collection of compounds, one compound -- known at this stage as 'Compound 1' -- was found to inhibit DNA gyrase in a new way."

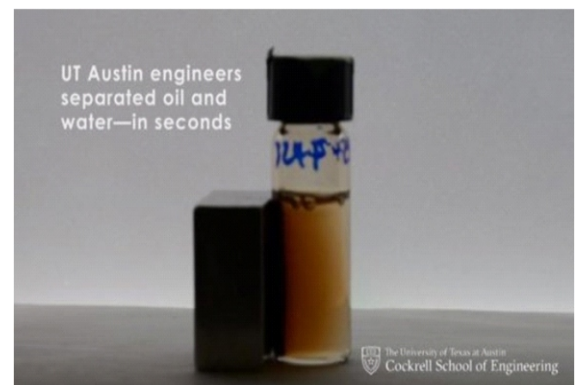
"Fluoroquinolones work by blocking DNA gyrase at the point at which it interacts with DNA. Compound 1, however, doesn't interfere with the DNA at all; rather it binds to a 'hinge pocket' in the other side of the enzyme's structure, which prevents the enzyme from swinging into the correct position to do its job." But the discovery doesn't end there. Professor Maxwell said: "Structural analysis revealed that if the chemical structure of Compound 1 was modified slightly, it would fit more tightly into the 'hinge' region of the DNA gyrase enzyme. This led to 'Compound 2', which is better DNA gyrase inhibitor, Both Compounds 1 and 2 prevent the growth of bacterial strains that are resistant to fluoroquinolone antibiotics in the laboratory." "Although the work on this compound series was stopped due to toxicity, this discovery shows that we can continue to identify novel compounds working in partnership with the pharmaceutical industry and it highlights the importance of collaborative effort, including European-funded collaboration."

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Nanoparticles and Magnets offer new, efficient Method of removing Oil from Water

Engineering researchers separate oil from water using the magnetic nanoparticles through a simple process that relies on electrostatic force and a magnet. They believe their new technique could improve water treatment for oil and gas production, more efficiently clean up oil spills and potentially remove lead from drinking water. When oil mixes with or enters into water, conventional methods of cleaning the water and removing the oil can be challenging, expensive and environmentally risky. But researchers in the Cockrell School of Engineering at The University of Texas at Austin believe they may have developed a better method. Their study has been published in the Journal of Nanoparticle Research. Today, nanoparticles, which are tiny particles that can be coated with different chemicals such as polymers, are used in a wide variety of areas and industries including medicine, energy and electronics. The versatility of nanoparticles inspired the UT Austin team to explore how the particles could be applied to oil production to lessen its environmental footprint and increase efficiency in both onshore and offshore drilling. They believe their technique could also be used to treat the millions of gallons of fresh water used in hydraulic fracturing and to help clean drinking water.

Modern oil production methods separate 95 percent of the oil from produced water but leave behind small oil droplets that are difficult to extract, which makes water treatment and disposal more challenging and environmentally risky. "This new technique is really aimed at removing that little bit of oil in that water that needs to be removed before you can consider it treated," said Saebom Ko, a research associate in the Department of Petroleum and Geosystems Engineering and lead author on the study. "The advantage of employing magnetic nanoparticles is that the small oil droplets that attach to the nanoparticles are much more quickly separated from water than traditional physical separation processes because magnetic force can be orders of magnitude larger than gravitation." Ko worked with a team including



petroleum and geosystems engineering professor Hugh Daigle, biomedical engineering professor Thomas Milner and researcher Chun Huh to design surface coatings for magnetic nanoparticles that could be used for the removal of oil. They employed a technique, called high gradient magnetic separation, that has been used in mining to remove metals and in the food industry to remove toxic particles.

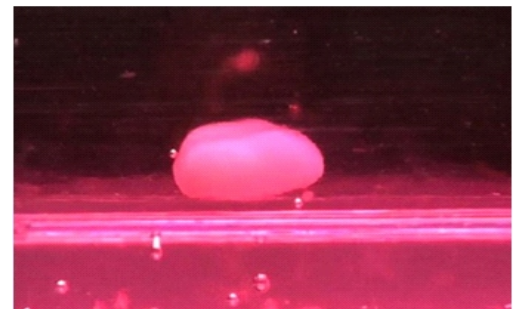
The team's main advancement is designing surface coatings for nanoparticles that are able to adhere to oil droplets using electrostatic force. The team coated the magnetic nanoparticles with polymers whose surface charge is positive. The positively charged magnetic nanoparticles then latch on to the negatively charged oil droplets through electrostatic attractive force, similar to how a dust-trapping cloth picks up dust. The process -- which takes seconds in laboratory tests -- could also happen in reverse. "It's a simple idea," Daigle said. "We are leveraging the magnetic properties of these nanoparticles to get them to stick to the oil droplets and essentially magnetize the oil droplets so they can be pulled out with a magnet." The ease of the technique and the flexibility of magnetic nanoparticles have motivated the researchers to consider different applications.

"We are currently developing a chemical-free regeneration process to reuse nanoparticles. Other regeneration methods use chemicals to extract the oil, resulting in production of other hazardous waste," Ko said. "We believe that by recycling and reusing nanoparticles, it could not only reduce operational costs, but it could be an environmentally friendly process that reduces hazardous waste."

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Bioengineered Human Livers Mimic Natural Development

Researchers bioengineering human liver tissues uncovered previously unknown networks of genetic-molecular crosstalk that control the organ's developmental processes -- greatly advancing efforts to generate healthy and usable human liver tissue from human pluripotent stem cells. The scientists report that their bioengineered human liver tissues still need additional rounds of molecular fine tuning before they can be tested in clinical trials.



This bright-field microscopic image shows a three-day-old human liver organoid grown by scientists who report research results in *Nature*. The tiny liver -- suspended in solution inside an under-lit petri dish well -- is about 10mm wide. Generated from human pluripotent stem cells (hPSCs), the miniature organs are being developed for their potential to study and treat liver disease.

The scientists report online in *Nature* on June 14 that their bioengineered human liver tissues still need additional rounds of molecular fine tuning before they can be tested in clinical trials. The research was led by Takanori Takebe, MD, a physician/investigator at Cincinnati Children's Hospital Medical Center (Division of Gastroenterology, Hepatology & Nutrition) in the United States, and Barbara Treutlein, PhD, Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. The only current treatment for end-stage liver disease is a liver transplant, and the number of livers available from deceased donors is limited. Because of this, a major goal in regenerative medicine is to attain self-organizing human tissues -- in which cells experience a series of coordinated molecular events precisely timed and spaced to form functioning three dimensional liver buds, the authors write. The new cellular and molecular data uncovered in the current study will be "exploited in the future to further improve liver bud organoids" and "precisely recapitulate differentiation of all cell types" in fetal human development.

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National Exhibition on IT & Computer Tools for Science and Education

15-17 September, 2017
Pak China Center, Islamabad
www.pastic.gov.pk

International Conference on Science, Technology, Engineering & Management

29-30 September, 2017
Rawalpindi,
[www. Conference2017/Pakistan/2/ICSTEM/](http://www.Conference2017/Pakistan/2/ICSTEM/)

International Multi-Disciplinary Research Conference

7th October, 2017
Mandi Bahauddin
www.imdrc.com.pk

International Conference on Agricultural and Food Science

25-27 October, 2017
Lahore, Pakistan
www.icbb.vu.edu.pk

International Events

International Energy Program Evaluation Conference

8 -10 August, 2017
Baltimore, Maryland
www.iepec.org

International Conference on Communication and Network Technology

1-3 September, 2017
Zurich, Switzerland
www.iccnt.org

International Conference on Management, Engineering, Science & Technology

1-2 October, 2017
United Arab Emirates
www.icmest.net

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