

TECHNOLOGY ROUNDUP

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



July-August, 2015

Vol. 7, No. 4

Editorial Board

Patron/Executive Editor
Dr. Muhammad Akram Shaikh
Director General, PASTIC

Managing Editors
Ms. Nageen Ainuddin
Mr. M. Aqil Khan
Editor
Dr. Saima Tanveer

Composer
Kashif Farooqui

Tech News Headlines

- Frequency Control in Cigre Low Voltage Distribution Network with Significant Amounts of Inverter Based Generators
- Finite Capacity Energy Efficient Femtocell Network
- Compound in Magnolia may Combat Head and Neck Cancers
- Computer Vision and Mobile Technology can Help Blind People
- Online Computer Game can Help Shed Weight
- Bio-fueled Jet Plane
- Renewable Energy from Evaporating Water

Tech & Trade Offers

Deep Cycle Gel range VRLA



Forthcoming Tech Events

- Conference on Life Sciences Research-2015
- 1st Multi Disciplinary Research Conference
- International Conference on Information Management & Libraries
- 15th International Nutrition & Diagnostics Conference October 5-8, 2015
- Euro Food Chem 2015 XVIII
- Integrated Continuous Biomanufacturing II
- International Conference on Lipid Science & Technology
- 2nd International Energy and Environment Conference (IEEC-2015)

Indigenous Technology

Frequency Control in Cigre Low Voltage Distribution Network with Significant Amounts of Inverter Based Generators

Researchers from the Department of Electrical Engineering & Department of Electronics Engineering, Quaid-E-Awam University of Engineering Sciences and Technology, Nawabshah have studied Frequency Control in Cigre Low Voltage Distribution Network with Significant Amounts of Inverter Based Generators

Maintaining demand side supply and regulating frequency in power networks are the prime requirements of the modern power systems. The frequency of the power system deviates from its nominal value if there is mismatch between power generation and consumption. If the active power demand is higher than the active power production in the network, the frequency decreases and vice versa. The increase or the decrease in the frequency can be compensated by balancing the generation and load demands. This is normally done by allocating reserve units or by using inverter based generators such as Battery Energy Storage Devices (BESDs). The main idea of the study proposed here is about the frequency stability in the CIGRE low voltage distribution network. This is done by matching load-generation balance in the network the CIGRE network is not performed here but the CIGRE network is split into a very simple network comprising finite grid (i.e. a synchronous generator with the active power capability of 30 kW), one battery unit and a load. This is done in order to show the detailed procedure about the control of frequency within the power networks and same procedure is proposed for the frequency stability within the CIGRE low voltage network. The work is done on a simple network and simulations are carried out by using DIgSILENT power factory software version 15.0. The procedure of modeling BES which should operate as Battery Energy Storage equipped Static Compensator (BES-STATCOM) developed in DIgSILENT power factory is also described in this research.

The Load-generation must be corrected within short duration; otherwise it might leads to the power line frequency to deviate from the rated value (e.g., 50 Hz in this study). Large deviations in the frequency of the power network cause the threats to the stability and the security of power systems and might cause permanent damage to the equipments. Different scenarios such as load reduction or generation deficit have been studied in this research. It has been proved with the help of the simulation results that the ESDs in all the conditions have successfully restored the frequency of the network within a short duration.

Courtesy:

Quaid-E-Awam University of Engineering Sciences and Technology, Nawabshah 2015 14(1) (Pages 19-24)
Ghullam Mustafa Bhutto*Muhammad Usman Keerio*, Rameez Akbar Talani*, (Department of Electrical Engineering, Quaid-E-Awam University of Engineering Sciences and Technology, Nawabshah Pakistan) Ehsan Ali Buriro** : (Department of Electronics Engineering, Quaid-E-Awam University of Engineering Sciences and Technology, Nawabshah Pakistan)

www.quest.edu.pk

Indigenous Technology

Finite Capacity Energy Efficient Femtocell Network

Researchers from the Department of Electronic Engineering, Mehran University of Engineering & Technology, Jamshoro have studied Finite Capacity Energy Efficient Femtocell Network

The rapid growth in the number of subscribers leads to an increased bandwidth demand which results into higher energy expenditure in current cellular networks. This in turn increases the CO₂ emission which is a critical issue nowadays. Furthermore, the increased number of users also leads to the problem of spectrum scarcity.

The issue of energy efficiency in ICT (Information Communication Technology) sector has motivated many researchers from academia and industry to propose and develop new communication architectures and protocols. Many countries have committed to reduce the carbon footprint of ICT sector. In this regard, the United Kingdom is aiming to achieve energy efficiency of 80% by year 2050. The research statistics show that current cellular communication causes only 1-2% of the total emission. However, the ever increasing number of subscribers and rapidly growing demand of data services will cause exponential increase in carbon emission. A hybrid cellular architecture consisting Macrocell and few femtocells is a practicable solution to address the issue of energy efficiency and to improve reliability in present cellular systems. This study presents the performance analysis of a finite capacity energy efficient femtocell network. A FAP (Femtocell Access Point) provides continuous connectivity for M communicating nodes in this network. The data transmission from M communicating nodes to the central entity (FAP) is represented using M/M/1/K queue. To save energy, the server, in this case, takes exponentially distributed vacations during idle periods. Due to finite buffer size of FAP, this network represents a finite capacity system. The network model where sever takes vacation to save energy is solved with help of MGM (Matrix Geometric Method). For different system capacities, the network performance is analyzed in terms of power savings and QoS (Quality of Service) parameters such as utilization, average packet delay, and packet blocking probability. Results show that with small traffic intensity the energy savings is high, whereas utilization, delay and blocking are low. Moreover, the maximum energy can be saved when system in quite underutilized. An economical solution to wireless spectrum scarcity is the deployment of small cells (called femtocells) with already available or new macrocells. This hybrid architecture escalates the problem of bad signal quality for indoor users, achieves energy savings, and increases the spatial reuse. Moreover, users can communicate at higher data rates.

Courtesy:

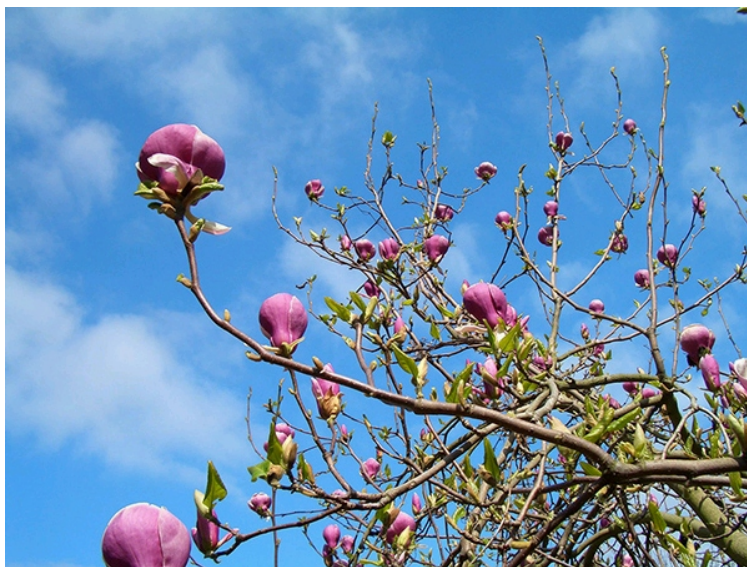
Mehran University Research Journal of Engineering & Technology, 2014 33(2) (Pages245-252)
J R Khan*, Wanod Kumar*, Imtiaz Hussain*, AND Sara Qadeer (Department of Electronic Engineering, Mehran University of Engineering & Technology, Jamshoro, Pakistan)

www.muett.edu.pk

Compound in Magnolia may Combat Head and Neck Cancers

Magnolias are prized for their large, colorful, fragrant flowers. This attractive tree can harbor a potent cancer fighter. According to a growing number of studies, including one from VA and the University of Alabama at Birmingham, the study focused on squamous cell head and neck cancers. According to the National Cancer Institute, at least 3 in 4 head and neck cancers are caused by the use of tobacco and alcohol. The cancers have only a 50 percent survival rate, killing some 20,000 Americans each year.

Honokiol($C_{18}H_{18}O_2$) is one of the major active compounds in magnolia extract, the phytochemical has been used for centuries in traditional Chinese and Japanese medicine to treat anxiety and other conditions. More recently, scientists have been discovering that the compound, found in magnolia bark, is a wily and versatile adversary of cancer. It seems to exploit many biochemical pathways to shrink tumors of various types, or to keep them from growing in the first place.



The Alabama scientists have now shown how it works against head and neck cancers: It blocks a protein called epidermal growth factor receptor, or EGFR. Prior research has found that almost all head and neck cancer cells display an over-abundance of the protein.

The VA-UAB team based on its lab studies told that honokiol binds more strongly with EGFR than does the drug gefitinib (sold as Iressa), which is commonly used to treat head and neck cancers.

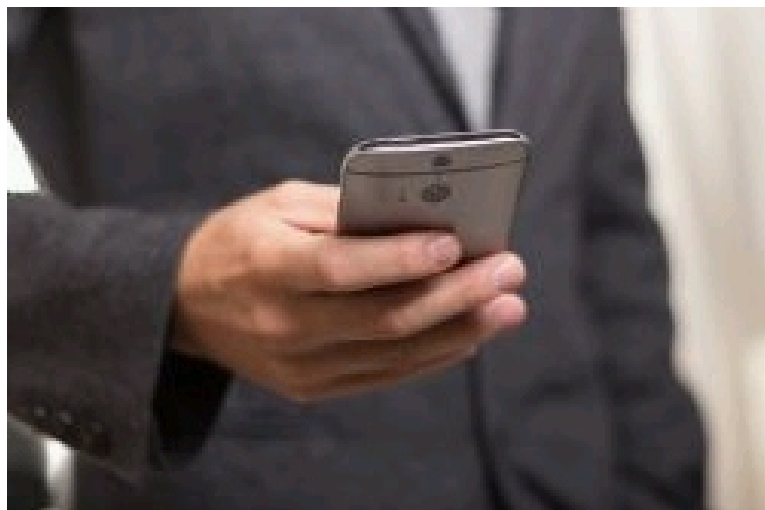
The researchers tested honokiol on cell lines derived from human cancers of the oral cavity, larynx, tongue, and pharynx. In all cases, the botanical shut down the aberrant cells. The team also tested it against tumors implanted into mice, with similar results.

Senior author Dr. Santosh K. Katiyar and his colleagues, honokiol appears to be an attractive bioactive small molecule phytochemical for the management of head and neck cancer which can be used either alone or in combination with other available therapeutic drugs. Katiyar has published extensively in the past on other natural substances that work against tumors, especially skin cancer.

Computer Vision and Mobile Technology can Help Blind People

Computer scientists are developing new adaptive mobile technology that could enable blind and visually-impaired people to 'see' through their smartphone or tablet.

Specialists in computer vision and machine learning at the University of Lincoln, UK are aiming to embed a smart vision system in mobile devices to help people with sight problems navigate unfamiliar indoor environments.



Based on preliminary work on assistive technologies done by the Lincoln Centre for Autonomous Systems, the team plans to use colour and depth sensor technology inside new smart phones and tablets to enable 3D mapping and localization, navigation and object recognition. The team will then develop the best interface to relay that to users whether that is vibrations, sounds or the spoken word.

Dr Nicola Bellotto, an expert on machine perception and human-centred robotics told that this project will build on our previous research to create an interface that can be used to help people with visual impairments.

There are many visual aids already available, from guide dogs to cameras and wearable sensors. Typical problems with the latter are usability and acceptability. If people were able to use technology embedded in devices such as smartphones, it would not require them to wear extra equipment which could make them feel self-conscious. There are also existing smartphone apps that are able to, for example, recognise an object or speak text to describe places. But the sensors embedded in the device are still not fully exploited. The research aim to create a system with 'human-in-the-loop' that provides good localisation relevant to visually impaired users and, most importantly, that understands how people observe and recognise particular features of their environment.

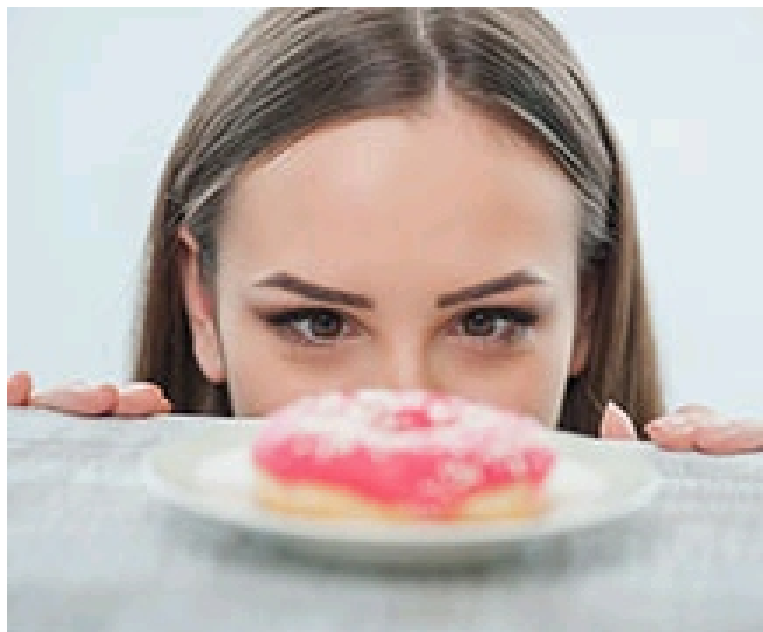
The research team, includes Dr Oscar Martinez Mozos, specialist in machine learning and quality of life technologies, and Dr Grzegorz Cielniak, in mobile robotics and machine perception, aim to develop a system that will recognise visual clues in the environment. This data would be detected through the device camera and used to identify the type of room as the user moves around the space.

A key aspect of the system will be its capacity to adapt to individual users' experiences, modifying the guidance it provides as the machine 'learns' from its landscape and from the human interaction. So, as the user becomes more accustomed to the technology, the quicker and easier it would be to identify the environment.

The research team is working with a Google sponsor and will be collaborating with specialists at Google throughout the Active Vision with Human-in-the-Loop for the Visually Impaired project.

Online Computer Game can Help Shed Weight

A simple new computerized game could help people control their snacking impulses and lose weight. A study that shows that participants lost an average of 0.7kg and consumed around 220 fewer calories a day whilst undergoing the week of training. The team of researchers, led by Dr Natalia Lawrence, has developed a simple online computer game that trains people to resist unhealthy snack foods. The game requires people to repeatedly avoid pressing on pictures of certain images (e.g. of biscuits), whilst responding to other images (e.g. fruit, clothes), and therefore trains people to associate calorie-dense foods with 'stopping'. The team previously showed that this training reduces how much food people eat in laboratory tests.



Now their new study published in the journal *Appetite*, has found that 41 adults who completed four 10-minute sessions of the training online lost a small but significant amount of weight and ate fewer calories. The training also reduced how much the calorie-dense 'stop' foods were liked. The reduction in weight and unhealthy snacking was maintained six months after the study. These effects were observed relative to a control group of 42 adults who completed the same "stop versus go" training, but involving pictures of non-food objects (e.g. pens).

Dr Natalia Lawrence of the University of Exeter, lead researcher in both the original research and the new studies told that these findings are among the first to suggest that a brief, simple computerized tool can change people's everyday eating behaviour. It is exciting to see the effects of our lab studies translate to the real world. This

research is still in its infancy and the effects are modest. However, findings suggest that this cognitive training approach is worth pursuing: It is free, easy to do and 88% of the participants said they would be happy to keep doing it and would recommend it to a friend. This opens up exciting possibilities for new behaviour change interventions based on underlying psychological processes. Eighty-three adults from the local community aged 23-65 with BMIs ranging from 21 to 46 (healthy to obese) were involved in the study. Participants had to report regular intake (at least three times per week) of energy-dense snack foods (crisps, chocolate, biscuits) and some problems controlling their food intake on a screening questionnaire. Most participants were recruited from the NIHR Exeter Clinical Research Facility's Exeter 10,000 participant panel. Participants were weighed by researchers and given food rating tasks and food diaries to complete one week before, and one week after the training, which they completed online at home or work. They were randomly allocated to receive the active (food-related) or control training intervention. Results showed that participants in the active group lost weight (~ 0.7 kg), consumed less (~ 220 kcal a day) and reported lower 'liking' of the snack foods they were trained to stop to.

www.exeter.ac.uk

Bio-fueled Jet Plane

Alexis Bell, a chemical engineer with joint appointments at Berkeley Lab and UC Berkeley combined chemical catalysis with life-cycle greenhouse gas modeling to create a new process for producing bio-based aviation fuel as well as automotive lubricant base oils. The recyclable catalysts are capable of converting sugarcane biomass into a new class of aviation fuel and



lubricants with superior cold-flow properties, density and viscosity that could achieve net life-cycle greenhouse gas savings of up to 80-percent. Bell is one of three corresponding authors of a paper published in the Proceedings of the National Academy of Sciences (PNAS). Titled "Novel pathways for fuels and lubricants from biomass optimized using life-cycle greenhouse gas assessment." Corinne Scown, a research scientist with Berkeley Lab's Energy Analysis and Environmental Impacts Division, and Dean Toste, a chemist with joint appointments at Berkeley Lab and UC Berkeley, are the other two authors.

The concentrations of carbon and other greenhouse gases in Earth's atmosphere are now at their highest levels in the past three million years, primarily as a result of the burning of petroleum and other

fossil fuels. Biofuels synthesized from the sugars in plant biomass help mitigate climate change. However, jet fuels have stringent requirements that must be met. Jet fuels must be oxygen-free, have the right boiling point distribution and lubricity, and a very low pour point, meaning the fuel can't become gelatinous in the cold temperatures of the stratosphere. According to Bell, Bio-fuel solutions, such as farnesane, mixed directly with petroleum jet fuel have been tested, but offer only modest greenhouse gas reduction benefits. This is the first process to generate true drop-in aviation bio-fuels. Scown cites the Intergovernmental Panel on Climate Change (IPCC). 2014 report, that drop-in biofuels are the only viable alternative to conventional jet fuels. according to Scown to reduce dependence on petroleum, air travel is going to require renewable liquid fuels because batteries and fuel cells simply are not practical.

The process developed at EBI can be used to selectively upgrade alkyl methyl ketones derived from sugarcane biomass into trimer condensates with better than 95-percent yields. These condensates are then hydro-deoxygenated into a new class of cycloalkane compounds that contain a cyclohexane ring and a quaternary carbon atom. These cycloalkane compounds can be tailored for the production of either jet fuel, or automotive lubricant base oils. Lubricant base oils can produce even more greenhouse gas emissions on a per-mass basis than petroleum-derived fuels if even a fraction of the lubricant is repurposed as fuel. The ability of the EBI process to yield jet fuel or lubricants should be a significant advantage for biorefineries.

According to Gokhale, a chemical engineer, Sugarcane biorefineries today produce ethanol, sugar and electricity, expanding the product slate to include aviation fuels and lubricant base oils could allow for operators to manage their market risks better, which is exactly how petrochemical refinery complexes operate today. Rather than optimize for one product, they try to optimize the overall product slate.

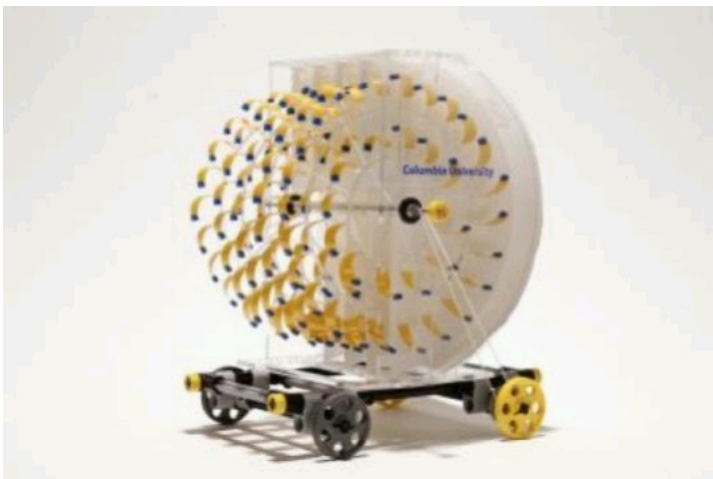
Scown adds that another important advantage offered by the process is that it enables refineries to convert a portion of the bagasse, the fibrous residue into fuels and other products. The rest of the waste biomass can be combusted to produce process heat and electricity to operate the refinery. This new EBI process for making jet fuel and lubricants could also be used to make diesel and additives for gasoline as Gokhale explains.

Although the goal of this study is to develop a strategy for the flexible production of jet fuels and lubricant base oils yet the strategy behind the process could also be applied to biomass from other non-food plants and agricultural waste that are fermented by genetically engineered microbes. Scown expects that further research will make this option increasingly attractive. The study shows that biorefineries can use inexpensive catalysts to produce a suite of hydrocarbon fuels and lubricants by strategically piecing together biological and thermochemical processes, biorefineries can also operate without any fossil-derived inputs.

www.sciencedaily.com

Renewable Energy from Evaporating Water

Columbia University scientists report the development of two novel devices that derive power directly from evaporation -- a floating, piston-driven engine that generates electricity causing a light to flash, and a rotary engine that drives a miniature car.



According to Ozgur Sahin, associate professor biological sciences and physics Columbia University, when evaporation energy is scaled up it could one day produce electricity from giant floating power generators that sit on bays or reservoirs, or from huge rotating machines akin to wind turbines that sit above water.

Evaporation is a fundamental force of nature. It is everywhere, and it is more powerful than other forces like wind and waves. Sahin found that when bacterial spores shrink and swell with changing humidity, they can push and pull other objects forcefully. They pack more energy, pound for pound, than other materials used in engineering for moving objects, he reported in a paper published in *Nature Nanotechnology*.

Building on last year's findings, Sahin and his Columbia colleagues sought to build actual devices that could be powered by such energy. To build a floating, piston-driven engine, the researchers first glued spores to both sides of a thin, double-sided plastic tape akin to that in cassette tapes, creating a dashed line of spores. They did the same on the opposite side of the tape, but offset the line so dashes on one side overlapped with gaps on the other.

When dry air shrinks the spores, the spore-covered dashes curve. This transforms the tape from straight to wavy, shortening the tape. If one or both ends of the tape are anchored, the tape tugs on whatever it's attached to. Conversely, when the air is moist, the tape extends, releasing the force. The result is a new type of artificial muscle that is controlled by changing humidity.

Sahin and Xi Chen, then placed dozens of these tapes side by side, creating a stronger artificial muscle that they then placed inside a floating plastic case topped with shutters. Inside the case, evaporating water made the air humid. The humidity caused the muscle to elongate, opening the shutters and allowing the air to dry out. When the humidity escaped, the spores shrunk and the tapes contracted, pulling the shutters closed and allowing humidity to build again. A self-sustaining cycle of motion was born.

The spore-covered artificial muscles function as an evaporation-driven piston. Coupling that piston to a generator produced enough electricity to cause a small light to flash. They turned evaporation from a pool of water into light. With its current power output, the floating evaporation engine could supply small floating lights or sensors at the ocean floor that monitors the environment, speculating that an improved version with stickier plastic tape and more spores could potentially generate even more power per unit area than a wind farm.

The Columbia team's other new evaporation-driven engine -- the Moisture Mill -- contains a plastic wheel with protruding tabs of tape covered on one side with spores. Half of the wheel sits in dry air, causing the tabs to curve, and the other half sits in humid environment, where the tabs straighten. As a result, the wheel rotates continuously, effectively acting as a rotary engine. The researchers next built a small toy car, powering it with the Moisture Mill and were successful in getting the car to roll on its own, powered only by evaporation. In the future, Sahin said, it may be possible to design engines that use the mechanical energy stored in spores to propel a full-sized vehicle. Such an engine would require neither fuel to burn nor an electrical battery. Sahin told a larger version of the Moisture Mill could also produce electricity, suggesting a wheel that sits above a large body of water and evaporates saltwater, causing the wheel to rotate and generate electricity. This development would steadily produce as much electricity as a wind turbine.

Forthcoming Tech Events

National/International Events

Conference on Life Sciences Research-2015

4- 6 September 2015
Islamabad, ICT, Pakistan
www.clsr.com.pk

1st Multi Disciplinary Research Conference

12 September 2015
Mandi Bahauddin,
Www.mdrc2015.com

International Conference on Information Management & Libraries

10-13 November, 2015
Lahore, Pakistan
[www. Pu.edu.pk](http://www.Pu.edu.pk)

15th International Nutrition & Diagnostics Conference October 5 – 8, 2015

5-8 October 2015
Prague 6, Czech Republic
www.pnds.org

Euro Food Chem 2015 XVIII

13-16 October, 2015
Madrid, Spain
www.ictan.csic.es

Integrated Continuous Biomanufacturing II

1-5, November, 2015
California, USA
www.engconf.org

International Conference on Lipid Science & Technology

30 November- 02 December, 2015
USA
www.lipids.conferenceseries.com/

2nd International Energy and Environment Conference (IEEC-2015)

22-24 December, 2015
Dubai, United Arab Emirates
www.warponline.org

Tech & Trade Offers

Deep Cycle Gel range VRLA



- ✍ **Exceptional energy Storage capacity combined with long life - BCI Classification**
- ✍ **Thick positive plate design for maximum service float life 12 year design life @20 C(68 F)**
- ✍ **SU UL Recognized component**
- ✍ **Spill proof and leak proof**
- ✍ **Maintenance free (no topping up) during the service life due Ever Exceed Gel Technology**
- ✍ **Flame arresting on way pressure relief vent for safe and long life**
- ✍ **Electrolyte in solid gel form will not stratify no equalization charge required**
- ✍ **Increased durability and deep cycle ability for heavy duty applications**

Company Contact:-

Sharif International

House # 151-A Street # 8 Chaklala Scheme 3, Rawalpindi

Tel: 92-51-5766380, Fax: 92-51-5598354

www.sharifinternational.net

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 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.

Please give us your feedback and address queries to editor@pastic.gov.pk