TECHNOLOGY ROUNDUP

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

PASTIC

November - December, 2013

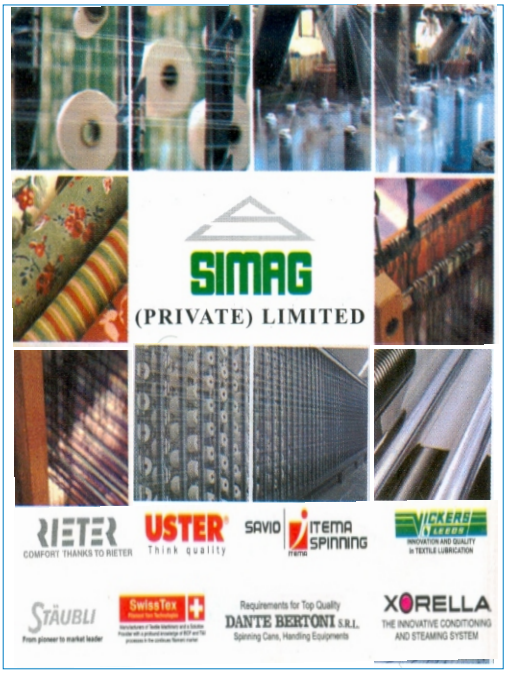
Vol. 5, No. 6

Editorial Board

Tech News Headlines

- Standardization of micropropgation techniques for Aloe vera: A pharmaceutically important plant
- Handwritten Character Recognition Using Multiclass SVM Classification with Hybrid Feature Extraction
- A Light Wave of Innovation to Advance Solar Energy: Researchers Adapt Classic Antennas to Harness More Power from the Sun
- Innovative Solar Technology May Lead to Interior Lighting Revolution
- Ultrasound, Nanoparticles May Help Diabetics Avoid the Needle
- Genetic Discovery Points to Bigger Yields in Tomato and Other Flowering Food Plants

Tech & Trade Offers



Forthcoming Tech Events

- 3rd International Conference of Pakistan Phytopathological Society
- 12th International Conference on Statistical Sciences
- International Workshop on Discrete Structures (IWODS)
- Food and Technology Pakistan 2014
- 2nd Abasyn International Conference on Teachnology and Business Management
- International Sustinable Built Environment Conference (ISBE)
- Conference on Applied Neuroscience 2014
- 4th International Conference on Environment and Industrial Innovation

PASTIC National Centre
Quaid-i-Azam University Campus
P.O. Box 1217, Islamabad

Phone: 051-9248103-4, 9248111
Fax: 051-9248113
Email:editor@pastic.gov.pk
Web: www.pastic.gov.pk

Indigenous Technology

Standardization of micropropgation techniques for Aloe vera: A pharmaceutically important plant

Reserchers from Pakistan Museum of Natural History, Islamabad, Pakistan, PMAS, Arid Agriculture University Rawalpindi, Pakistan and Pakistan Science Foundation, Islamabad, Pakistan have developed Standardization of micropropgation techniques for Aloe vera

Aloe vera (Syn. Aloe barbadensis Mill). a monocotyledonous plant, belonging to family Asphodelaceae. More than 160 metabolites are found in Aloe vera leaves. It is a medicinal plant, has a great potential in cosmetic and drug industry due to presence of more than 200 bioactive compounds and Aloe vera is used internally as laxative, antihelminthic, hemorrhoid remedy and uterine stimulant as menstrual regulator and reported to be used as wound healing. It is reported to be used on sun damaged skin and UV damaged skin as well. The common propagation of Aloe vera is conventional method by means of suckers which is inefficient to meet the industrial demand. Current production of leaves is not enough for the fast growing demand of cosmetic and pharmaceutical industries.

Large-scale cultivation of selected genotype is the need of time. Sexual reproduction of Aloe vera by means of seeds is limited due to presence of male sterility. Limited number of lateral shoots from a single donor plant per year is also a limiting factor for the vegetative reproduction of Aloe vera. Because of these factors there is less availability of plant propagating material leading to low productivity of this important pant. The problem of low productivity can be minimized by using micropropagation as a possible solution to overcome the problems ssociated with conventional propagation techniques.

Presence of plant growth regulators plays a significant role in a successful regeneration of any plant species. Among the plant growth regulators, cytokinin in culture medium is the most important factors for shoot proliferation. Some researchers reported presence of both of auxin and cytokinin necessary for shoot proliferation and combination of these two critical to shoot regeneration. The objective of research was to standardize an appropriate concentration of various plant growth regulators for a successful micropropagation of Aloe vera for disease free, true to type Aloe vera plantlets. The research was further aimed for mass propagation of this important plant.

Healthy Aloe vera plants with good biomass were selected as experimental material. Shoot tip explants were selected from these healthy and good biomass plants of 2 years of age. The extra leaves were trimmed to avoid any contamination and shoots were resized to 2-3 cm. Shoot tip was used as an explant for in vitro regeneration of Aloe vera. Explants were disinfested with the use of 0.1% mercuric chloride and 0.5% sodium hypochlorite, and washed thoroughly with autoclaved distilled water. Solid MS medium was used with addition of different concentrations of 6-benzyl aminopurine and a-naphthalene acitic acid. After 7 weeks of inoculation, greatest number of shoots (11.18) and highest shoot length (12.15cm) were found in MS medium supplemented with 0.5 mg l-1 6-benzylaminopurine (BAP) along with same concentration of a-naphthalene acitic acid (NAA). Best rooting (84.67%) was found in medium supplemented with 1.5 mg l-1 of indole butyric acid (IBA). The rooted explants were then gradually acclimatized and shifted to green house.

Indigenous Technology

Handwritten Character Recognition Using Multiclass SVM Classification with Hybrid Feature Extraction

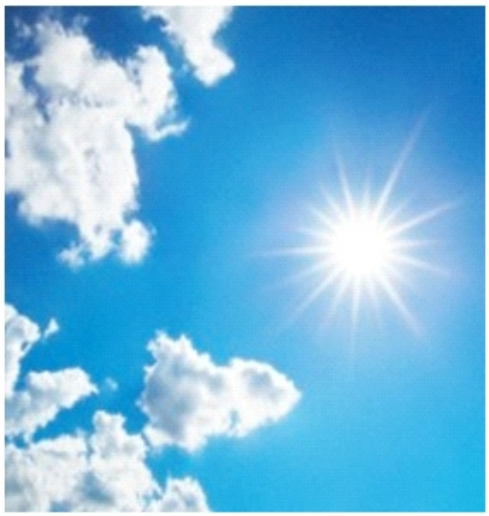
The researchers from Department of Electrical Engineering and Al-Khawrizmi Institute of Computer Science, University of Engineering and Technology, Lahore, Pakistan have research on Handwritten Character Recognition Using Multiclass SVM Classification with Hybrid Feature Extraction

Handwritten character recognition (HCR) is the computer based identification of handwritten numerals and alphabets. HCR is a step towards the automation of human interaction with machines. HCR has applications for assisting visually-impaired people; for automatic database recording and filtering of written documents; writer identification and signature verification etc. Despite its tremendous scope of application, HCR is a difficult object classification task because each writer has its own way of writing characters and writing fashion varies for a single writer too.

One of the most important phases in successfully achieving character recognition is the task of feature extraction. Feature extraction stage identifies and extracts various attributes from characters that help distinctly and uniquely distinguish different characters. The second most important component in successfully achieving handwritten character recognition is the pattern classification stage. This stage will assign an unknown character sample to one of possible classes by utilizing the information of feature extraction stage. Different types of classifiers can be built based on the nature and type of data samples and the extracted features. Classifiers used for character recognition problem include k-nearest neighbor classifier, hidden Markov model (HMM), support vector machine (SVM), and artificial neural network (ANN) etc.

The proposed technique is a hybrid of structural, statistical and correlation features. In the first step, the proposed technique identifies the type and location of some elementary strokes in the character. The strokes to be looked for comprise horizontal, vertical, positive slant and negative slant lines as we observe that the structure of any character can be approximated with the help of a combination of simple straight line strokes. The strokes are identified by correlating different segments of the character with the chosen elementary shapes. These normalized correlation values at different segments of the character give correlation features. For making feature extraction more robust, they add in the second step certain structural/statistical features to the correlation features. The added structural/statistical features are based on projections, profiles, invariant moments, endpoints and junction points. This enhanced, powerful combination of features results in a 157-variable feature vector for each character, which they find adequate enough to uniquely represent and identify each character. Prior, handwritten character recognition problem has not been addressed the way there proposed hybrid feature extraction technique deals with it. The extracted feature vector is used during the training phase for building a support vector machine (SVM) classifier. The trained SVM classifier is subsequently used during the testing phase for classifying unknown characters. Experiments were performed on handwritten digit characters and uppercase alphabets taken from different writers, without any constraint on writing style. The obtained results were compared with some related existing approaches. Owing to the proposed technique, the results obtained show higher efficiency regarding classifier accuracy, memory size and training time as compared to these other existing approaches.

A Light Wave of Innovation to Advance Solar Energy: Researchers Adapt Classic Antennas to Harness More Power from the Sun



Some solar devices, like calculators, only need a small panel of solar cells to function. But supplying enough power to meet all our daily needs would require enormous solar panels. And solar-powered energy collected by panels made of silicon, a semiconductor material, is limited contemporary panel technology that can only convert approximately seven percent of optical solar waves into electric current.

Researchers of Tel Aviv University's Department of Physical Electronics, Isreal and its innovative new Renewable Energy Center are now developing a solar panel composed of nano-antennas instead of semiconductors. By adapting classic metallic antennas to absorb light waves at optical frequencies, a much higher conversion rate from light into useable energy could be achieved. Such efficiency, combined with a lower material cost, would mean a cost-effective way to harvest and utilize "green" energy.

Both radio and optical waves are electromagnetic energy. When these waves are harvested, electrons are generated that can be converted into electric current. Traditionally, detectors based on semiconducting materials like silicon are used to interface with light, while radio waves are captured by antenna.

For optimal absorption, the antenna dimensions must correspond to the light's very short wavelength, a challenge in optical frequencies that plagued engineers in the past, but now we are able to fabricate antennas less than a micron in length. To test the efficacy of their antennas,the researchers measured their ability to absorb and remit energy. "In order to function, an antenna must form a circuit, receiving and transmitting of a cell phone, whose small, hidden antenna both receives and transmits radio waves in order to complete a call or send a message.

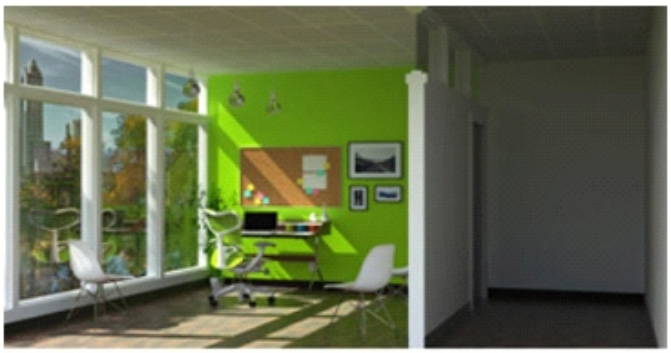
By illuminating the antennas, the researchers were able to measure the antennas' ability to re-emit radiation efficiently, and determine how much power is lost in the circuit, a simple matter of measuring the wattage going in and coming back out. Initial tests indicate that 95 percent of the wattage going into the antenna comes out, meaning that only five percent is wasted.

According to the researchers, these "old school" antennas also have greater potential for solar energy because they can collect wavelengths across a much broader spectrum of light. The solar spectrum is very broad, they explain that with UV or infrared rays ranging from ten microns to less than two hundred nanometers. No semiconductor can handle this broad spectrum, and they absorb only a fraction of the available energy. A group of antennas, however, can be manufactured in different lengths with the same materials and process, exploiting the entire available spectrum of light.

When finished, the team's new solar panels will be large sheets of plastic which, with the use of a nano-imprinting lithography machine, will be imprinted with varying lengths and shapes of metallic antennas. Improving solar power's bottom line. The researchers have already constructed a model of a possible solar panel. The researchers say that the next step is to focus on the conversion process that how electromagnetic energy becomes electric current, and how the process can be improved. The goal is not only to improve the efficiency of solar panels, but also to make the technology a viable option in terms of cost.

Www.aftau.org

Innovative Solar Technology May Lead to Interior Lighting Revolution



University of Cincinnati researchers have seen the light, a bright, powerful light that just might change the future of how building interiors are brightened.

“The researchers claim that SmartLight technology would be groundbreaking. "This would change the equation for energy. It would change the way buildings are designed and renovated. It would change the way we would use energy and deal with the reality of the sun.

There's a simple question SmartLight addresses: Is there a smarter way to use sunlight? Every day the sun's rays hit Earth with more than enough energy to meet many of society's energy demands, but existing technologies designed to harness that energy, such as photovoltaic cells, aren't very efficient. A typical photovoltaic array loses most of the sun's energy when it gets converted into electricity. But with SmartLight, Harfmann says the sunlight channeled through the system stays, and is used, in its original form. This method is far more efficient than converting light into electricity then back into light and would be far more sustainable than generating electric light by burning fossil fuels or releasing nuclear energy. The technology could be applied to any building big or small, old or new, residential or commercial and will have the greatest impact on large commercial buildings.

SmartLight could help shift that energy imbalance. It works like a narrow grid of electrofluidic cells which is self-powered by embedded photovoltaics is applied near the top of a window. Each tiny cell only a few millimeters wide contains fluid with optical properties as good or better than glass. The surface tension of the fluid can be rapidly manipulated into shapes such as lenses or prisms through minimal electrical stimulation about 10,000 to 100,000 times less power than what's needed to light a traditional incandescent bulb. In this way, sunlight passing through the cell can be controlled.

The grid might direct some light to reflect off the ceiling to provide ambient room lighting. Other light might get focused toward special fixtures for task lighting. Yet another portion of light might be transmitted across the empty, uppermost spaces in a room to an existing or newly installed transom window fitted with its own electrofluidic grid. From there, the process could be repeated to enable sunlight to reach the deepest, most "light-locked" areas of any building. And it's all done without needing to install new wiring, ducts, tubes or cables. "You're using space that's entirely available already. And you don't need something mechanical and bulky, like a motor whirring in the corner of your office steering the light. It just looks like a piece of glass that all of a sudden switches.”

As for switching, the workplace where physical light switches join other anachronistic office equipment like mouse pads or bulky CRT monitors. Plans call for SmartLight to be controlled wirelessly via a mobile software application. So instead of manually flipping a switch on a wall, a user would indicate their lighting preferences through an app on their mobile device, and SmartLight would regulate the room's brightness accordingly. SmartLight could even use geolocation data from the app to respond when a user enters or leaves a room or when they change seats within the room by manipulating Wi-Fi-enabled light fixtures.

"SmartLight would be controlled wirelessly. There would be no wires to run. You wouldn't have light switches in the room. You wouldn't have electricity routed in the walls You would walk into a room and lights would switch on because your smartphone knows where you are and is communicating with the SmartLight system.”

But what happens at night or on cloudy days? That's where SmartLight's energy storage ability comes in. On a typical sunny day, sunlight strikes a facade at a rate that's often hundreds of times greater than what is needed to light the entire building. SmartLight can funnel surplus light into a centralized harvesting- and energy-storing hub within the building. The stored energy could then be used to beam electrical lighting back through the building when natural light levels are low. The

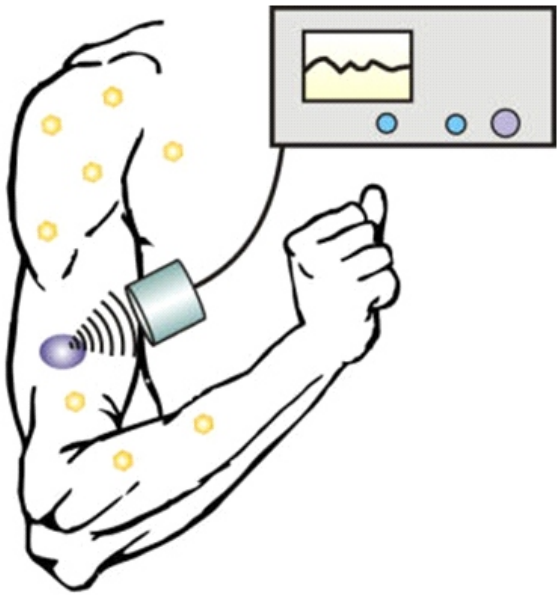
SmartLight's grid is so responsive -- each cell can switch by the second -- it can react dynamically to varying light levels throughout the day, meaning office lighting levels would remain constant during bright mornings spent catching up on email, stormy lunch hours spent eating at your desk, and late nights spent reviewing the budget. With such potential for energy storage, a building's electrical network also could tap into the centralized hub and use the stockpiled energy to power other needs, such as heating and cooling. And if centralized collection of surplus sunlight isn't possible inside some existing structures, the light could even be sent straight through a building to a neighboring collection facility.

Www.sciencedaily.com

Ultrasound, Nanoparticles May Help Diabetics Avoid the Needle

A new nanotechnology-based technique for regulating blood sugar in diabetics may give patients the ability to release insulin painlessly using a small ultrasound device, allowing them to go days between injections, rather than using needles to give themselves multiple insulin injections each day. The technique was developed by researchers at North Carolina State University and the University of North Carolina at Chapel Hill.

When a patient has type 1 or advanced type 2 diabetes, his or her body needs additional insulin, a hormone that transports glucose or blood sugar from the bloodstream into the body's cells. These diabetes patients must inject insulin as needed to ensure their blood sugar levels are in the "normal" range. However, these injections can be painful.



This technology is hopefully a big step toward giving diabetics a more painless method of maintaining healthy blood sugar levels. The technique involves injecting biocompatible and biodegradable nanoparticles into a patient's skin. The nanoparticles are made out of poly(lactic-co-glycolic) acid (PLGA) and are filled with insulin. Each of the PLGA nanoparticles is given either a positively charged coating made of chitosan (a biocompatible material normally found in shrimp shells), or a negatively charged coating made of alginate (a biocompatible material normally found in seaweed). When the solution of coated nanoparticles is mixed together, the positively and negatively charged coatings are attracted to each other by electrostatic force to form a "nano-network." Once injected into the subcutaneous layer of the skin, that nano-network holds the nanoparticles together and prevents them from dispersing throughout the body. The coated PLGA nanoparticles are also porous. Once in the body, the insulin begins to diffuse from the nanoparticles. But the bulk of the insulin doesn't stray far and it is suspended in a *de facto* reservoir in the subcutaneous layer of the skin by the electrostatic force of the nano-network. This essentially creates a dose of insulin that is simply waiting to be delivered into the bloodstream.

Using the new technology developed by Gu's team, a diabetes patient doesn't have to inject a dose of insulin as it's already there. Instead, patients can use a small, hand-held device to apply focused ultrasound waves to the site of the nano-network, painlessly releasing the insulin from its de facto reservoir into the bloodstream.

The researchers believe the technique works because the ultrasound waves excite microscopic gas bubbles in the tissue, temporarily disrupting nano-network in the subcutaneous layer of the skin. That disruption pushes the nanoparticles apart, relaxing the electrostatic force being exerted on the insulin in the reservoir. This allows the insulin to begin entering the bloodstream and process hastened by the effect of the ultrasound waves pushing on the insulin. The researchers are now trying to determine its precise details because when the ultrasound is removed, the electrostatic force reasserts itself and pulls the nanoparticles in the nano-network back together. The nanoparticles then diffuse more insulin, refilling the reservoir. The researchers have done proof-of-concept testing in laboratory mice with type 1 diabetes and found that this technique achieves a quick release of insulin into the bloodstream, and that the nano-networks contain enough insulin to regulate blood glucose levels for up to 10 days. When the insulin runs out, you have to inject a new nano-network and the previous nano-network is dissolved and fully absorbed into the body in a few weeks. This advance will certainly give millions of people with diabetes worldwide hope that better days are ahead.

Www.news.ncsu.edu

Genetic Discovery Points to Bigger Yields in Tomato and Other Flowering Food Plants

Every gardener knows the look of a ripe tomato. That bright red color, that warm earthy smell, and the sweet juicy flavor are hard to resist. But commercial tomato plants have a very different look from the backyard garden variety, which can grow endlessly under the right conditions to become tall and lanky. Tomatoes that will be canned for sauces and juice are harvested from plants that stop growing earlier than classic tomato varieties, and are therefore more like bushes. While the architecture of these compact bushy plants allows mechanical harvesters to reap the crop, the early end of growth means that each plant produces fewer fruits than their home garden cousins.

Researchers from Cold Spring Harbor Laboratory (CSHL), USA announced that they have determined a way to accomplish this. Their research has revealed one genetic mechanism for hybrid vigor, a property of plant breeding that has been exploited to boost yield since the early 20th century. Teasing out the hidden subtleties of a type of hybrid vigor involving just one gene has provided the scientists with means to tweak the length of time that bushy tomato varieties can produce flowers. In these plants, longer flowering time substantially raises fruit yield. Prognosis.

First identified at CSHL hybrid vigor or heterosis, involves interbreeding genetically distinct plants to generate offspring more robust than either inbred parent. It has been used for decades to improve agricultural productivity, but scientists have long debated how and why it works. Later on in their previous work, CSHL researchers identified a rare example of hybrid vigor involving a genetic defect in the gene that makes florigen, a hormone that controls the process of flowering and flower production. The mutation dramatically increases tomato yields in bush tomatoes, and researcher set out to understand the mechanism behind this remarkable result.

They found that bushy plants with a mutation in one of the two copies of the florigen gene, producing half as much florigen as plants without the mutation do, postpone the moment when they stop producing flowers. This, in turn, leads too many more fruits overall. The bushy tomato varieties are highly sensitive to the amount, or dosage, of the florigen hormone, which alters plant architecture that is, how many flowers can form before growth ends. These discoveries lead to an exciting prediction: that it may be possible to tweak florigen levels to increase yields even further.”

The team also studied florigen mutants in another plant, the crucifer weed known as Arabidopsis that is a cousin of crops like broccoli and cauliflower. Although they did not see the same increase in yield, they did observe similar changes in plant architecture because of florigen dosage sensitivities. These results suggest that it may be possible to manipulate florigen in a wide variety of flowering species to increase yields.

Www.cshl.edu

Forthcoming Tech Events

National Events

3rd International Conference of Pakistan Phytopathological Society
23-25 January, 2014
Karachi, Pakistan
www.conference.researchbib.com

12th International Conference on Statistical Sciences
10 - 12 Feburary, 2014
DHA Suffa University, Karachi, Pakistan
Www.conference.researchbib.com

International Workshop on Discrete Structures (IWODS)
05-07 March, 2014
Islamabad, Pakistan
www.conferencealerts.com

Food and Technology Pakistan 2014
18th - 20th March, 2014
Karachi, Sindh, Pakistan
Www.foodntechnology.com.pk

2nd Abasyn International Conference on Teachnology and Business Management
26th to 27th March 2014
Peshawar, Khyber Pakhtunkhwa, Pakistan
Www.easychair.org/conferences

International Events

International Sustinable Built Environment Conference (ISBE)
28 - 30 January, 2014
Doha, Qatar
Www.materialstoday.com

Conference on Applied Neuroscience 2014
30 January- 02 Feburary, 2014
Netherlands,
www.nature.com

4th International Conference on Environment and Industrial Innovation
12 March, 2014
Penang, Malaysia
Www.conferencealerts.com

Tech & Trade Offers

SIMAG
(Private) Limited

Dealer:

I. RIETER

i) K 45 comfortable spin machine

II. USTER

ii) USTER quantum 3

iii) USTER auto sorter 5
Essential information with international benchmarking

iv) Count measurement The basis for all spinning parameters

v) USTER ZWEIGLE yarn and roving reel

Vi) USSTER ZWEIGLE splice tester 4

vii) Quick and easy assessment of yarn grades

Company Contact

Simag

M. Iqbal Khan Leghari (Sales Manager)

Tel:092-21-35670757

E-mail: leghari@simag.com.pk

Address: 505 - 506 Alameera Center, 150 - Shahrah-e-Iraq, Saddar, Karachi Pakistan.

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.