



VATIS UPDATE

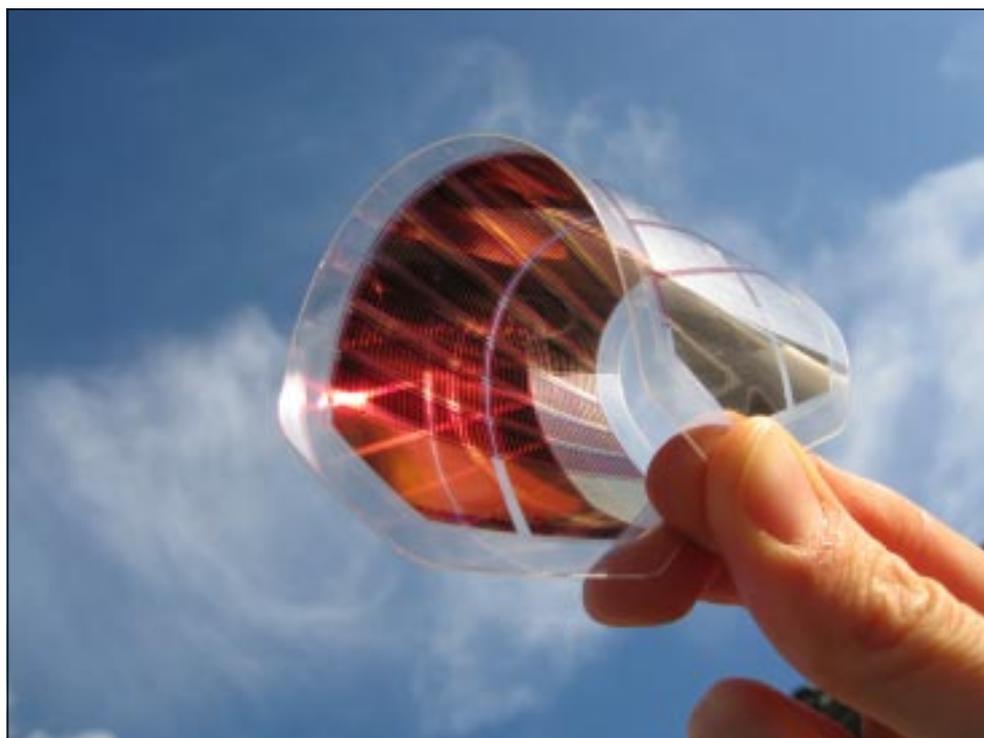
Non-conventional Energy

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Highlights

- Super spiky solar cell
- Low wind speed power production
- Power and potable water from the sea
- Cyanobacteria help generate electricity
- Novel catalyst for electrolysis
- Green process for producing fuel additive



The **Asian and Pacific Centre for Transfer of Technology (APCTT)**, a subsidiary body of ESCAP, was established on 16 July 1977 with the objectives: to assist the members and associate members of ESCAP through strengthening their capabilities to develop and manage national innovation systems; develop, transfer, adapt and apply technology; improve the terms of transfer of technology; and identify and promote the development and transfer of technologies relevant to the region.

The Centre will achieve the above objectives by undertaking such functions as:

- Research and analysis of trends, conditions and opportunities;
- Advisory services;
- Dissemination of information and good practices;
- Networking and partnership with international organizations and key stakeholders; and
- Training of national personnel, particularly national scientists and policy analysts.



The shaded areas of the map indicate ESCAP members and associate members

Cover Photo

Organic solar cell module (see page 7)

(Credit: Fraunhofer ISE, Germany)

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VATIS* Update Non-conventional Energy

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Working paper on renewables in Southeast Asia

The International Energy Agency (IEA) has released a working paper entitled “Renewables in Southeast Asian Countries: Trends and Potentials”. The paper focuses on the potential and barriers for scaling up market penetration of renewable energy technologies (RETs) in the electricity, heating and transport sectors of the ASEAN-6 countries (comprising the 10 members of the organization of Southeast Asian Nations (ASEAN) plus China, the Republic of Korea, Japan, India, Australia and New Zealand.

Besides analysing the implications of effective policies on renewable energy market growth, the paper examines how to overcome economic and non-economic barriers that slow investment in renewable energy, and formulates policy recommendations to encourage effective and efficient exploitation of renewable energy in Southeast Asia.

Owing to the rapid growth in production of biofuels in the region, the paper includes a special focus on their sustainability. The paper further notes that decision makers in most Southeast Asian countries have, of late, fostered the deployment of renewable energy technologies in a more concerted manner, identifying the potential effects of climate change and the rising dependency on fossil fuels imports as the key driving forces.

Source: climate-1.org

ADB may fund Philippine renewable energy projects

The Asian Development Bank (ADB) is considering financing a facility in

the Philippines that will be used for energy efficiency and renewable energy initiatives. According to Mr. Sohail Hasnie, Energy Specialist at ADB’s Energy and Water Division, the Bank is looking at co-financing up to US\$1 billion with its partners for the Philippines in the next three to four years.

Mr. Hasnie said that Philippines has all the necessary parameters for promoting renewable energy, such as very high electricity tariff, availability of renewable energy sources, good regulatory framework and a net import of oil. Therefore, significant investments in clean energy would be required in the next five years.

ADB has also discussed a 100 MW solar power project with the Philippine government. The Philippines has secured US\$125 million from the Clean Technology Fund, administered by the World Bank, and other multilateral institutions to support climate change mitigation.

Source: www.bworldonline.com

Foreign firms target Indian solar business

As India commits to an ambitious US\$70 billion programme to build 20 GW of solar capacity by 2022 (from about 30 MW now), China’s Suntech Power Holdings and First Solar Inc. of the United States are working on plans to enter the market. Foreign firms that have the scale and ability to sell solar gear cheaply are likely winners as this market grows.

For now, those with advanced technology, such as the French public multinational industrial conglomerate Areva and eSolar Inc. of the United States, have an advantage. While its rising power demand and high irradiation levels make the country ideal for harnessing solar energy, India is highly dependent on imports

of critical raw materials, including silicon wafer used for solar cells and panels. India is a manufacturer of solar concentrator collectors for another type of solar infrastructure – solar thermal energy. But its industry is underdeveloped in terms of technology.

India is building an initial capacity of 1 GW by 2013, enough to power close to 1 million homes. It would then add 3-10 GW by 2017, before targeting 20 GW by 2022. India’s top solar players have announced expansion plans, including Tata BP Solar, a joint venture of Tata Power and the global energy company BP based in the United Kingdom, and Moser Baer. But limited resources and a lack of know-how could slow them down as they compete with bigger foreign firms for contracts with solar developers.

India’s top public sector power producer NTPC Ltd., through its NTPC Vidyut Vyapar Nigam (NVVN) unit, will lead the plan’s initial phase via long-term contracts to buy the first 1 GW of energy from developers. Solar energy will be bundled with cheaper sources of electricity at the power utility and sold to distributors, who would reflect the solar cost on the rates they charge consumers. NVVN will award up to 700 MW of solar contracts this year and harness 2-3 GW of capacity later, but has no mandate to issue contracts beyond that at present. India hopes international funding and technological support would help build the rest of the capacity.

Source: economictimes.indiatimes.com

IFC supports renewable energy project in Sri Lanka

The International Finance Corporation (IFC), the private-sector arm of

the World Bank, will share the risks of Sri Lanka's NDB Bank to help finance a larger quantum of renewable energy projects, including mini-hydro and wind power projects in Sri Lanka. The US\$12.5 million risk-sharing facility would support the country's power generation capacity while addressing climate change, said an IFC statement. The project is expected to produce economic benefits for local entities, including small and medium enterprises.

IFC will share its financing, project structuring capability and benchmark data for renewable energy technologies with Sri Lanka. IFC also will help enhance NDB's ability to appraise projects using these technologies. The project follows a unique distributed generation approach, with smaller-scale electricity production at or near energy demand, improving reliability of supply and lowering pollution by using renewable sources.

Source: finchannel.com

Energy-starved Pakistan seeks wind investors

Pakistan expects to finalize four wind power deals worth US\$500 million to exploit a renewable resource that has been barely tapped in a country with a yawning gap between power capacity and demand. The country suffers chronic power cuts, with daily shortfalls ranging from 4,500 MW to 5,000 MW, according to the Water and Power Ministry figures. The country's coastal belt holds particular promise for wind power, with a potential for 50,000 MW production, according to National Renewable Energy Laboratory (NREL) of the United States.

Talks were under way with investors to build wind farms. Four deals worth US\$500 million and involving

four 50 MW plants are expected to be finalized this year, with implementation commencing early 2011. Pakistan's Alternative Energy Development Board (AEDB) is trying to boost private investment in alternative energy by offering incentives and access to wind turbine makers and operators, including Siemens (Germany), Nordex SE (Germany), SWEG (Egypt) and General Electric (the United States). The government is guaranteeing an annual rate of return of up to 18 per cent and payment to power producers if the wind blows below an annual average of 7.3 m/s.

Source: www.dailytimes.com.pk

Thailand adopts 'realistic' incentives for renewables

Tariffs to support renewable energy projects in Thailand will be changed to reflect more realistic costs as the previous programme to encourage investment in the sector has already achieved its targets, according to the Energy Minister Mr. Wannarat Channukul. The new feed-in tariff (FIT) scheme will be applied to all new renewable energy operators who are yet to sign purchasing contracts with power buyers, except for the solar power sector that will still receive an added tariff but at a lower rate per kWh of 6.5 baht (US\$ 0.21) down from 8 baht (US\$0.26).

The new tariff will be based on real investment costs and appropriate returns on investment for operators. With FIT, every supplier of renewable energy to the Electricity Generating Authority of Thailand (EGAT), the country's sole power buyer, will need to propose and negotiate their tariff or power price with EGAT.

The Ministry will set up a panel to consider the feed-in power price on a case-by-case basis, depending

on the size of each project and the quality of its energy. The Ministry said the new scheme will offer better rates across the board, even to very small projects.

Source: www.istockanalyst.com

Malaysia falls short on renewable energy

In Malaysia, only 15 per cent of the targeted 350 MW of renewable energy (RE) under the Ninth Plan had been achieved until December 2009. Energy, Green Technology and Water Deputy Minister Ms. Noriah Kasnon said the percentage was based on the 53 MW achieved under the Small Renewable Energy Programme (SREP) and 1.5 MW from the Malaysia Building Integrated Photovoltaic (MPIV) project.

Ms. Kasnon said the government had also approved the Renewable Energy Policy and Action Plan to ensure energy security through less dependence on fossil fuel in generating electricity, to be implemented from 2011. The Action Plan covers implementation of the feed-in tariff (FIT) mechanism that is expected to attract more parties to increase RE use. Besides SREP and MPIV, the government has initiated other programmes to encourage RE project development. These include the Biomass Power Generation and Co-Generation in the Palm Oil Mills programme, and offering various fiscal incentives like pioneer status and exemption from investment, export and sales taxes.

Source: www.bernama.com

Singapore funds solar energy research

Singapore's solar energy research is continuing its growth with a US\$ 9.4 million research grant awarded

to five research teams to improve solar cell efficiency and renewable energy storage systems. The grant was awarded by the Clean Energy Research Programme (CERP) under the government's Clean Energy Programme Office (CEPO) to speed up research and development efforts to help drive Singapore's growth in the clean energy industry. One of the research aims is to develop more cost-effective solar energy systems, in terms of solar cells, module and production efficiency. The research also seeks to find solutions to address the intermittency of renewable energy sources such as solar and wind.

The five research proposals awarded funding are: high-energy-density vanadium redox flow cell for renewable energy storage; high-reliability, long-life and low-cost lithium ion batteries for green energy storage applications; advanced superstrates for micromorph silicon solar cells; advanced polysilicon thin-film solar cells and modules (application for solid phase crystallization); and development of high-efficiency multi-crystalline silicon wafer solar cells (application of laser and ink-jet technologies). These were selected out of 48 submissions.

Source: www.rechargenews.com

Indonesia's biofuel initiatives

The Indonesian government is issuing a subsidy for the distribution of biofuels when the biofuel market price is higher than the market price for oil-based fuel. The subsidy is for the distribution of biofuel ranging between Rp 2,000 and Rp 2,500 (US\$0.22-0.28) per litre in the 2011 budget. Mr. Darwin Zahedy Saleh, the Energy and Mineral Resources Minister, said the subsidy is needed to ensure that a fall in prices would not cause financial losses to the

companies already involved in the production of biofuel in the country.

Indonesia began to use biofuel in October 2008 as part of a government initiative to reduce the consumption of petroleum-based fuels. Currently, the country produces bioethanol and biodiesel. Subsidized premium petrol contains at least 1 per cent bioethanol, while subsidized diesel contains at least 5 per cent biodiesel. Indonesia expects biofuel consumption to make up 5 per cent of its fuel consumption in 2025. The revised 2010 state budget allocates 36.5 million kilolitres as the subsidized fuel consumption quota, but the Ministry estimates the actual consumption could reach 40.1 million kilolitres. The volume is estimated to further increase up to 42.56 million kilolitres in 2011.

Source: www.biofuels-news.com

China could dominate wind power

China is quickly developing into the world's biggest wind power market. In 2009, the Asian giant installed more wind turbines than Europe and by 2017, China could have the world's largest total capacity, says the Global Wind Energy Council (GWEC). China in 2009 installed 13 GW of new wind power capacity compared with 10 GW in Europe and 9.9 GW in the United States, the GWEC figures indicate. While European and United States companies still dominate the turbine sector, the Chinese industry has grown strongly. There are 30 turbine producers and 40 suppliers now in China.

Meanwhile, growth within Europe is expected to remain strong. Wind will account for half of the European Union's power mix in 2030, reports the German Engineering Federation (VDMA). That means around 330

GW of wind power capacity will have to be built until 2030, with projected investments of around US\$30 billion per year. The European Wind Energy Association also unveiled its forecast for 2010, saying that 10 GW worth of wind power capacity will be installed in Europe this year.

Source: www.upi.com

Viet Nam looks to renewable energy

Renewable energy sources such as wind, solar and tidal flow in Viet Nam have the potential to eliminate power shortages in the country by 2015, according to Mr. Nguyen Duc Cuong, Director of the Centre for Renewal Energy and Clean Development Mechanism. The country has a range of high-capacity renewable sources due to its geographical location and agrarian character, he added. Around 10,000 MW could be generated from wind, 200-340 MW from geothermal sources, 500 MW from agricultural waste, 200 MW from urban waste, 100 MW from ocean tides and 58 MW from biogas. Solar energy would contribute up to 5 kWh/m²/d.

From 2010 to 2025, the country's energy needs would triple, with the electricity need growing 8 fold, Mr. Duc Cuong said. With oil prices fluctuating based on the growing demand from emerging industrial countries like China, India and Brazil and hydroelectric plants around the country operating at full capacity, Viet Nam may have to import coal for power plants after 2015. The energy shortage is estimated at 15 million tonnes of oil equivalent (TOE) in 2020 and 56 million TOE in 2030. Experts estimate that the country's reliance on imported energy would be 12.2 per cent in 2020, rising to 28 per cent in 2030.

Source: vietnamnews.vnagency.com.vn

Power from plastic

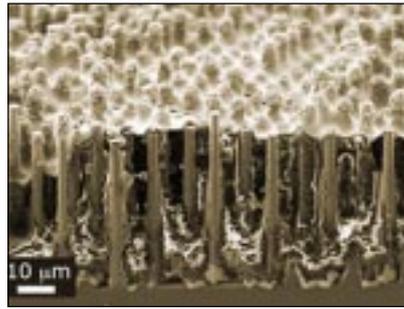
In Germany, the Freiburg Materials Research Centre (FMF) is working closely with the Fraunhofer Institute for Solar Energy Systems (ISE) on optimizing the efficiency of organic solar cells. A research team led by Dr. Uli Dice has succeeded in reaching the world's best value in the fill factor for flexible organic solar cells, ISE claims. The fill factor is a key quality characteristic that ascertains (near the short circuit current and open circuit voltage) the efficiency of the solar cell and thus the power output.

The Freiburg researchers achieved a promising efficiency – 64 per cent of the world's highest for flexible organic solar module fill factor. Two key cost advantages are the inverted structure of the organic solar cells and the avoidance of using costly indium tin oxide electrode. The laboratory-made modules so far consist of 11 series-connected cells and deliver a voltage of 6.5 V. The prototype is used to power an energy-sensor system, which will be integrated into clothing. Various sensors to collect environmental and physiological parameters can be included. *Contact: Dr. Uli Dice, Project Manager, Fraunhofer Institute for Solar Energy Systems (ISE)/ Freiburg Materials Research Centre, Germany. Tel: +49 (7) 61203 4796.*

Source: www.ise.fraunhofer.de

Super spiky solar cells

Unprecedented energy efficiencies using a very promising solar cell design have been demonstrated by scientists in the United States. The microwire-array solar cell is a technology that drives down the cost of solar cell production by using less silicon. This is achieved by aligning micron-thick silicon wires perpen-



Micron-thick silicon wires create an efficient solar cell array

dicular to a substrate of dimethylsiloxane (unlike the traditional flat layer of silicon), giving the cell the appearance of a bed of nails. However, efficiencies of only 3.4 per cent have so far been achieved with this design, despite a theoretical efficiency of 17 per cent.

Recently, Dr. Harry Atwater and his team at the California Institute of Technology demonstrated an efficiency of 7.9 per cent using their silicon microwire-array solar cell, by implementing an insulator that minimizes surface recombination of charge carriers, aluminium oxide particles to scatter light between the wires and silver back reflectors to prevent loss of incident illumination into the substrate. Much higher efficiencies could be achieved, the researchers claim.

Source: www.rsc.org

Lifespan of plastic solar cells extended to 8 months

Scientists in Canada have extended the operating life of plastic solar cells – from just few hours to eight months. Led by Dr. David Rider, a team from the University of Alberta and the National Institute for Nanotechnology has developed a longer-lasting polymer coating for the electrode that is central to the goal of a solar energy technology, extracting electricity from cell.

Prior to the polymer coating breakthrough, the plastic solar cells could operate at high capacity for about 10 hours only. When Dr. Rider and his team members first presented a paper on their development, the plastic solar cell had performed at high capacity for 500 hours. But, the cell kept on working for another seven months. The scientists report that the unit eventually stopped working, when it suffered damage during transit between laboratories.

Source: www.hindustantimes.com

PV module with embedded power optimization

SolarEdge Technologies from Israel offers its latest generation of innovative solutions for distributed solar power harvesting. SolarEdge's first commercial modules with embedded power optimization are available for 350 W modules as well as highly efficient 8 kW, 12 kW and 15 kW three-phase inverters.

SolarEdge PowerBoxes are power optimizers performing maximum power point tracking (MPPT) and monitoring on a module-level to enable constraint-free design, improved maintenance and safety, and up to 25 per cent more energy from residential and commercial photovoltaic (PV) systems. PowerBoxes are now embedded directly into solar modules and include all the benefits offered by the standard ones, but support modules of up to 350 Wp. The company has added three new three-phase inverters – 8 kW, 12 kW and 15 kW. The SolarEdge system is the industry's first fully automated solution for electrocution prevention and fire safety.

Performance of individual modules is continuously measured by their respective PowerBox and transmitted over existing power lines. Hence,

no added wiring is needed. The Web-based solar monitoring software automatically analyses and alerts on underperforming modules, underperforming strings, faults and safety events, and visually pinpoints affected modules on a site layout map. *Contact: Mr. Yael Eldar, SolarEdge Technologies, 6 HaHarash Street, P.O. Box 7349, Neve Neeman, Hod Hasharon 45240, Israel. Tel: +972 (9) 9576620; Fax: +972 (9) 9576591; E-mail: yael.e@solaredge.com.*

Source: www.solaredge.com

Record efficiency of 24.2 per cent for solar cells

Sun Power Corp., the United States, claims that it has yet again successfully maintained its lead in manufacturing solar cells with the world's highest efficiency. It has reported a 24.2 per cent efficiency record in solar energy generation at its full-scale prototype manufactured in its plant in the Philippines.

Normal energy conversion rates of mass-produced cells are in the vicinity of just 15 per cent, with efficiency rates nearing 40 per cent only under lab conditions. The company hopes that the high-efficiency solar cell technology will help in scaling down the cost of solar energy by increasing the energy production from each solar panel. *Contact: Sun Power Corp., Corporate Headquarters, 3939 N. 1st Street, San Jose, California 95134, United States of America. Tel: +1 (408) 2405 500; Fax: +1 (408) 2405 400.*

Source: m.ecofriend.org

Method for LID control in a-Si films

Researchers from Dainippon Screen (DNS) and Gifu University in Japan have developed a new technology

for analysing the characteristics of amorphous silicon (a-Si) films for use in thin-film photovoltaic (PV) panels. Excess hydrogen introduced during the process of forming the film on glass substrates is a culprit behind light-induced degradation (LID) of a-Si solar cells (a problem for multijunction cells as well). No technology has been able to accurately analyse (and thus control) hydrogen content during production processes, to gain stability and streamline cell/panel production. To address this, DNS and Gifu have jointly devised an analysis method for a-Si silicon films that digitizes information useful for the accurate control of LID. More work is needed to commercialize the technology for accurate analysis of film properties, as well as non-contact non-destructive measurement of film thicknesses.

Source: www.electroiq.com

Solar cell efficiency raised to 66 per cent

In the United States, researchers at the University of Texas in Austin and the University of Minnesota in Minneapolis have discovered a process that can boost the conversion efficiency of solar cells up to 66 per cent. In typical semiconductor solar cells, photons with energies above the semiconductor's bandgap generate hot electrons, and much of the energy from the hot electrons is lost through heat before it can be harnessed and used for electricity. This new process uses quantum dots to slow down the cooling process of hot electrons and then captures and transfers them. This allows the addition of energy that is currently lost as heat in conventional solar cells.

Evolution Solar, the United States, is currently building a demonstration site for the technology in partnership with Texas Southern University, to

be located at the University campus in Houston. It is also developing a solar demonstration project with the City of Brookshire in Texas. These projects should help Evolution Solar acquire new business and compete in the energy industry. *Contact: Mr. Robert Hines, Evolution Solar Corp., United States of America. Tel: +1 (281) 3622 760; E-mail: rhines@evolutionsolar.com.*

Source: www.marketwatch.com

Nanowire/polymer hybrid solar cells

Researchers at the National Taiwan University in Taipei, China, have created and tested a hybrid solar cell based on a heterojunction between poly(3,4-ethylenedioxythiophene) : poly(styrenesulphonate) (PEDOT:PSS) and vertically aligned n-type GaAs nanowire arrays. Such arrays have been shown to lessen optical reflectance and enhance light absorption compared with a planar geometry, and hybrid solar cells that combine organic polymers with inorganic III-V compounds can take advantage of the benefits of both materials.

Inorganic III-V compounds are good carrier transporters, and polymers such as PEDOT:PSS can be formed into films with low production cost, a large area and low processing temperature. The researchers found that the morphology of the GaAs nanowire arrays strongly influenced the characteristics of hybrid GaAs nanowire/PEDOT:PSS cells, and that solar cells using the nanowire arrays had a better efficiency than conventional planar cells. Under AM 1.5 global one sun illumination, the power conversion efficiency of planar GaAs/PEDOT:PSS cells was 0.29 per cent against 5.8 per cent of the nanowire/PEDOT:PSS cells.

Source: www.solarnovus.com

Bladeless, ultra-efficient wind turbine

SolarAero, the United States, has introduced a novel bladeless wind turbine that offers several advantages over current wind turbines – it emits hardly any noise in operation, has few moving parts and, as it does not have spinning blades, poses much less hazard to bats and birds. The whole assembly is housed in an enclosure, with screened inlets and outlets to keep animals out. It also can be installed at sensitive locations such as radar installations where rotating blades cause detrimental effects.



SolarAero's bladeless wind turbine

SolarAero's turbine is based on the Tesla turbine originally developed by Mr. Nocolai Tesla. The principle of the turbine is to set up an array of closely spaced, very thin and extremely smooth metal disks. The viscous flow of air moving in parallel to the disks is what propels the turbine, instead of buffeting blades with moving air. This makes for a more compact mechanism with only one moving part: the turbine-driveshaft assembly.

According to SolarAero, this turbine should cost around US\$1.50/W of rated output, and have a lifetime operating cost of about US\$0.12/kWh. This would make the SolarAero turbine about two-thirds more economical than any comparable bladed unit, and because of the significantly lower operating costs, lifetime maintenance could be just

25 per cent the cost. Currently, the turbine is still under development. *Contact: Mr. Howard Fuller, President, SolarAero, 77 Pleasant Street, Unit G, Greenville, NH 03048, United States of America. Tel: +1 (603) 8782 422; E-mail: hfuller@solaraero.org.*

Source: *inhabitat.com*

Wind power generator

Kalahari Greentech Inc., the United States, designs, manufactures and supplies solar collectors, wind turbines as well as other sustainable energy technologies. Around US\$2 billion from the American Recovery and Reinvestment Act was invested in 2009 on wind energy, funding the development of novel wind farms for powering 2.4 million homes. The company's Wind Generator generates electric power even at low wind speeds. It can even be optimized to function in water. Furthermore, the Wind Generator is equipped with a shield, which prevents birds from hitting the turbine blades. *Contact: Kalahari Green Tech Inc., 1710, Crosswinds Landing, Fort Walton Beach, FL 32547, United States of America. Tel: +1 (410) 2420 763; E-mail: info@kalaharigt.com.*

Source: *www.azocleantech.com*

VAWT wind generator

Planetary Systems Inc., the United States, offers the VAWT-C1KW wind generator. This vertical axis wind turbine (VAWT) incorporates eight fibreglass-reinforced vertical blades and the blade assembly measures 2.6 m in diameter. The VAWT produces 24/48 VDC and a maximum power of 1,000 W, with an optimal wind speed of 24.6 m/s. The blades of this turbine are bolted to the hub at a fixed angle, and stall control is used to manage high-speed winds. The VAWT-C1KW incorporates a permanent magnet brushless rotor.

The power generated by the wind turbine is distributed using three wire AC power connectivity. The installed controller in the wind turbine starts the turbine at 7.6 m/s wind speed, maintains the rotation at optimum speed and shuts down the turbine when the wind speeds reach the survival wind speed of 50 m/s. The wind turbine is mounted on a steel pipe measuring 12.7 cm in diameter. It can be installed at higher levels by using an optional tower measuring 3 m in height. *Contact: Planetary Systems Inc., Box 340, 262 Badger Road, Ennis, MT 59729, United States of America. Tel: +1 (406) 682 5646; Fax: +1 (406) 682 5644; E-mail: info@planetarysystems.com.*

Source: *www.azocleantech.com*

Small wind generator



Superwind's small wind power unit

Superwind GmbH, Germany, offers the Superwind 350 small wind power generator. This wind generator is suitable for use in places with extreme weather conditions and no grid connectivity. The power generated by the wind generator can be directly connected to 12 V or 24 V electric instruments such as measurement systems, transmitters and navigational aids, or to energy-saving appliances such as water pumps, refrigerators and electronic gadgets.

For using appliances with 230/110 V power requirement, an optional inverter can be coupled to the wind generator. The unit can also be used in combination with solar hybrid systems for increased power generation. The Superwind 350 small wind generator offered produces a maximum power output of 350 W at a nominal wind speed of 12.5 m/s. This wind turbine starts producing power at a cut-in wind speed of 3.5 m/s. The rotor has a diameter of 1.2 m and incorporates three blades made of carbon fibre-reinforced plastic. It operates in speed ranges of 500 to 1,300 rpm. A permanent magnet generator unit in the wind generator produces a nominal voltage of 12/24 VDC. *Contact: Superwind GmbH, Am Rankewerk 2-4, D-50321 Bruhl, Germany. Tel: +49 (2232) 577 357; Fax: +49 (2232) 577 368; E-mail: power@superwind.com.*

Source: www.azocleantech.com

Low wind speed power production

Aerogenesis, Australia, offers its 5 kW wind turbine, which starts its power production at 3.0 m/s speed and produces a maximum of 5 kW power at 10.5 m/s speed at 320 rpm. The upwind rotor of this wind turbine has two blades with an overall diameter of 5 m, made of vacuum-infused, fibreglass-reinforced epoxy. The computer-designed blades are moulded using computer-controlled milling machine for accuracy. The swept area of the rotor is 19.64 m². The wind turbine incorporates a yaw system with passive regulation by tail fin, and an electromechanical brake is used as overspeed control.

Aerogenesis 5 kW wind turbine has a fan-cooled, four-pole, three-phase induction generator manufactured by Rexnord. This generator outputs voltage in the range of 80 to 500 VAC in a frequency range of 20-70



Aerogenesis 5 kW wind turbine

Hz. The generator uses an 8.15:1 helical inline gearbox and a fail-safe electromechanical disk brake for over-speed protection. The 5 kW Aerogenesis wind turbine deploys a microprocessor controlled power point tracking to generate power during wind speed below 10 m/s. The control system utilizes a stall governing for power reduction to stop the rotor during high velocity winds.

This turbine is available in 24/48 V DC outputs and more outputs are available on specification by the customer. Similarly the AC inverter output is available in 110 V, 60 Hz frequency or 220/240V with 50 Hz frequency, or as specified by the customer. The recommended tower height of this wind turbine is 18 m and it is available in hinged tower and hinged at base options.

Source: www.azocleantech.com

Main control and pitch systems for wind turbines

DEIF Wind Power Technology from Denmark supplies ready-to-install complete main control switchboards and pitch control systems for wind turbines. The company designs and develops solutions tailored to meet a client's application requirements.

DEIF mains control and pitch control system is supplied as a totally integrated solution to clients so that

interfacing between different control systems is hassle-free. While the main control solutions from DEIF are all tailored to application, they are all based on decades of DEIF experience in: overall control strategies; aerodynamics and load calculations; optimization of regulation algorithms; electrical switchboard design; and the overall wind turbine design.

Regardless of whether the preferred pitch system is hydraulic or electrical, DEIF can supply tailor-made control solution. If the choice is an electrical pitch system, DEIF will supply the entire system including chargers, sensors, motors, etc. as an all-comprising proven system ready to implement. If a hydraulic pitch system is chosen, DEIF will work closely with a supplier – of the client's choice, if that is required, to design and fabricate a customized solution. *Contact: DEIF Wind Power Technology A/S, Frisenborgvej 33, 7800 Skive, Denmark. Tel: +45 9614 9614; Fax: +45 9614 9615; E-mail: info@deif.com.*

Source: www.deifwindpower.com

Asia-Pacific Partnership on Clean Development and Climate

Asia-Pacific Partnership on Clean Development and Climate is an innovative new effort to accelerate the development as well as deployment of clean energy technologies. It will focus on expanding investment and trade in clean energy technologies, goods and services in key market sectors. For further information, contact:

*Administrative Support Group
Asia-Pacific Partnership on
Clean Development and Climate
Tel: +1 (202) 647 4875
Fax: +1 (202) 647 0191
E-mail: APP_ASG@state.gov
Website:
www.asiapacificpartnership.org*

Hydrokinetic energy power generator-cum-desalinator

Gayatri Energy, India, has reported the development of a device that can be used for power generation and simultaneous desalination of seawater on a mass scale. The device is adapted to tap energy from flowing water in rivers, seas and oceans. It uses the kinetic energy of water molecules moving in horizontal and vertical directions for power generation and simultaneous desalination of sea water. The device is based on the principle of having a barrier standing in the path of moving water, and the barrier rotating a gearbox/generator.

When installed on sea or ocean, the device can be set up onshore, near shore or offshore. The device can produce power from tidal currents with low speeds and waves with low power density. With suitable reflectors, power can be generated from very low-energy currents as well. Automatic adjustment with change in sea levels, ability to operate when current or wave directions change, and survivability under severe operating conditions are other major features.

Gayatri Energy proposes using this device for simultaneous power production, and mass-scale desalination of seawater by reverse osmosis or any other suitable method. When employed for tapping energy from tidal currents, the efficiency of the system will normally be around 25 to 35 per cent. A shrouded configuration will enhance this by another 20-25 per cent. *Contact: Mr. Ashish Kumar Deb, Gayatri Energy, BD-95, Janakpuri, New Delhi 110 058, India. Tel: +91 (11) 6571 1096; Mobile: +91-98993 29476; E-mail: gayatrirenewables@gmail.com.*

Source: Direct communication

Sensors aid tidal turbine development

Non-contact torque sensors from Sensor Technology Ltd., the United Kingdom, are playing a key role in the development of commercial-scale, in-stream tidal turbines produced by OpenHydro, an Irish firm. OpenHydro is utilizing these novel sensors based on surface acoustic wave technology to measure rotational speed and frictional forces in a simulator for the turbine bearings, thereby allowing it to optimize the performance and reliability of its innovative products. Because the turbines are submerged, they are invisible and produce no noise. They present no hazard to shipping as they are submerged at a considerable depth.

OpenHydro technology uses open-centre turbines that can be deployed directly on the seabed. Installation in inaccessible locations makes reliability a prime consideration in the design and construction of the turbines. OpenHydro comprehensively evaluates the performance of all components used in its turbines. For the bearings, this evaluation involves the use of a simulator that allows engineers to determine how frictional forces in the bearings vary with different loads and rotational speeds. Central to the operation of this simulator is the measurement of torque in a shaft from the motor that drives the bearing under test.

With conventional sensors, it is hard to carry out such torque measurements accurately and reliably, but Sensor Technology's TorqSense RWT320 series sensor provides an ideal solution. OpenHydro uses the RWT320 sensor along with Sensor Technology's TorqView software. This offers a choice of dial, digital bar and chart graph format display for torque, rpm, temperature and power. *Contact: Mr. Tony Ingham,*

Sensor Technology Ltd., Balscott Mill, Balscote, Banbury, Oxon, OX 15 6EY, United Kingdom. Tel: +44 (1295) 730 746; Website: www.sensors.co.uk.

Website: www.pandct.com

Tidal current turbine to be tested



Tidal turbine being readied at Voith Hydro Ocean Current Technologies

The German companies Voith Hydro and RWE Innogy will jointly install a 1 MW marine tidal current turbine at the European Marine Energy Centre (EMEC) in Orkney, Scotland, through the joint venture company Voith Hydro Ocean Current Technologies. The turbine is scheduled to start its two-year trial operation at EMEC in 2011. The installation of the foundation will begin before the end of 2010. The tidal turbine is designed to feed around 1,800 MWh/y of electricity into the grid. A turbine of this type with 110 kW capacity is being installed by Voith Hydro Ocean Current Technologies on the coast of Republic of Korea.

The tidal current turbines from Voith Hydro Ocean Current Technologies are installed fully under water and anchored to the seabed. They have direct drive and there is no need to adjust the rotor blade angle. The turbines use a permanent magnet generator and to avoid costly sealing solutions, the flow of seawater is channelled through the turbine, to serve as a bearing lubricant.

Source: www.renewableenergyfocus.com

Hydroelectric generator targets developing countries

Students at Cambridge University, the United Kingdom, have developed a portable hydroelectric generator that could be used to power homes in developing countries. The FloDrive Turbine can produce up to 1 kW of power when deployed in free-flowing rivers. The third-year students – Mr. Deniz Erkan, Mr. Li Jiang and Mr. Ned Stuart-Smith – aimed to design a generator that was easy to install without training and needed no special equipment or infrastructure.

The 500 kg device is designed for rivers with a minimum flow rate of 1 m/s and a uniform flow rate profile. It is suitable for small-scale use on flowing rivers, not dam-controlled waterways, but multiple devices could be deployed along a single river. Designing the device to adapt to different river sizes was one of the key issues for the students, and it was tackled by creating an on-land support system that permits easy installation and maintenance. The team also developed a brushless generator to increase the life and robustness of the device. This has previously been used in wind turbines but not hydroelectric systems, and improved technology has reduced its cost to an economic level for small turbines.

Source: www.theengineer.co.uk

Power and potable water from the sea

Technology developed in Japan is now able to generate electricity and produce fresh water from seawater more efficiently and at a lower cost than before, edging the technology closer to practical use. Ocean thermal energy conversion (OTEC) –

although currently cost-ineffective – is hoped to be not only a source of renewable energy, but a way to collect lithium from the sea.

Former President of Saga University, Japan, Dr. Haruo Uehara, a pioneer in the OTEC field, has created the Uehara cycle, a technological discovery that may open the door to practical use of OTEC. The Uehara Cycle generates energy using the difference in temperature between deep and shallow seawater. Warm, surface seawater of about 25°C is used to vaporize a fluid with a low boiling point, often ammonia, which turns a turbine to generate electricity. Cold seawater – about 5°C – from 800 m below the surface is then used to condense the vapour back into a liquid.

A Japanese electricity company had earlier succeeded in using OTEC to generate power on a small scale, but has found its commercialization difficult due to inefficiency. In 1994, Dr. Uehara's group developed the Uehara Cycle, which is 50 to 70 per cent more efficient than previous systems. The cycle makes use of a mixture of ammonia and water to control the evaporation temperature, raising thermal efficiency higher than when using pure ammonia. The efficiency improvement was confirmed by a test at a 30 kW OTEC research plant at Saga University.

Early this year, Dr. Uehara's non-profit Organization for Promotion of Ocean Thermal Energy Conversion had collaborated with Xenosys Inc., Japan, to improve the efficiency of the system for a 10,000-kW OTEC plant to be built in the South Pacific island of Tahiti. A Xenosys estimate puts the cost of power generation to be about 15-20 yen (US\$0.18-0.24) per kW, about the same as wind-powered electricity.

Deep seawater used in OTEC can also produce desalinated water, and

eventually hydrogen through electrolysis. It might also be possible to collect lithium, while deep seawater can be used to enrich fishing areas with nutrients.

Source: www.yomiuri.co.jp

All-tide power generation technology

A businessman from Harrowgate in the United Kingdom has launched the first prototype of a tidal technology that could power about 1,000 homes. Mr. Andrew Laver, along with Professor Jack Hardisty, a former professor from the University of Hull, had set up a renewables business called Neptune Renewable Energy Ltd. (NREL).

NREL's Proteus NP100 consists of a 6 m x 6 m turbine inside a floating chamber, and works equally well in ebb and flow currents. The Proteus NP1000 demonstrator, which is 20 m long and weighs more than 150 tonnes, is the culmination of five years' work and it is expected to generate at least 1,000 MWh per year, Mr. Laver said. He claims the device would provide more reliable and cheaper energy than wind turbines, at less than £1 million/MW.

Source: www.yorkpress.co.uk

CleanEnergyAsia.net

CleanEnergyAsia.net is intended as a major information resource for clean energy practitioners in Asia, including policy-makers, technical experts, project developers, investors and civil society. The resources section of the website contains high quality reports, presentations, policy briefs and case studies on critical clean energy issues, including: renewable energy, energy efficiency, clean energy financing, greenhouse gas accounting, technology transfer, etc. For more information, access:

<http://www.cleanenergyasia.net>

Cyanobacteria help generate electricity

At the Centre for Biomedical Engineering and Technology (BioMET) of University of Maryland-Baltimore (UMB), the United States, scientists have for the first time developed a way to convert sunlight directly into electricity using blue-green algae (cyanobacteria), without producing carbon dioxide (CO₂). They showed that electrogenic workings of cyanobacteria are an important conduit of solar energy into the biosphere.

Dr. Iliia Baskakov, who led the study, says that such findings could lead to ways to generate energy in a self-sustainable manner using renewable resources. The UMB researchers discovered that cyanobacteria possess a natural light-dependent electrogenic activity, and that it can generate and transfer high-energy electrons to the external environment under illumination. Within themselves, cyanobacteria fix an estimated 25 Giga tonnes of carbon in the form of CO₂ per year and account for 20-30 per cent of Earth's total photosynthetic productivity. Colonies of cyanobacteria can form filaments, sheets or even hollow balls. On a global scale, the amount of solar energy that is harvested by cyanobacteria exceeds more than 25 times the energy consumed by humans. Cyanobacteria utilize the energy of sunlight to drive photosynthesis to split water molecules into oxygen, protons and electrons.

While most of the water-derived high-energy electrons are utilized by the cyanobacterial cells for their own needs, scientists at UMB's BioMET laboratories found that a fraction of these electrons are donated to the external environment. To harvest the electrons from cyanobacteria, the BioMet scientists developed a photosynthetic microbial fuel cell (PMFC) that serves as both a growth

chamber for cyanobacteria and an electron harvester. Inside the transparent PMFC, the cyanobacteria grow in contact with an anode. On exposure to light, the cyanobacteria produce an electrical current, with the electrons moving directly from the cyanobacteria to the anode.

Source: www.hindustantimes.com

Thin film fuel cells



A GS NanoTech researcher checks a thin-film cell

GS Caltex, the Republic of Korea's second largest refiner, is betting its future on developing new materials and eco-friendly technologies, such as fuel cells, thin-film batteries and plasma-based waste recycling. GS FuelCell, a 100 per cent-owned affiliate of GS Caltex and the first fuel cell company in the Republic of Korea, has commissioned pilot tests of its 1 kW and 3 kW home fuel cell systems and plans to install them in some apartments. It has already developed a 50 kW system and is working on a 100 kW product.

GS FuelCell reports that the cells are sufficiently efficient compared with the existing electricity and heat generating cells, and are adequate to meet the country's target of expanding home fuel cells to 10,000 households by 2012. Thin-film fuel cells are touted as the next-generation cash cow for GS Caltex, which is looking to commercially release them for the first time in Asia. Its subsidiary GS NanoTech is at present taking charge of that goal.

Source: www.koreatimes.co.kr

Improved material for fuel cell bipolar plates

Bac2, the United Kingdom, has introduced an improved version of its ElectroPhen material for producing moulded fuel cell bipolar plates. The new material called EP1109 was originally developed for operation in direct methanol fuel cell (DMFC). However, tests in low-temperature proton exchange membrane (PEM) fuel cells have indicated that using EP 1109 results in higher output voltages from individual cells and that the steady-state cell voltage is maintained for longer, both of which are desirable characteristics. Bipolar plates, made of graphite or metal, contain channels through which fuel, air and water vapour flow, and they need to be electrically conductive to pass the current generated by the cells.

Graphite plates are not economical since they need to be individually machined to create the flow channels, while metal plates suffer from surface corrosion due to the acidic environment in a fuel cell stack. ElectroPhen – a chemically inert, electrically conductive, thermoset composite material – is designed to overcome these issues. It can be compression-moulded and cured at low temperatures, enabling plates to be produced quickly and economically in any quantity. Compared with other composites, ElectroPhen can achieve the required conductivity for fuel cell plates with a lower loading of graphite. This means that the flow properties of ElectroPhen moulding compounds are superior, leading to a better mould fill and tighter dimensional tolerance.

For prototyping purposes, Bac2 can supply either moulded blank plates or plates machined to customers' designs, prior to producing mould tools for high volume production. Standard blank ElectroPhen plates

are available in sizes from 60 × 40 mm up to 300 × 200 mm. The mechanical strength of ElectroPhen allows plates of 1 mm thickness or less to be produced, enabling production of compact fuel cell stacks.

Source: www.favstocks.com

Field testing of fuel cell product

MTI Micro Fuel Cells Inc., the United States-based developer of the off-the-grid portable power solution Mobion®, has announced the commencement of a US\$1.5 million field testing programme for its Mobion micro fuel cell with support from the United States Department of Energy (DOE) and New York State Energy Research and Development Authority (NYSERDA). The programme will enable MTI Micro to obtain feedback on Mobion products from key stakeholders, including DOE, the United States Defence Department, original equipment manufacturers and industry experts.

The company has also announced a 20 per cent improvement in the power density of its Mobion technology after demonstrating an increase in performance from 84 mW/cm² to 100 mW/cm² at the company's lab. MTI Micro believes this is the highest performance achieved in a vapour feed, passive water management direct methanol fuel cell (DMFC).
Contact: MTI MicroFuel Cells Inc., 431 New Karner Road, Albany, NY 12205, United States of America. Tel: +1 (518) 533 2222; Fax: +1 (518) 533 2223; E-mail: mtimicro@digcommunications.com.

Source: www.marketwatch.com

Portable fuel cell for electronic gadgets

Horizon Fuel Cell Technologies Ltd., Singapore, has launched a pocket-

sized fuel cell called MiniPak that has been designed to be used to power portable electronics. The fuel cell is a Polymer Electrolyte Membrane (PEM) type cell. For filling up the hydrogen cartridges, the company is developing a "HydroFILL" hydrogen station that will supply hydrogen to the cartridges made by electrolysing water. MiniPak can provide 1.5 W to 2 W of continuous power via a mini USB port. It is powered by a metal hydride cartridge, with a cartridge providing 12 Wh of energy, or as much power as 1,000 disposable AA alkaline batteries. The cartridge can then be refilled with hydrogen.

Source: www.h2journal.com

Better hydrogen fuel cell process

Researchers at Purdue University, the United States, have developed hydrogen fuel cell technology that does not require a catalyst. Instead, the fuel cell employs hydrothermolysis, or both hydrolysis and thermolysis. The process uses powdered ammonia borane and water to generate the hydrogen needed for fuel cells. Ammonia borane has a very high hydrogen content for solid materials of 19.6 per cent hydrogen, said Dr. Arvind Varma, who heads Purdue School of Chemical Engineering. A high weight percentage means that a relatively small quantity and volume of the material are required to store large amounts of hydrogen.

After extensive testing, scientists have determined that a 77 per cent concentration of borane was ideal for maximum hydrogen release using their new process. Normally, to get hydrogen from the solution it would have to be heated to 170°C. With the Purdue process, the material need only be heated to 85°C, which is the normal operating tempera-

ture of the car engines designed for fuel cells. Purdue process requires maintaining the reactor at a pressure of less than 200 psi, far lower than the 5,000 psi required for current hydrogen-powered test vehicles that use compressed hydrogen gas stored in tanks. Purdue has filed for a patent on this technology.

Source: green.blorge.com

Joint eco bus project

Singapore's first eco-friendly bus will transport athletes and officials around the Youth Olympic Village during the Youth Olympic Games to be held in Singapore in August 2010. The hybrid fuel cell-battery bus is a joint research project by Singapore's Nanyang Technological University (NTU) and China's Tsinghua University, and marks another major step forward in NTU's sustainability research and development. A research team from the universities have been developing the hybrid fuel cell-powered bus in China. The bus uses a hybrid fuel cell and battery system that allows it to generate and store energy on-board. The fuel cell acts as an "energy converter" that transforms hydrogen and oxygen – chemical energy sources – into electricity, which drives the bus. Unlike conventional buses that run on diesel fuel, it has zero carbon emission and only clean water and heat are released.

This project is supported by Singapore's Land Transport Authority as well as Singapore bus company SBS Transit in an effort to reduce carbon dioxide emissions and develop a more energy-efficient model of public transport for the future.
Contact: Ms. Julia Wang, Manager, Corporate Communications Office, Nanyang Technological University, Singapore. Tel: +65 6790 4717; E-mail: juliawang@ntu.edu.sg.

Source: news.ntu.edu.sg

Novel catalyst for electrolysis

GridShift Inc., the United States, developed a new water electrolysis technology that uses no expensive metals such as platinum. GridShift claims that the technology reduces the costs of the catalysts by 97 per cent, with an ounce costing just US\$58, as opposed to US\$1,700 an ounce for platinum. The new water electrolysis process generates carbon-neutral hydrogen that is cheaper than petrol at a fraction of the cost and size of currently available water electrolysis hydrogen generators, according to GridShift.

The key to GridShift's process is a new method for coating a complex three-dimensional electrode on all surfaces with a unique combination of readily available nanoparticles that expose the catalysts to the electrolyte for efficient water electrolysis. The result is an electrolyser running as a full cell at 1,000 mA/cm² at 80 per cent energy efficiency. GridShift is on track to reach its goal of 85 per cent energy efficiency, which is 47 kWh/kg or US \$2.35/kg of hydrogen. Overall, the new method produces four times more hydrogen per electrode surface area than what is reported for commercial units at present.

Source: www.greenoptimistic.com

New catalyst for hydrogen from formic acid

Researchers from the University of Rostock in Germany have taken a leaf out of nature's book to develop a new, low-cost, iron-based catalyst powered by light that can extract hydrogen from formic acid. Formic acid has been widely investigated as a stable and readily available carrier for hydrogen. However, pulling

hydrogen out of the formate relies on expensive catalysts based on noble metals. The new catalyst is based on inexpensive iron and, as it can be driven by sunlight, does not require any fossil fuel to provide energy to activate it.

The researchers, led by Dr. Mathias Beller and Dr. Ralf Ludwig, created their catalytic system by screening a large number of organometallic compounds in the presence of various ligands to stabilize the iron centre – akin to an enzyme – that would decompose formic acid into hydrogen and carbon dioxide. The best catalyst system identified was triirondodecacarbonyl [Fe₃(CO)₁₂] in the presence of triphenylphosphine, 2,2':6'2"-terpyridine and dimethylformamide. These ingredients form a catalyst *in situ*, which is activated by visible light.

"We do not know all the details of exactly how the system works," Dr. Ludwig states. "The ligands are stabilizing the catalyst, enabling it to run for longer – if they were not there the iron would drop out of the system." When the system is exposed to visible light in the presence of formic acid, hydrogen and carbon dioxide are produced; when the light is cut off, the reaction stops.

Source: www.rsc.org

Nanomaterials show promise for solar hydrogen generation

A new strategy for engineering semiconductor materials can boost the performance of water-splitting solar cells for hydrogen production, says a recent study by researchers at the University of California-Santa Cruz (UCSC), the United States. Photovoltaic (PV) cells use solar energy to generate electricity, and electricity can be used to split water by electrolysis. But a more direct and



Graduate students at Dr. Zhang's lab testing composite materials

efficient approach is provided by photoelectrochemical (PEC) cells, which use solar energy to generate hydrogen inside the cell itself.

The UCSC researchers – led by Dr. Jin Zhang, Professor of chemistry and biochemistry, and Dr. Yat Li, Assistant Professor of chemistry and biochemistry – focused on the semiconductor material used as a light-absorbing anode in the PEC cell. They combined two techniques – elemental doping and quantum dot sensitization – that have been used to improve the performance of metal oxide semiconductors in solar cells. These two techniques use nanotechnology to manipulate the structure of a material on the scale of billionths of a metre.

The research team synthesized thin films of titanium dioxide (TiO₂) nanoparticles, and TiO₂ nanowire arrays vertically aligned in a thin film on a substrate. The TiO₂ films were doped with nitrogen, and cadmium selenide nanoparticles were used for quantum dot sensitization. The resulting nanostructured composite materials were then used as photoanodes in a PEC cell to compare their performance in controlled experiments. The results show the potential of carefully designed materials to improve the performance of PEC cells.

Source: www.physorg.com

Green process for producing fuel additive

A researcher from the Iowa State University, the United States, has developed a new green, bio-based method for producing a much-used fuel additive and industrial chemical that is currently produced from petroleum products. Working along with Mr. David Gogerty, a doctoral student, Prof. Thomas Bobik developed a process for manufacturing isobutene (isobutylene) by identifying a new, natural enzyme that produces the fuel organically. Prof. Bobik believes that once the research is completed there could be huge benefits to the biofuels industry. Prof. Bobik's undisclosed enzyme makes it possible to convert the glucose found naturally in plants to make isobutene. The enzyme is found naturally in about half of all organisms in the world.

By using this naturally occurring, biological process to produce isobutene, Prof. Bobik believes there will be environmental as well as cost benefits to the biofuels industry. Currently, one of the largest expenses in producing the biofuel ethanol is the cost of separating ethanol from water where it is made. Prof. Bobik's process will not include the cost of separation and, currently, the process takes too long.

Prof. Bobik argues, "Isobutene is a gas, so we can imagine that it will be easy to remove the isobutene from the vessel in which it was made, and that should be a very cheap and efficient way to purify the biofuel." *Contact: Prof. Thomas Bobik, Biochemistry, Biophysics and Molecular Biology, Iowa State University, Ames, Iowa 50011, United States of America. Tel: +1 (515) 2944 165; E-mail: bobik@iastate.edu.*

Source: 7thspace.com

A step towards next-generation biodiesel technology



Demonstration of SBI Bioenergy's biodiesel process

In Canada, SBI BioEnergy Inc. is focusing on demonstrating a new biodiesel process that offers cost and operational benefits. The company has developed an advanced proprietary process and associated catalyst that resolves many of the well-recognized issues facing the global biodiesel industry. Its next-generation technology is based on a proprietary solid catalyst formula that processes virtually all plant oils and animal-derived fat feedstock, as well as free fatty acids (FFAs), to produce high-purity biodiesel with high-grade glycerol as by-product.

SBI's Process Intensifying Continuous Flow-Through Reaction, a heterogeneous catalyst-based process is adapted for the production of biodiesel from a variety of feedstock. At the core of this technology is a carefully designed proprietary blended catalyst formula that has a long, active life. The catalyst is unaffected by the presence of water and is recyclable, eliminating the need for continuous replenishing of the catalyst. It is capable of transesterification of triglycerides and esterification of the FFAs present in feedstock simultaneously and effectively into biodiesel, in one step.

Importantly, the process does not consume any chemical or water at any stage and produces no waste.

The catalyst is expected to last for extended periods without losing its activity, and in case its performance is compromised due to variations in feedstock quality, it can be rejuvenated to its original performance with a simple non-chemical process. The output from the biodiesel process exceeds ASTM and European standards, and the long-life renewable catalyst is not consumed in the process. *Contact: Mr. Inder Pal Singh, President and CEO, SBI BioEnergy Inc., 9607 41st Street, Edmonton, Alberta, Canada. Tel: +1 (780) 4139 832; E-mail: ips@sbi finechemicals.com.*

Source:
www.biodieselmagazine.com

Biomass-to-fuel plant

A Canadian biofuel company, Core BioFuel Inc., has developed a biomass conversion process for synthesising petroleum. The process is reported to be energy-efficient and carbon-neutral, and uses feedstock that does not endanger food supply. An off-the-shelf gasification system is used to transform wood chips into a synthetic biofuel known as syngas, a hydrogen-rich mixture of carbon monoxide and carbon dioxide. Syngas is run through a reactor to create various fuels, including a 92-octane, carbon-neutral alternative to petroleum. Core BioFuel plans to create its fuel from beetle-killed timber, mill waste and timber slash.

The demo plant in Houston, B.C., is expected to produce roughly 68 million litres of petroleum and 23 million litres of distilled water per year, and will generate its own electric power. The demo facility, which adjoining the world's largest timber mill, Canfor, will be on-line by the end of 2012. No toxic wastes are

produced and the plant can be located in any area zoned industrial, according to the company website. Because the process creates large quantities of distilled water, facilities can be erected independent of water availability requirements.

Source: www.dailyinterlake.com

Enzymatic biodiesel pilot plant



The enzymatic biodiesel pilot plant developed by Piedmont Biofuels

In the United States, Piedmont Biofuels LLC has unveiled its newest technology for renewable fuel production. The enzymatic biodiesel pilot plant was developed in partnership with the Biofuels Centre of North Carolina, Novozymes and the Chatham County Economic Development Corporation. This pilot plant, first of its kind in the United States, uses cutting-edge technology developed by Piedmont Biofuels and Novozymes to create high-quality biodiesel from low-quality waste grease. The current biodiesel production method forms soaps or salts in both the biodiesel and glycerine phases, producing low-grade co-products.

The new process of using enzymes to produce biodiesel will increase yields, decrease waste and allow producers to use lower cost feedstock. This novel technology will create more valuable co-products and allow biodiesel producers to double their output. Glycerine, a co-product resulting from the enzymatic process, can be used to make

a wide variety of products, including bioplastics and solvents.

Source: www.biodieselmagazine.com

Oil-from-algae technology

OriginOil Inc. (OOIL), the United States, has developed a breakthrough technology to transform algae, the most promising source of renewable oil, into a true competitor to petroleum. OOIL's technology uses algae to turn carbon dioxide from power plants into fuel, oil, plastic and hundreds of other useful products, via sound waves and electric pulses that enable the oil to separate out in solution. Furthermore, OOIL recently announced a direct-solar growth design that uses growth layers to harness the sun's energy more effectively than existing pond systems, while greatly reducing the real estate required.

The company can crack the oil from the algae without having to remove the water. This is done via a combination of ultrasound and electrical pulses to crack the microscopic algae cell wall, liberating its oil, which rises to the top, while the biomass drops to the bottom. The biomass can be used either as fuel, fertilizer or livestock feed. The oil is straight vegetable oil, with its high unsaturated fat. It can also be used for making plastics, varnish, fuel and hundreds of other uses. *Contact: OriginOil Inc., 5645 West Adams Boulevard, Los Angeles, CA 90016, United States of America. Tel: +1 (323) 9396 645.*

Source: pesn.com

Power from potato

Yissum Research Development Co. Ltd., the technology transfer arm of Hebrew University of Jerusalem in Israel, has introduced solid organic

electric battery based upon treated potatoes. This simple, sustainable and robust device can potentially provide an immediate, inexpensive solution to electricity needs in parts of the world that lack in electrical infrastructure. Researchers at the Hebrew University discovered that the enhanced salt bridge capability of treated potato tubers can generate electricity using means readily available in the developing world. The cheap, easy-to-use green power source can provide important needs, such as lighting, telecommunication and information transfer.

The researchers discovered that the simple action of boiling the potato before use in electrolysis, increases electric power up to ten fold over the untreated potato, and enables the battery to work for days and even weeks. Cost analyses showed that the treated potato battery generates energy, which is 5 to 50 fold more cheap than commercially available 1.5 VDC cells and Energizer E91 cells. The clean light powered by this green battery is also at least six times more economical than kerosene lamps often used in the developing world. *Contact: Mr. Tsipi Haitovsky, Media Liaison, Yissum Ltd., Israel. Tel: +972 (52) 5989 892; E-mail: tsipih@yissum.co.il.*

Source: www.businesswire.com

Clean Energy Asia

This user-generated website is a forum to share and discuss information on clean energy solutions for Asia that help address climate change and energy security.

For more information, contact:

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Tel: +66 (2) 615 5104-6
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E-mail: communications@cleanenergyasia.net*

Hydrogen Energy

This book assesses the challenges of hydrogen energy comprehensively and realistically. It discusses the different technologies for the production, distribution, storage and use of hydrogen, and analyses both the economics of these technologies and the risks they pose. The book describes the experiences of hydrogen economies in the United Kingdom and Canada, and assesses the nature of different hydrogen futures that might develop in different contexts. It also examines the critical relationship between public acceptance of hydrogen, public policy and market conditions, as well as the policy drivers and levers that could stimulate a sustainable hydrogen economy.

Renewable Energy in Europe: Markets, Trends and Technologies

This second edition analyses the current situation of renewable energy in Europe; examines the latest technological, financial and economic developments; and outlines ways in which the renewable energy market can be developed. The book is divided into sections examining the integration of renewable energy, electricity, heating and cooling, as well as biofuels. All the main technologies are covered.

Planning and Installing Solar Thermal Systems: A Guide for Installers, Architects and Engineers

This second edition is a fully updated version of the best-selling guide of 2004. It offers clear guidance on planning and installation of a solar thermal system, crucial to the successful uptake of this technology. All major topics for successful project implementation are included. This book offers comprehensive guidance for professionals wishing to install solar thermal technology. It is a highly valued resource for architects and engineers alike who are working on new projects; electricians, roofers and other installers; craftspersons undertaking vocational training; and anyone with a practical interest in this field.

For the above three books, contact: Earthscan Ltd., Dunstan House, 14a St. Cross Street, London EC1N 8XA, United Kingdom. Tel: +44 (20) 7841 1930; Fax: +44 (20) 7242 1474; E-mail: earthinfo@earthscan.co.uk.

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