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Highlights

- Process converts polyethylene waste into carbon fibre
- Minimizing e-waste’s environmental impact
- Waterless textile dyeing cuts effluents
- Microbes recover fuel from oil sands
- Fingerprinting air pollution
- New materials remove CO₂ from the air
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.

Cover Photo

A near-infrared unit that separates different kinds of plastic automatically.

(Credit: Thomas Mayer/Der Grüne Punkt – Duales System Deutschland GmbH, Germany)
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### TECH EVENTS
New global pact on hazardous electronic waste

A recent United Nations agreement seeks to abate the damage caused by electronic waste (e-waste) by way of collecting and recycling of hazardous materials, as well as by introducing measures to improve the ways in which electronic equipment is managed. According to the International Telecommunication Union (ITU), e-waste is expected to grow exponentially, particularly in developing countries. Yet, only 13 per cent of e-waste is recycled. The agreement signed between ITU and the Secretariat of the Basel Convention (SBC) aims to strengthen collaboration between information and communications technology (ICT) and environment policymakers to address this issue. Through the agreement, ITU and SBC will exchange information and practices and will work on joint projects and programmes to set ICT standards, and raise awareness among countries about e-waste management.

The collaboration will allow the global community to address the “ever increasing problem through a holistic approach, involving the recycling industry as well as environmental policy makers,” according to ITU Secretary-General Dr. Hamadoun Touré. “ICT equipment has to be dealt with in view of its entire lifecycle, and this includes the time when the equipment comes to its end-of-life and becomes e-waste,” remarked Mr. Jim Willis, Executive Secretary of the Basel Convention. Collaboration between ITU and SBC will further their shared objectives in support of sustainable development that essentially includes environmentally sound management of e-waste, he added.

Source: www.un.org

Viet Nam to fully treat hospital waste

In Viet Nam, the Prime Minister has approved a new programme to treat 100 per cent of the hazardous solid waste emanating from hospitals by 2025. The programme includes collecting, classifying and transporting waste to treatment facilities. About 70 per cent of waste will be treated according to environmental standards by 2015 and 100 per cent by 2025. The forecast volume of solid waste by 2015 is around 50,071 kg per day, which will jump to 91,991 kg by 2025.

The Prime Minister has outlined the need for relevant agencies to minimize solid waste at the source, enhance recycling efforts and utilize innovative technologies that are environment-friendly. The plan proposes three models for handling hazardous hospital solid waste: concentrated hazardous waste treatment facilities; hospital groups-based management; and hospital facility-based management.

Source: www.ferrostaal.com

China to recycle more industrial waste

The industrial authority of China has released a plan to recycle 7 billion tonnes of industrial solid waste during the 2011-2015 period, in an effort to help ease the environment deterioration trend. The figure is nearly double the amount of such waste recycled during the 11th Five-Year Plan period (2006-2010), the Ministry of Industry and Information Technology (MIIT) said.

Over the five years, the country will reclaim about 23,330 ha of land previously occupied by industrial waste, a change that will greatly improve its ecological environment. By 2015, the annual recycling of industrial waste will reach 1.6 billion tonnes, achieving a utilization ratio of 50 per cent, according to the plan. The plan refers to “massive industrial solid waste” generated from industrial production that has huge impact on the environment. Examples include coal gangue and ashes category, with an annual output of over 10 million tonnes, MIIT says.

Automated tyre-recycling plant starts operation in India

In Vapi, Gujarat, India, a fully automated tyre-recycling plant started function from 24 January 2012. The plant at S&J Granulate Solutions Pvt. Ltd. was supplied by the German company Ferrostaal. Currently, the plant has the highest capacity of any such facility in India – processing capacity of up to 5,000 kg of shredded used tyres per hour. The resulting granulated rubber meets international quality standards, as it is 99.9 per cent free of steel and textiles. The plant was built by Eldan Recycling, a Danish mechanical engineering company.

“Our goal is to establish and further develop local recycling projects. Ferrostaal is a long-term partner in this project, one that brings technology and market knowledge to the table and is able to cover the entire process; in this case from the delivery of the raw material through to approval of the end products from the tyre-recycling plant in India”, explain Mr. Kishan Jiwarajka and Mr. Amit Agarwal of S&J Granulate. “As the recycled material can be used in the development of the country’s infrastructure, investment in such projects produces rapid returns, and the tyre-recycling plant meets the demands of energy efficiency and sustainability”, states Dr. Gurnad Sodhi, Head of Ferrostaal India.

Source: www.ferrostaal.com

Source: english.vietnamnet.vn

IN THE NEWS
The world’s second-largest economy has been generating and consuming large amounts of energy to fuel its galloping economy, thus creating tough environmental challenges. During the 2006-2010 period, China recycled 3.6 billion tonnes of solid waste, and reclaimed 1,200 ha of waste-occupied land. The country’s 12th Five-Year Plan, released in late 2010, made it clear that China will seek scientific development and strive to build an energy-saving and environmentally friendly society.

Source: eng.ctime.cn

Thailand: Nokia promotes recycling of used cell phones

A recent global consumer survey revealed that 44 per cent of old mobile phones are lying in drawers at home and not being recycled. The survey encouraged Nokia Thailand to launch a recycling project, in cooperation with Future Park, one of Thailand’s biggest shopping centres, and the Pollution Control Department. The “Weee Can Do Project” campaign that will run till September 2012 calls for drop-offs of unused mobile device and/or accessories along with names and addresses of the users at the shopping centre. The entries will entitle participants to a lucky draw for a Nokia phone. For every phone dropped off, Nokia will also donate money to Chaipattana Foundation for its charity works.

According to Mr. Nontawan Sindvananda, Marketing Head for Nokia Thailand and Emerging Asia, “Nokia has always strived for connecting people to contribute to environmental sustainability. This includes using 100 per cent recyclable materials to produce Nokia devices and supporting mobile phones recycling.”

Future Park joins the project as it matches the business policies, said Mr. Jittinan Wanglee, Executive Vice President, Business Development & Marketing. Mr. Rangsan Pinthong, Director of Waste and Hazardous Substance Management Bureau, Pollution Control Department, saw the project as a good example on how to handle waste electrical and electronic equipment as well as support product reuse.

Source: www.nationmultimedia.com

Indonesia sends back contaminated waste

The United Kingdom’s Environment Agency is preparing to take back 89 containers of alleged illegally imported waste that was intercepted at an Indonesian port in February 2012. The Indonesian authorities have raised concerns that the 1,800 tonnes of cargo, described as scrap metal, was heavily contaminated with liquid and mixed waste. Under international laws that govern global waste exports, contaminated waste must not be exported. The shipment, which was intercepted at Jakarta’s Tanjung Priok Port by port officials, contained 113 containers in total. Twenty-four of these were from the Netherlands and will be handled by the Dutch authorities. The Environment Agency is conducting its own investigation in cooperation with the Indonesian authorities. Mr. Andy Higham, Head of the Environment Agency’s Environmental Crime team has promised to take stern action where there is evidence of waste being exported illegally.

Source: www.manilatimes.net

India’s e-waste rises 8 times in 7 years

India’s e-waste output has jumped by eight times in the past seven years, and the open yet illegal incineration of massive quantities of such trash may lead to serious public health hazards, a government report says. According to the latest annual report of the Union Ministry of Environment and Forest (MoEF), by the end of 2012, India would have

Source: www.letsrecycle.com

Philippines: new pact for green financing

To help local government units and regulated industries, the Department of Environment and Natural Resources (DENR) of the Philippines has signed an agreement with the Development Bank of the Philippines (DBP) that will boost green financing in the country, by providing concerned stakeholders access to the best financing programme available for their environmental improvement initiatives. The agreement was signed on 12 April 2012 by Mr. Gilbert Gonzales, Assistant Director of DENR’s Environmental Management Bureau (EMB), and Mr. Francisco Del Rosario Jr., President of DBP.

Under the agreement, EMB will work with DBP and other financial institutions to assist its stakeholders in gaining access to financing programmes that will support projects on improved environmental compliance, pollution control, waste management, and climate change mitigation and adaptation. Recognizing the lack of funds as the reason for non-compliance to environmental requirements on the part of industries and other establishments, Mr. Gonzales hoped that the agreement would help address the issue and strengthen the implementation of the country’s environmental laws. Mr. Del Rosario said, “DBP continues to reaffirm its commitment to help industries, especially those cited for violation, to bring them back to a state of compliance and improve their environmental performance.”

Source: www.manilatimes.net
generated a whopping 800,000 tonnes of e-waste — up eight times in the past seven years. Environmentalists point out that an additional 50,000 tonnes are imported from developed countries despite a ban.

Mumbai city tops the list of 10 most e-waste generating cities, with Delhi, Bangalore, Chennai, Kolkata, Ahmedabad, Hyderabad, Pune, Surat and Nagpur following. A state-wise break-up shows that of the total e-waste generated in the country, 70 per cent comes from 10 states – Maharashtra, Tamil Nadu, Andhra Pradesh, Uttar Pradesh, Gujarat, West Bengal, Delhi, Karnataka, Madhya Pradesh and Punjab. Last year, the Ministry had notified the E-Waste (Management and Handling) Rules, 2011, making producers “responsible for environmentally sound management of the end-of-life products, including collection and recycling”.

Source: articles.timesofindia.indiatimes.com

High-tech bins in the Republic of Korea to curb food waste

Aiming to keep streets clean and landfills less crowded in the long term, the government of the Republic of Korea has come up with a new strategy that seeks to charge both residents and businesses for the food they discard. In countries like the United States and the United Kingdom, up to 40 per cent of the food supplies reportedly end up in landfills annually, and surprisingly, the percentage is similar to the one displayed by the Republic of Korea. Experts indicate various causes for this: excessive purchase, ignorance or wasteful ‘all you can eat’ offers aggressively promoted by eateries.

The smart high-tech food waste bins designed by SK Telecom are expected to provide a viable solution in this case. They weigh the quantity of trash with maximum precision, making residents know how wasteful they really are. The bins, equipped with radio frequency identification (RFID) technology and card readers, can also establish the value of the disposal fee paid by the residents using their credit card or public transportation card. After installing the RFID bins, authorities hope to reduce food waste by up to 20 per cent over the next few years.

Source: news.softpedia.com

China exports processed waste oil

A cargo ship carrying 20 tonnes of processed waste oil headed for the Netherlands from Qingdao port of Shandong Province, China, towards the end of March 2012. This is the first batch of China’s export of oil refined from leftover cooking oil and the product will be further processed into aviation fuel for the Royal Dutch Airlines. In June 2011, Royal Dutch Airlines became the world’s first airline company to adopt bio-fuel.

Fresh Bio-Energy Technology Development Company Ltd. based in Qingdao sold the oil to SkyBRG, a Dutch bio-fuel supplier, Mr. Zheng Dehua, Deputy General Manager of the Chinese company, said. “The non-edible oil will become bio-diesel oil after the second process. The Dutch company did not purchase our final products owing to higher costs and other factors,” Zheng said. The Chinese company produced the oil from waste oil and fat, including discarded cooking oil or ‘gutter oil’, as it is commonly called. Fresh Bio-Energy Technology Development Company has a capacity to produce annually 50,000 tonnes of biodiesel from gutter oil, Mr. Zheng said.

Source: news.xinhuanet.com

Viet Nam sets waste import standards

The Ministry of Natural Resources and Environment of Viet Nam has issued a draft circular regulating types of waste that can be imported into the country for treatment and disposal. The draft circular, which aims to prevent imports of hazardous waste, is based on the amendment of the Ministry’s Decision 12 issued in 2006. Mr. Nguyen Hoang Duc from the Environment Administration’s Department of Pollution Control said the circular would encourage enterprises in border economic zones to recycle garbage created during the manufacturing process, which would help save resources while reducing environmental pollution.

The updated list includes 37 types of waste that can be imported to Viet Nam. The circular, which was put up for public comment in March 2012, also lists 43 types of waste that can be collected at the border economic zones, including waste paper, plastics, fabrics and scrap metal that can be reused for production. Further, before its import, waste must be cleaned to ensure hazardous and prohibited chemicals have been removed and must also be categorized to ensure compliance with international standards.

Source: english.vietnamnet.vn

**WEEE Recycle**

WEEE Recycle institutionalizes collection and channelization of e-waste for recycling, using environmentally sound technologies involving SMEs. For more information, contact:

Advisory Services in Environmental Management (ASEM)
Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ)
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Process converts polyethylene waste into carbon fibre

Polyethylene used in plastic bags could be turned into something far more valuable through a process being developed at the United States Department of Energy’s Oak Ridge National Laboratory (ORNL). A team led by Mr. Amit Naskar of the Materials Science and Technology Division has described a method that allows not only for production of carbon fibre but also the ability to tailor the final product to specific applications. “Our results represent what we believe will one day provide industry with a flexible technique for producing technologically innovative fibres in myriad configurations such as fibre bundle or non-woven mat assemblies,” Mr. Naskar said.

By utilizing a combination of multi-component fibre spinning and their sulphonation technique, the ORNL scientists demonstrated that they can make polyethylene-base fibres with a customized surface contour and manipulate filament diameter down to the submicron scale. The patent-pending process also allows them to tune the porosity, making the material potentially useful for filtration, electrochemical energy harvesting and catalysis. The sulphonation process allows for great flexibility, because the carbon fibres exhibit properties that are dictated by processing conditions. For this project, the researchers produced carbon fibres having unique cross-sectional geometry – from hollow circular to gear-shaped – by using a multi-component melt extrusion-based fibre spinning method.

The possibilities are virtually endless, according to Mr. Naskar, who described the process. “We dip the fibre bundle into an acid containing a chemical bath where it reacts and forms a black fibre that no longer will melt,” he said. “It is this sulphonation reaction that transforms the plastic fibre into an infusible form. At this stage, the plastic molecules bond, and with further heating cannot melt or flow. At very high temperatures, this fibre retains mostly carbon and all other elements volatilize off in different gas or compound forms,” Mr. Naskar explained.

New recycling method for plastic materials

Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V., Germany, has taken a United States patent on a method for recycling plastic materials that contain at least two polymers, copolymers or blends thereof based on polystyrene. The method seeks to recycle plastic materials, eliminating the disadvantages of current methods, and enable simple economical recovery of polymers based on polystyrene. The method may be used for recycling any plastic material, in particular plastic materials from e-waste processing and from shredder light fractions.

The method has the advantage that the precipitation can be effected economically in agitation tanks at low temperatures, preferably below 100°C., because of which no thermal damage occurs to the polymers. The polymer phases are thereby separated on the basis of their different material properties to form highly pure products with very good rheological and mechanical properties that enable them to be used as substitute for virgin material. Further, the quantity of solvent used can be reduced so far that the operation can take place with polymer gel and the solvent residue can be withdrawn mechanically in an economical manner. The separation of the remaining solvent is then effected in parallel and directly subsequent to the phase separation.

Method of recycling laminated moulding

Kureha Corp., Japan, has secured a United States patent on an improved method to recycle a shaped laminate product, particularly a bottle. The process entails the steps of: breaking a moulded laminate product that has at least one layer of an aliphatic polyester resin, particularly glycolic acid polymer, in addition to a principal resin layer;
storing the resultant broken pieces in a moisturizing environment to adjust the moisture content of the aliphatic polyester resin layer to at least 0.5 wt. per cent; and then washing the broken pieces with alkaline water to remove the aliphatic polyester resin layer, thereby recovering the principal resin. As a result, the induction period in the alkaline water washing step, which is a key process step, is shortened, thereby rationalizing the entire process.

Source: www.freepatentsonline.com

**Innovative process to recycle plastics into petroleum**

The present means of waste plastics disposal such as mechanical recycling, land filling and incineration have certain limitations and are inadequate for disposing of the ever increasing amount of waste. Chemical recycling—the conversion of waste plastics to value-added hydrocarbons—is generally accepted as the only feasible solution for the utilization of waste plastics.

The Indian Institute of Petroleum (IIP) of the Council of Scientific and Industrial Research (CSIR), India, has developed a unique process to chemically recycle all polyolefinic waste plastics, particularly polyethylene and polypropylene, into petrol, diesel or aromatics, with simultaneous production of liquefied petroleum gas (LPG). The liquid fuel (petrol or diesel) meets most of the standard fuel specifications (Euro III), while aromatics are rich in benzene, toluene and xylene (BTX). The process is scalable in batch and continuous mode. Preliminary cost analysis suggests that the process would be economical.

Source: www.specialchem4polymers.com

**Recycling and de-vulcanizing rubber**

In Italy, F.Lii Maris S.p.A. and Mr. Gianfranco Maris have jointly filed a patent application on a process for recycling and de-vulcanizing rubber, constituted in particular by industrial manufacturing rejects and/or by articles that have reached the end of their useful life cycle and originate from specialist collection centres and/or landfill sites. The known processes have many disadvantages owing to their specificity that allows only some types of vulcanized elastomeric material to be treated, to the high consumption of energy per unit of de-vulcanized material produced, and to the associated high degree of wear to the machinery used. Those processes also produce a de-vulcanized rubber with a very strong and acrid smell, which has a strong influence on the potential for reuse.

The new process, which seeks to address the above-said disadvantages, essentially consists of two steps. The rubber is first grinded in a mill to reduce it into particles that are substantially between 5 mm and 15 mm. These particles are then washed and de-vulcanized rubber product extruded in a twin-screw co-rotating extruder. The extruder has a length 64 times or more the external diameter of the screws that are equipped with mixing elements and is kept at a temperature between 35° and 350°C (about 270°C, preferably) and a rotation speed of between 15 rpm and 300 rpm (about 150 rpm, preferably).

The process is claimed to be very flexible in terms of the starting materials to be treated. In principle, this enables de-vulcanizing of all types of vulcanized rubber or mixtures thereof, such as natural rubber, nitrile rubber, butadiene rubber, ethylene propylene rubber, styrene butadiene rubber, isoprene rubber and chloroprene rubber. In addition, other substances, such as thermoplastic materials or process additives, do not have to be added to said rubbers, and this results in a reduction in process costs as well as in the environmental impact connected to their use. The process is also said to be particularly advantageous in terms of the energy balance.

Contact: F.Lii Maris S.p.A., Corso Moncenisio 22, Rosta, I-10090, Italy.

Source: www.sumobrain.com

**A novel chemical process for recycling material from boats**

Most small ships and boats have their hulls and superstructures made using composite materials that contain polyester and glass fibre. Such composites have links that hamper molecular degradation and therefore it is difficult to recycle them. For the past three years, a group formed by the companies Veolia, SINTEF, Reichhold and Nordboat and the Norwegian Composite Association has been conducting research, with support from the Research Council of Norway, to address this problem.

The group has developed an innovative chemical process to separate and reuse the polyester and glass fibre used in boats and other inactive vessels. The process is reported to allow recycling about 80 per cent of the materials. In addition, over 80 per cent of matter is dissolved in two hours and the temperature required for this solution is below 220°C. While the new generation of boats also contain other materials that must be separated, the research results provide hope for the start of a new stage in recycling of boats, according to officials of the company Veolia.

Source: materiable.com
A recycling process for Li-ion batteries

In Germany, scientists from RWTH Aachen University’s Process Metallurgy and Metal Recycling Department, cooperated with the industrial project partners Accurec Recycling GmbH and UVR-FIA GmbH, to develop a recycling process for portable lithium (Li) ion batteries. The process combines a mechanical pre-treatment with hydrometallurgical as well as pyrometallurgical process steps. Therefore, it is possible to recover not only cobalt, but other battery components, especially lithium, as well.

Apart from the characterization and evaluation of all generated metallic material fractions, the researchers focused on the development of a pyrometallurgical process step in an electric arc furnace for the carbo-reductive melting of the fine fraction extracted from spent Li-ion batteries. This fine fraction mainly consists of the electrode material containing cobalt and lithium. Since a selective pyrometallurgical treatment of the fine fraction for producing a cobalt alloy has not been done before, the proof of feasibility was the principal aim. Contact: Mr. Tim Georgi-Maschler, IME Process Metallurgy and Metal Recycling, RWTH Aachen University, D-52056 Aachen, Germany.

Source: www.sciencedirect.com

New electronic waste recycling facility

In Sweden, ABB and Boliden are working together to build a plant at the electronic waste recycling facility at the latter’s Rönnskär copper smelter, with the intent of tripling its recycling capacity. Metal recovery from waste takes 10-15 per cent of the energy required to refine metal from raw ore, the company said. With a capacity of 120,000 tonnes per year, the new Boliden electronic waste recycling facility would be the world’s largest — recovering copper and precious metals from electronic waste using only a fraction of the energy required to extract metals from ore.

The pre-sorted and pre-shredded e-scrap is smelted at Rönnskär using proprietary Kaldo® Furnace Technology. After smelting, the molten metals are transferred to the adjoining production lines for processing into high-grade products. The process also supports the European Union’s Waste Electrical and Electronic Equipment (WEEE) Directive, which requires 4 kg of e-waste to be collected and sorted per head of population in the European Union. This is expected to rise to 13-16 kg per person by 2016.

ABB played a significant role in the Kaldo plant expansion and at the Rönnskär complex as a whole. For the new Kaldo plant, ABB has supplied a comprehensive range of process-critical automation and power technologies, including the process control system. The entire electronic waste recycling process is controlled by ABB’s 800xA Extended Automation System, and includes customized features such as remote operation of the process and an exact positioning system to prevent spilling of hot molten metal from the furnace.

Source: www.tandfonline.com

Reuse of rare earth metals from used vehicles

In Japan, Honda Motor Co. Ltd. and Japan Metals & Chemicals Co. Ltd. have jointly announced the establishment of the world’s first mass-production plant to extract rare earth metals from various used parts in

Source: m.controleng.com
Honda products. Honda will use a process newly developed by Japan Metals & Chemicals for recycling rare earth metals – obtained from used nickel-metal hydride batteries collected from Honda hybrid vehicles at Honda dealers inside and outside of Japan – in not only new nickel-metal hydride batteries but also in a wide range of other Honda products.

Honda had been applying a heat treatment to used nickel-metal hydride batteries and recycling nickel-containing scrap as a raw material of stainless steel. However, the successful stabilization of the extraction process at the plant of Japan Metals & Chemicals made possible the extraction of rare earth metals in a mass-production process with a purity as high as that of newly mined and refined metals. The new process enables the extraction of above 80 per cent of the rare earth metals contained in used nickel-metal hydride batteries.

Source: world.honda.com

**Noble metal separation from waste PCBs**

Henan Province Sanxing Machinery Co. Ltd., China, offers an automated machine for separating noble metals from waste printed circuit boards (PCBs). The machine includes patented equipment for the separation of electrical conductors and non-conductors, PCB disassembling, crushing and pulverizing. The machine, which adopts advanced recycling process by physical methods and high voltage electrostatic separation, offers a high recovery percentage of noble metals with up to 98 per cent purity. To avoid dust pollution, the equipment also uses the three-in-one equipment that has a three-stage dust removal: cyclone dust removal, bag dust removal and dust removal by air cleaner.

The Model SX-1001 machine has an output capacity of 400-800 kg/hour. It has a power rating of 75 kW and occupies an area of 120 m^2_. Contact: Henan Province Sanxing Machinery Co. Limited, West Gang Xushui Town, Zhongyuan Region, Zhengzhou, Henan, 450042 China. Tel: +86 (371) 6784 2763; Fax: +86 (371) 6784 2730.

Source: hnssxjx.en.alibaba.com

**Recycling system for insulated wire scrap**

Machinery manufacturer Seltek Srl., Italy, has introduced a cable recycling system that is claimed to produce excellent results with insulated wire scrap. The producer of ‘Stokermill’ brand of recycling equipment says that the compact granulator 3000 Turbo is capable of shredding and separating large quantities of cable with a high operating efficiency. The 3000 Turbo features a vibrating table for dry separation, with the grinding mill consisting of three rotating blades and two fixed blades, each 430 mm long. The granulator boasts a capacity of 250-350 kg per hour and includes an integrated turbo unit to ensure a high quality and purity of even very thin cables, the company states. On request, the machine can be delivered with an integrated pre-grinder and conveyor belt system with magnetic separation. Contact: Seltek Srl., Via Stiria 36, Scala C, 33100 Udine, Italy. Tel: +39 (328) 827 2193; E-mail: info@seltekitalia.it; Website: www.seltekitalia.it.

Source: www.recyclinginternational.com

**Minimizing e-waste’s environmental impact**

Researchers at the University of Florida (UF), the United States, are looking for ways to minimize environmental hazards associated with a material that is likely to play an increasingly important role in the manufacture of these goods in the future. Carbon nanotubes are being used in touch screens and to make smaller, more efficient transistors. If current research to develop them for use in lithium ion batteries is successful, carbon nanotubes could become important technology for powering everything from smartphones to hybrid vehicles. However, there is some concern too.

“Depending on how the nanotubes are used, they can be toxic – exhibiting properties similar to asbestos in laboratory mice,” said Mr. Jean-Claude Bonzongo, an associate professor of environmental engineering at UF College of Engineering. He is involved in a research collaboration with Mr. Kirk Ziegler, a UF associate professor of chemical engineering, to minimize this potential for harm. In particular, they are investigating toxicity associated with aqueous solutions of carbon nanotubes that would be used in certain manufacturing processes.

Exploiting advantageous properties of carbon nanotubes is difficult because the nanotubes tend to clump together, Mr. Ziegler said. Hence, carbon nanotubes have to be treated to keep them dispersed and available for electron interactions that make them good conductors. One way to do it is to mix them with an aqueous solution that acts as a detergent and separates the tangled bundles. However, some of these solutions are toxic or become toxic in the presence of carbon nanotubes, Mr. Bonzongo said. The study focuses on solutions that become hazardous when mixed with the carbon nanotubes. The most recent results indicate that toxicity can be reduced by controlling the ratio of liquid to particulate.

Source: www.sciencedaily.com
Silver nanoparticles could aid clean-up of mercury in water

A process for creating very fine silver nanoparticles could usher in more effective, cheaper ways of cleaning water contaminated with mercury. At Brighton University, the United Kingdom, a team of scientists says the particles themselves could then be incorporated into industrial processes that use mercury or small-scale filters for dentists and jewellery manufactures.

Brighton’s cost-effective alternative first involves mixing silver with specially modified quartz sand, which reduces silver particles to a nano-scale with a high degree of purity. While other methods such as citrate reduction may leave residual organics, these silver particles are pure, and small as their size can be controlled, says Dr. Kseniia Katok from Brighton. This is important because when the diameter of these nanoparticles drops below a critical 32 nm, they attain a property called ‘hyperstoichiometry’. The upshot is that the ratio of mercury to silver goes from 1:2 to around 1.5:1 – to effectively clean up contaminated water with less silver. Contaminated water could be poured through some kind of filter so that the mercury will be immobilized on the surface of the silver nanoparticles and pure water will come out, Dr. Katok said.

Improved process for wastewater sludge reduction

The group will also look at ways of scaling up both the production of the nanoparticles themselves and their deployment in various scenarios. Brighton scientists hope that these findings would enable a key shift towards the use of nanomaterials for wastewater remediation and metal removal and recycling.

Source: www.theengineer.co.uk

Nanocomposite removes heavy metals from effluent

A semi-crystalline, stable nanocomposite cation-exchange adsorbent was successfully employed by researchers at Aligarh Muslim University (AMU), India, for the treatment of industrial effluent and sewage water to remove heavy metal ions. Using columns packed with this cation-exchange material, several important and analytically difficult quantitative separations of metal ions have been achieved. The nanocomposite can also be used as a conducting material.

The adsorbent was synthesized at pH 1.0 by the sol-gel method and characterised. Ion-exchange capacity, pH titration, elution behaviour and distribution studies were also carried out to determine the primary ion-exchange characteristics of the material. The composite material showed good exchange capacity of 1.47 meq/g (for Na+ ions), besides higher chemical and thermal stability. The adsorbent can be used at up to 200°C with 88 per cent retention of its initial ion-exchange capacity.

The distribution coefficient values (Kd) of metal ions have been determined in various solvent systems. On the basis of Kd values, the material was selective for barium (II), mercury (II) and lead (II) ions. The limit of detection (LOD) and the limit...
of quantification (LOQ) for lead (II) were found to be 0.97 and 2.93 µg/L, respectively.

Source: workingwithwater.filtsep.com

Waterless textile dyeing cuts effluents

The sports goods company Nike Inc., the United States, is adopting a waterless dyeing technology that uses recycled carbon dioxide (CO₂) to colour synthetic textiles. The process, which the company has been exploring for eight years, could eliminate the use of countless billions of litres of polluted discharges into waterways near production plants in Asia, where much of the world’s textile dyeing occurs. On average, an estimated 100-150 litres of water is needed to process 1 kg of textile materials. By 2015, more than 39 million tonnes of polyester will be dyed annually, according to industry analysts.

The waterless dyeing process, developed by DyeCoo Textile Systems based in the Netherlands, will begin to show up on Nike products later this year. It utilizes a supercritical fluid CO₂ (SCF) technology, which involves heating CO₂ to above 31°C and pressurizing it to make it supercritical—a state of matter that can be seen as an expanded liquid or a heavily compressed gas. DyeCo is believed to be the first company to successfully apply the SCF CO₂ process to the commercial dyeing of polyester fabric, and research is underway to apply the technology to cellulosic and synthetic fabrics.

According to DyeCoo, the environmental benefits of its technology include the elimination of water consumption and discharges, the elimination of wastewater as well as effluents from the dyeing process, reductions in air emissions as well as energy use, faster dyeing time, and the elimination of surfactants and other chemicals used in many dyes. It says that 95 per cent of the CO₂ used in the process gets recycled. The process also needs less re-dyeing, another massive water consumer.

Source: www.greenbiz.com

Nanofiltration enhances textile wastewater treatment

Researchers from the Material Sciences and Environment Laboratory of Sfax University, Tunisia, have studied the use of nanofiltration as a post-treatment after coagulation-flocculation, which was used to treat a mixture of effluents coming from different textile industry operations (dying, bleaching, etc.). The scientists first determined the fluctuation in the characteristics of the different effluents resulting from different treatment steps of cotton clothes. The effects of operating conditions, such as pressure and temperature, on the permeate flux and retention of chemical oxygen demand (COD), colour and salinity were then investigated. The critical flux concept was used to study the effect of salt on nanofiltration performance. It was found that it is more difficult to eliminate the salts when their concentration is higher than 9 g/L.

Nanofiltration experiments showed that the permeate flux was about 24 L/h-m², obtained at a volume reduction factor (VRF) of 3 under optimal pressure (10 bar) and temperature (40°C). The best pollutant retention was 57 per cent for COD, 100 per cent for colour and 30 per cent for salinity. Finally, it was demonstrated that using microfiltration in place of coagulation-flocculation as pre-treatment prior to nanofiltration leads to enhanced effluent treatment performance, particularly in terms of salinity and COD retention.

Contact: Ms. Emna Ellouze, Laboratoire Sciences des Matériaux et Environnement, Faculté des Sciences de Sfax, Université de Sfax, Route de Soukra Km 4, 3000 Sfax, Tunisia.

Source: www.greenbiz.com

Ozone/biofiltration as RO alternative for PPCP removal

A pilot-scale research project at the University of New Mexico, the United States, studied and compared the removal of pharmaceuticals and personal care products (PPCPs) and other micropollutants from treated wastewater by ozone/biofiltration and reverse osmosis. The study found that while ozone/biofiltration and reverse osmosis are comparable for micropollutant removal, ozonation fares better than reverse osmosis in terms of energy consumption, water recovery and waste production. Ozone doses of 4-8 mg/L were nearly as effective as reverse osmosis for removing micropollutants.

The reduction in UV_254 absorbance (ultraviolet absorbance at 254 nm) as a function of ozone dose correlated well with the reduction in non-biodegradable, dissolved organic carbon and the simultaneous production of biodegradable dissolved organic carbon (BDOC). BDOC analysis demonstrated that ozone does not mineralize organics in treated wastewater, and that biofiltration can remove organic oxidation products of ozonation. Biofiltration is recommended for treating ozone contactor effluent, to minimize the presence of unknown micropollutant oxidation products in the treated water.

Source: workingwithwater.filtsep.com
**Microbes recover fuel from oil sands**

The United States Department of Energy’s Savannah River National Laboratory (SRNL) is patenting a collection of microbes that can be utilized both for addressing energy needs and cleaning up the environment. The surfactant-producing ‘BioTiger’ microbial consortium is the result of more than eight years of extensive work that began at a century-old Polish waste lagoon to develop a microbe-based method for cleaning up oil-contaminated soils. From that lagoon, a team of SRNL and Polish researchers identified microbes that could break down the oil to carbon dioxide (CO₂) and other non-hazardous products.

BioTiger microbes produce biosurfactants and attach themselves to the oil sands separating the oil from the sand particles. The microbes make the separation step easier, resulting in more removed oil and reduced energy costs. In a test on oil sands, BioTiger demonstrated a 50 per cent improvement in separation over four hours and a five-fold increase in 25 hours. BioTiger also degrades polycyclic aromatic hydrocarbons (PAHs) – pollutants that form one of the most harmful aspects of oil spills.

**New in situ aerobic bioremediation**

Groundwater remediation equipment specialists Enviro-Equipment Inc., the United States, recently demonstrated ‘OxyGreen’, a new patented in situ aerobic bioremediation system. The demonstration involved placing the OxyGreen Cell in a mock well constructed out of clear plastic for display, and then filling the well with tap water to show the substantial amount of oxygen produced by the device’s in situ electrolysis process. Unlike typical amendments, OxyGreen does not require any injector, chemical or activator. It also runs non-stop until the job is done via a standard 120 V power source or a solar panel. According to Mr. Brian E. Chew, Vice President of Enviro-Equipment Inc., the new OxyGreen system applies electrolysis process in a new way – one that does not require injection permits, multiple injection events, an injection rig or injection well installation.

**Bioremediation of soil contaminated with lead**

Lead (Pb) has been recognized as one of the most emerging hazardous heavy metals that pollute soil. Soil lead pollution is very serious in many cities of China. The soil of Urumqi, an economically fast developing city in northwestern arid China, is known to be highly contaminated with lead. Conventional lead removal methods have several disadvantages, such as less effective metal-ion removal, high reagent requirement and the problem of safe disposal of the pollutant. Bacterial methods for removal of lead from contaminated sites provide an attractive alternative to physicochemical methods. According to previous studies, biomineralization based on microbially induced calcite precipitation (MICP) provides a promising technique to remediate toxic metals from contaminated soils with additional advantages over current bioremediation techniques.

Scientists at the State Key Laboratory of Desert and Oasis Ecology, Xinjiang Institute of Ecology and Geography, China, investigated the usage of the calcite-precipitating bacterium *Kocuria flava* (CR1 strain) for Pb bioremediation in soils collected from a farmland in Urumqi. The bacterium was able to grow on nutrient agar media supplemented with 50 mM Pb²⁺ [Pb(NO₃)₂]. The results showed that incubating contaminated soil with *K. flava* CR1 could reduce the active Pb, alleviate the Pb stress and stabilize the
Pb contaminated soil. The wide distribution of MICP and the ability of its products to trap heavy metals may provide a new in situ remediation method for contaminated soil. This process can be widely used in the remediation of heavy metals, even in arid areas where phytoremediation cannot be successful. Moreover, MICP is not sensitive to redox potential, which makes this process highly effective in bioremediation. Contact: State Key Laboratory of Desert and Oasis Ecology, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, Urumqi 830011, China.

Source: english.cas.cn

Bioremediation for water contamination

In the United States, JRW Bioremediation LLC and Archer Daniels Midland Company have jointly filed a patent application on methods for bioremediation of contaminants in water using soapstock, an acid oil of soapstock, a neutralized acid oil of soapstock or combinations thereof. In one embodiment, a method comprises placing in contact with water the said composition, along with a compound selected from the group consisting of an emulsifier, a lactate ester, a lactate polymer, a polyhydric alcohol, carboxylic acids, salts of carboxylic acids, and any of their combinations.

In another embodiment, the composition comprises a first component selected from the group consisting of soapstock, acid oil of soapstock, a neutralized acid oil of soapstock and any combinations thereof; and a second component selected from the group consisting of ethoxylated monoglyceride, lecithin, sodium stearoyl lactylate, polyglycylate, ethyl lactate, a carboxylic acid, a salt of a carboxylic acid and any of their combinations. Upon placement of 0.2 mL of the composition in 100 mL of water comprising an amount of contaminant and a mixed culture of halo-respiring bacteria, at least a portion of the amount of contaminant is converted into an innocuous derivative after a period of time.

Source: www.freepatentsonline.com

Metal-reducing bacteria for degrading hydrocarbons

Micro-organisms from anoxic environments have the ability to reduce numerous metals as part of anaerobic growth. They are capable of using a wide range of organic compounds, including organic acids, sugars and extracts as substrates for growth. However, very few studies have looked at the utilization of hydrocarbons linked to metal reduction; a vast majority of hydrocarbon degradation studies have been carried out under aerobic conditions.

In a recent study by scientists from Griffith University, Australia, a comprehensive screening program revealed positive enrichment cultures where the reduction of metals iron (Fe), arsenic (As) and molybdenum (Mo) was linked to growth on various hydrocarbons in Soda Lake, oil reservoir, aquifer and contaminated oil refinery soil samples. Three hydrocarbons – diesel, hexadecane and kerosene – and three polycyclic aromatic hydrocarbons (PAHs) – phenanthrene, anthracene and pyrene – were used. Two pure bacteria were isolated from enrichments and studied further. Strain BP5, isolated from an oil reservoir in the Great Artesian Basin, coupled the reduction of Fe(III) to pyrene and anthracene degradation. Strain CalA was isolated from Caltex oil refinery soil and was able to link anthracene degradation to Fe(III) reduction. They are the first reported isolates capable of degrading either 3 or 4-ringed PAHs linked to Fe(III) reduction. Anaerobic degradation of hydrocarbons, particularly PAHs, is likely to represent an important process in the future for clean up of contaminated aquifers and other subsurface environments.

Source: www.asm2012.org
A simple, efficient process for CO$_2$ recycling

A new generation of catalysts can be used to simultaneously recycle two types of industrial waste: carbon dioxide (CO$_2$) and polymethylhydrosiloxane (PMHS), a silicon production waste. Researchers from the French Commissariat à l’Energie Atomique (CEA) and Le Centre National de la Recherche Scientifique (CNRS) have developed a simple catalysed chemical reaction that allows these two types of industrial waste to be used to produce formamides – compounds used in the industrial manufacture of adhesives, solvents and medical products. This optimized recycling process also makes it possible to synthesize a greater number of different compounds, thus extending its scope of application to new fields.

The new process developed produces formamides from CO$_2$ in one step, under environmentally safe conditions. This formylation reaction has the advantage of presenting a high yield: one formamide molecule produced for each CO$_2$ molecule consumed. The use of a new generation of carbene-type catalysts (2,000 times more reactive than those previously used) allows for simplified reaction conditions (atmospheric pressure, ambient temperature, etc.). Most importantly, these new catalysts can also be used with PMHS, a low-reactivity molecule. In the past, the reaction was obtained through the interaction of CO$_2$ with silane, an expensive sub-product of electronic and photovoltaic production processes. The new catalysts make it possible to use PMHS instead of silane, thus basing the reaction on the simultaneous recycling of two industrial wastes. The principle behind the process could solve a number of problems posed by current production systems – waste processing costs, environmental and health impact, depletion of energy sources, etc.

Source: www.cea.fr

Fingerprinting air pollution

A research team from the University of Pittsburgh (Pitts) and the Electric Power Research Institute (EPRI), the United States, collected emissions samples from several power plant stacks in the country and developed a unique method for the detection of the isotopic signatures of nitrogen oxide (NOx) emissions under different configurations. These isotopic signatures will be instrumental in helping to identify emission sources of air pollution across the nation.

The researchers developed a process for extracting NOx emission samples from the stacks of different types of coal-fired power plants and measuring their isotopic composition. They discovered that emissions from power plants employing advanced NOx controls differed with those plants without the advanced technologies or NOx emissions from other sources in the proportions of the 15N atom in the NOx emitted. With this information, the scientists will be able to analyse deposition samples and better determine the sources contributing to the deposited NOx products. According to Ms. Emily Elliott, principal investigator and assistant professor in the Pitts Kenneth P. Dietrich School of Arts and Sciences, “These ‘isoscapes’ can only be interpreted with fingerprint data like the isotopic signatures collected in this study.”

Ms. Elliott’s lab utilized bacteria to convert nitrate in the NOx collected into a gaseous form for isotopic analysis. Earlier analytical approaches were time- and labour-intensive, and precluded widespread characterization of environmental nitrate isotopes. The new method saves both time and effort. The results of analyses, combined with additional information from other NOx sources, will allow scientists to look at rain samples and determine how much nitrogen comes from power plants stacks, as opposed to how much comes from such other sources as motor vehicles, lightning or soil. “It was important for us to understand how the implementation of emission control technologies affects the isotopic nature of the NOx being emitted in order to evaluate its fate in the atmosphere,” Ms. Elliot said.

Source: www.phys.org

A new material for CO$_2$ capture

Hitachi Ltd., Japan, has developed a solid adsorbent material made by using cerium oxide for collecting and accumulating carbon dioxide (CO$_2$) produced by coal-fired power generation. Hitachi has also increased the number of adsorption sites of the new adsorbent material by using its exhaust purification catalyst technologies so that more CO$_2$ can be adsorbed. Specifically, to increase adsorption efficiency, a second component that attracts CO$_2$ was added to the surface of the adsorbent material. Compared with zeolitic solid adsorbents, the amount of CO$_2$ adsorbed by the new material is about 13 times larger, the company said.

Hitachi utilized a template method for forming pillar-shaped fine pores, which are regular hollow structures, on cerium oxide. As a result, CO$_2$ molecules are dispersed inside the fine pores and are more likely to contact with the adsorption sites, thereby improving the rate of CO$_2$ adsorption.
Currently, for collecting CO$_2$, the new method using the solid adsorbent material requires an amount of energy equivalent to that needed by the chemical absorption technique using amine fluid. Hitachi plans to reduce the required amount of energy by an additional 20 per cent or more by improving the solid adsorbent material and by building an optimal system, with the aim of commercializing the new material in or after 2025.

Source: techon.nikkeibp.co.jp

A catalyst to make CO$_2$ into fuel

Researchers at the Massachusetts Institute of Technology (MIT), the United States, have created a stable catalyst that can convert carbon dioxide (CO$_2$) to fuel while using only a trickle of electricity. The material can be used to recycle waste gases, curbing greenhouse emissions, as well as for creating useful products, like methane, which could be sold to offset pollution reduction costs and provide another energy source. The new recipe, which uses a blend of copper and gold formed into nanoparticles, overcomes some of the earlier challenges to developing an efficient way to recycle carbon.

“Copper is an attractive metal for carbon dioxide reduction,” explained Ms. Kimberly Hamad-Schifferli, an associate professor in mechanical engineering at MIT. The metal is generally cheap and reacts in well-understood ways. However, it oxidizes when it is exposed to air and moisture, turning from a lustrous brown to a pale green, rendering the metal ineffective as a catalyst, she noted. Since the reaction takes place on material’s surface, the researchers make the process more efficient by forming the copper into tiny particles, thereby increasing the catalyst’s surface area. However, doing this accelerates oxidation as well, rendering the substance inert in as little as 20 minutes.

To address this issue, Ms. Hamad-Schifferli and her colleagues mixed in gold, a relatively stable metal that drastically slowed oxidation to several days. The scientists mixed gold and copper salts in a solution and heated it to form the hybrid particles. The experiment indicated that the CO$_2$ binds to their surface, reacts to form methane and other hydrocarbons and then moves along quickly, allowing the reactions to progress. To use the catalyst, CO$_2$ needs to be dissolved in a liquid. The fluid then must flow over the copper and gold as a voltage is applied, producing hydrocarbon fuels, which are then harvested. Though gold is more expensive than pure copper, the efficiency and durability improvements and the reaction products can offset the increasingly pricey metal’s upfront costs.

Source: www.eenews.net

New materials remove CO$_2$ from the air

Scientists have reporting a way to remove carbon dioxide (CO$_2$) from smokestacks and other sources, including the atmosphere, achieving some of the highest CO$_2$ removal capacity ever for real-world conditions where the air contains moisture. Existing methods for removing CO$_2$ from smokestacks and other sources are energy-intensive, don’t work efficiently and have other drawbacks. In an effort to overcome such obstacles, Mr. Alain Goeppert and colleagues from the Department of Chemistry, University of Southern California, the United States, turned to solid materials based on polyethylenimine, a readily available and inexpensive polymeric material.

Their tests showed that these inexpensive materials achieved some of the highest CO$_2$ removal rates ever reported for humid air, under conditions that stymie other related materials. After capturing CO$_2$, the materials give it up easily so that the CO$_2$ can be utilized in making other substances, or permanently isolated from the environment. The capture material then can be recycled and reused many times over without losing efficiency. Contact: Mr. Alain Goeppert, Department of Chemistry, University of Southern California, University Park, Los Angeles, California, CA 90089-1661, United States of America. E-mail: goeppert@usc.edu.

Source: www.sciencedaily.com

CO$_2$ capture process ready for big projects

In Germany, a pilot project carried out by Siemens AG and E.ON AG has demonstrated that carbon dioxide (CO$_2$) emissions from power plants can be captured effectively. More than 90 per cent of the greenhouse gas was captured from a part of the flue gas at the Staudinger coal-fired power plant near Hanau, Germany. The results of the pilot project, running from 2009, will allow further demonstration projects and calculation of investment and operating costs. It was also shown that the flue gas scrubbing process does not reduce the plant’s efficiency to the extent expected and that the Siemens PostCap process produces nearly no emissions.
Separation of CO₂ from power plant exhaust gases is one of the ways in which plants that run on fossil fuels can help protect the climate. The CO₂ is removed from the flue gas using Siemens’ post-combustion process, and captured with a special scrubbing agent consisting of an aqueous amino acid salt solution. The amino acid salt solution is almost completely non-volatile – it generates practically no solvent emissions – and is not harmful to the environment. Unlike previous processes, the new method does not require extensive cleaning of the flue gas after the CO₂ is captured. Furthermore, the scrubbing agent removes other pollutants in the flue gas besides CO₂ and can be reused repeatedly.

Besides being very environmentally friendly, the process is also energy efficient. The Siemens process is suited for new power plants using fossil fuels as well as for retrofitting existing power stations. Siemens has a comprehensive, technologically optimized package for CO₂ capture. This technology is part of the Siemens environmental portfolio, which generated around 28 billion euros in sales for the company in fiscal year 2010. Contact: Siemens AG Energy Sector, Freyselebenstrasse 1, 91058 Erlangen, Germany. Tel: +49 (180) 524 7000; Fax: +49 (180) 524 2471; E-mail: support.energy@siemens.com.

Source: www.siemens.com

**Oxygen-separation membranes could aid in CO₂ reduction**

It may seem counterintuitive – but one way to reduce carbon dioxide (CO₂) emissions to the atmosphere may be to produce pure CO₂ in power plants that burn fossil fuels. In this way, greenhouse gases (GHGs) isolated within a plant could be captured and stored in natural reservoirs, deep in the Earth’s crust. Such “carbon-capture” technology might greatly reduce GHGs emissions from cheap and abundant energy sources such as coal and natural gas, and help minimize fossil fuels’ contribution to climate change. But extracting CO₂ from the rest of a power plant’s by-products is now an expensive process requiring huge amounts of energy, special chemicals and extra hardware.

Researchers at the Massachusetts Institute of Technology (MIT) are evaluating a system that efficiently eliminates nitrogen from the combustion process, delivering a pure stream of CO₂ after removing other combustion by-products such as water and other gases. The centre-piece of the system is a ceramic membrane used to separate oxygen from air. Burning fuels in pure oxygen, as opposed to air – a process known as oxyfuel combustion – can yield a pure stream of CO₂. The researchers have built a small-scale reactor in their lab to test the membrane technology, and have begun establishing parameters for operating the membranes under the extreme conditions found inside a conventional power plant.

Ceramic membranes are selectively permeable materials through which only oxygen can flow. These membranes, made of metal oxides such as lanthanum and iron, can withstand extremely high temperatures – a huge advantage when it comes to operating in the harsh environment of a power plant. Ceramic membranes separate oxygen using a mechanism called ion transport, whereby oxygen ions flow across a membrane, drawn to the side of the membrane with less oxygen. Mr. Ahmed Ghoniem, the Ronald C. Crane Professor of Engineering at MIT, says that ceramic membrane technology may be an inexpensive, energy-saving solution for capturing CO₂. “The whole objective behind this technology is to continue to use cheap and available fossil fuels, produce electricity at low price and in a convenient way, but without emitting as much CO₂ as we have been,” he says.

Mr. Ghoniem and his colleagues built a small-scale reactor with ceramic membranes and studied the resulting oxygen flow. They observed that as air passes through a membrane, oxygen accumulates on the opposite side, finally slowing the air-separation process. To avert this build-up of oxygen, the group built a combustion system into their model reactor. They found that with this two-in-one system, oxygen passes through the membrane and mixes with the fuel stream on the other side, burning it and generating heat. The fuel burns the oxygen away, making room for more oxygen to flow through. According to Mr. Ghoniem, the system offers a “win-win situation,” enabling oxygen separation from air while combustion occurs in the same space.

Source: www.pennenergy.com

**Warehouse of Persistent Organic Pollutants**

This warehouse aims to harmonize and/or develop monitoring and local or regional effects data to provide the tools for East Asian countries to establish scientifically sound priorities for the management of chemicals, particularly persistent organic pollutants (POPs).

For more information, contact:

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E-mail: soiljh@me.go.kr
Website: www.pops-asia.org
**RECENT PUBLICATIONS**

**Treatment Processes for Removal of Emerging Contaminants**

This study was designed to investigate the nature of colloids associated with wastewater effluents and to evaluate the association of emerging contaminants with these wastewater colloids. Two distinct emerging contaminants were studied to gain general insight into the potential importance of emerging contaminant interactions with wastewater colloids. Evaluating the association of antibiotic resistance genes (ARGs) with colloids and the removal of ARGs by membrane processes forms Part I of the report. Obtaining preliminary data on the potential association of nonylphenol with various colloidal size fractions and evaluating their removal in wastewater treatment plants forms Part II. Overall, it aims to determine the degree of association of two major emerging contaminants with various colloidal sizes and to determine the removal efficiency of these colloids in wastewater treatment plants. Depending on the size of the fractions that the emerging contaminants are associated with, conventional treatment processes or advanced treatment processes would be needed.

*Contact:* Portland Customer Services, Commerce Way, Colchester CO2 8HP, United Kingdom. Tel: +44 (1206) 796351; Fax: +44 (1206) 799331; E-mail: sales@portland-services.com.

**Decontamination of Heavy Metals: Processes, Mechanisms, and Applications**

From crystallization to membrane filtration, this book covers a very wide range of subjects relating to heavy metals in the environment. The author explores the treatment, removal, recovery, disposal, management, and modelling of heavy metals. The text covers heavy adsorption processes including metal biosorption, ion exchange and electrolysis processes for heavy metal decontamination. It also gives an overview of radioactive metals and their transportation in natural systems. The book presents various mathematical models for metal removal and recovery as well as transportation, and discusses a series of emerging technologies for metal treatment and management.

*Contact:* Customer Service, Taylor & Francis Group LLC., 130 Milton Park, Abingdon, Oxon, OX14 4SB, United Kingdom. Tel: +44 (1235) 400524; Fax: +44 (1235) 400525; E-mail: book.orders@tandf.co.uk.

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<td>Mysore, India</td>
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<td>28-29 Aug</td>
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<td>Kuala Lumpur, Malaysia</td>
<td>Contact: Mr. Marco Raciti Castelli, Dipartimento di Ingegneria Industriale, Università di Padova, Via Venezia, 1 35131 Padova, Italy. Tel: +393207179239; Fax: +39 (042) 226 0333; Website: <a href="http://www.waset.org">www.waset.org</a>.</td>
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<td>05-07 Sep</td>
<td>7th International Conference on Waste Management and Technology</td>
<td>Beijing, China</td>
<td>Contact: Mr. Yu Keli, Basel Convention Coordinating Centre for Asia and the Pacific, School of Environment, Tsinghua University, Beijing 100084, China. Tel: +86 (10) 6279 4351; Fax: +86 (10) 6277 2048; E-mail: <a href="mailto:icwmt@tsinghua.edu.cn">icwmt@tsinghua.edu.cn</a>; Website: conf.bcrc.cn.</td>
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<td>10-13 Oct</td>
<td>ENVIRO-TECH PHILIPPINES 2012</td>
<td>Pasay City, Philippines</td>
<td>Contact: Global-Link Marketing and Management Services Inc., Unit 1003 Antel 2000, Corporate Centre, 121 Valero St. Salcedo Village, Makati City, The Philippines. Tel: +63 (2) 750 8588; Fax: +63 (2) 750 8585; E-mail: <a href="mailto:ing.lagandaon@globallinkmp.com">ing.lagandaon@globallinkmp.com</a>; Website: globallinkmp.com.</td>
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<td>27-30 Oct</td>
<td>ECO EXPO ASIA 2012</td>
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<td>Contact: Conference Organizing Committee of ICWMT, Development Council (HKTDC), 38th Floor, Office Tower, Convention Plaza, 1 Harbour Road, Wanchai, Hong Kong, China. Tel: +852 183 0668; Fax: +852 2824 0249; E-mail: <a href="mailto:exhibitions@tdc.org.hk">exhibitions@tdc.org.hk</a>.</td>
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(Free access at www.techmonitor.net)

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