



# ChemEdge

## From the Editors Desk.

Welcome to the first issue of ChemEdge, a monthly newsletter designed and published by the Department of Chemical Engineering, Heritage Institute of Technology, Kolkata. This is a joint effort by the faculty members and the students of this Department. Since 2013 marks the beginning of our much awaited newsletter, we begin our edition by recollecting some events organized by the Department of Chemical Engineering, Heritage Institute of Technology in the recent past. Two significant events need special mention. SCHEMCON 2011, a national seminar was held during 23<sup>rd</sup>-24<sup>th</sup> September 2011 with the theme “Sustainable Green Technology”. It was an event jointly organized by Students’ Chapter, Department of Chemical Engineering, Heritage Institute of Technology and Indian Institute of Chemical Engineers. Several distinguished guests of honour were invited to deliver lectures and chair different sessions. The event was well contributed by Oral/Poster presentations, Quiz contest etc. In October 2012, student chapter of IICHE, Heritage Institute of Technology, organized a technical quiz in which Heritage Institute of Technology emerged as the winner. A special research program was organized jointly by NJIT, USA and Heritage Institute of Technology, Kolkata in which a 4<sup>th</sup> year student of Chemical Engineering, Biswajit Debnath undertook research work in NJIT for a month in the area of Electroless electrohydrodynamic printing of aqueous nanosuspension for fabrication of unit dosages.

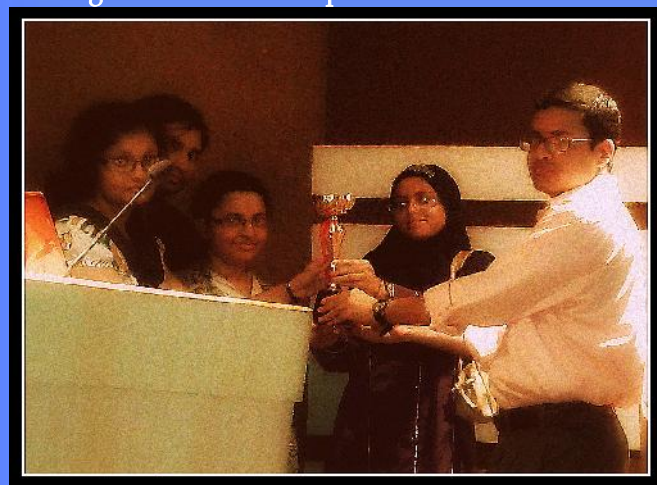
Editors

Pramita Sen & Punam Mukhopadhyay

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### Heritage wins technical quiz.



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### VIDEO OF THE MONTH

[“http://www.youtube.com/watch?v=IPM8OR6W6WE”](http://www.youtube.com/watch?v=IPM8OR6W6WE)

### DID YOU KNOW ???

Columbia University has developed an artificial tree that passively soaks up carbon dioxide from the air .

[See more..](#)

ChemEdge, Inaugural Issue.

## Heritage Hosts SCHEMCON' 11.

On 23rd and 24th September, 2011, Heritage Institute of Technology Kolkata (HITK), Students' Chapter Department of Chemical Engineering in association with Indian Institute of Chemical Engineers (IChE) organized 7th Annual Session of Students' Chemical Engineering Congress 2011 (SCHEMCON) in the Multiplex Simulated Auditorium of the HITK campus. The conference provided a platform for the Chemical Engineering students to interact, learn and share their ideas and knowledge to the diversified fields of Chemical Engineering. The conference emphasized on Sustainable Green Technology to conserve the nature through utilization of renewable sources of energy like solar, wind, hydro, bio and geothermal energy and finding alternative routes to production of consumer durables.

The inauguration ceremony of the conference started with lighting of lamp at 10:00 am in the auditorium of HITK campus by the Chief Guest Shri S.K.Jena, Honourable Minister of State for Chemicals & Fertilizer, Govt. of India and Minister of State (Independent Charge) for Statistics & programme Implementation, Govt. of India in august presence of Dr. D.P. Mishra, Director, TATA Consulting Engineers Ltd, Mumbai & Past President, IChE, Mr. K.K.Das, Chairman, Calcutta Regional Centre, IChE, Prof. B.B. Paira, Director, HITK, Prof. B.R.Saha, HOD,ChE, HITK & Hony. Secretary, IChE, Mr. Praveen Saxena, Director & CEO, Blast Carbo Blocks Pvt. Ltd & Jt. Secretary, IChE and Mr. Bhaskar Reddy, President, IChE and Prof. (Dr) Swami Vedajnananda, Professor, Chem. Engg. & Organizing Secretary of SCHEMCON.. The event was well contributed by Oral/Poster Paper Presentation, Quiz Contest, Keynote and Plenary Lectures, Essay Competition and a soothing cultural programme. Also in the conference, the MP Chary Memorial Medal Award was presented to an outstanding young chemical engineer below 35 years of age from the participants.

Pt. Bikram Ghosh and his 'Rhythmscape' kept the audience enthralled during the cultural section. Piyali Ghosh of Heritage Institute of Technology, Department of Chemical Engineering was the first place holder amongst all the paper presentations. Apart from that Arunima Ghose also became first in the "Computaional Fluid Dynamics" section and Biswajit Debnath also became first in "CRE & Energy Engineering" section. On the second day of this event prizes were distributed. A concluding ceremony performance was given by a group of students known as 'Recollection and Friends' which was interesting. Rajshekar Chatterjee and Biswajit Debnath composed the theme for SCHEMCON 2011 which was put up to the website.

Shiladitya Chaudhuri

HIT-K

M.tech 2<sup>nd</sup> Year.

## Heritage wins technical quiz.

[Click here](#)

A technical quiz was organized by Students' Chapter of IICHE, Heritage Institute of Technology on 8th day of October, 2012. Chemical Engineering Departments of four colleges - Jadavpur University, Calcutta Institute of Technology, Durgapur Institute of Advanced Technology Management (DIATM) & the home team Heritage Institute of Technology participated in this quiz contest. The quiz was coordinated by quizmaster Mr. Abhyuday Mallick, Assistant Professor of Heritage Institute of Technology, Department of Chemical Engineering. Mrs. Mahjabeen Akram, Assistant Professor from Calcutta Institute of Technology was present during the quiz competition. In this contest out of the four teams, the home team took the crown of the winner and Calcutta Institute of Technology occupied the place of runner's up. A winner's trophy was awarded to the winners and runner's up trophy was awarded to the runner's up. Certificates were given to each participant.



From left Winners (Shaoni Basu ChE 4<sup>th</sup>, Sougata Rakshit ChE 3<sup>rd</sup>, Arunima Ghose ChE 4<sup>th</sup>), Mahjbeen Akram & Abhyuday Mallick.

Picture courtesy : Nilanjan Dutta (ChE 3<sup>rd</sup>)

## Heritage beyond India.

Heritage Institute of Technology has crossed the border of India and left its footprints on USA. A special research program was organized at New Jersey Institute of Technology, Newark, NJ, USA. Biswajit Debnath, a student of 4<sup>th</sup> year (3<sup>rd</sup> year then), Department of Chemical Engineering went to NJIT in the year 2012 for 45 days. This was the fifth batch that went to NJIT. Biswajit worked on “*Electrodeless electrohydrodynamic printing of aqueous nanosuspension for fabrication of unit dosages*” under the guidance of Dr. Boris Khusid and Dr. Ezinwa Elele . He was awarded with a certificate at the end of the session.



From left Prof. Durga Madhab Misra (Program Director at NJIT), Dr. Boris Khusid (NJIT), Biswajit Debnath (Student HIT – K)

Picture courtesy : Rik Dhar

## Did You know????

See more..

**did you know?**

**Columbia University has developed an artificial tree that passively soaks up carbon dioxide from the air using artificial leaves that are 1,000 times more efficient than true leaves that use photosynthesis.**



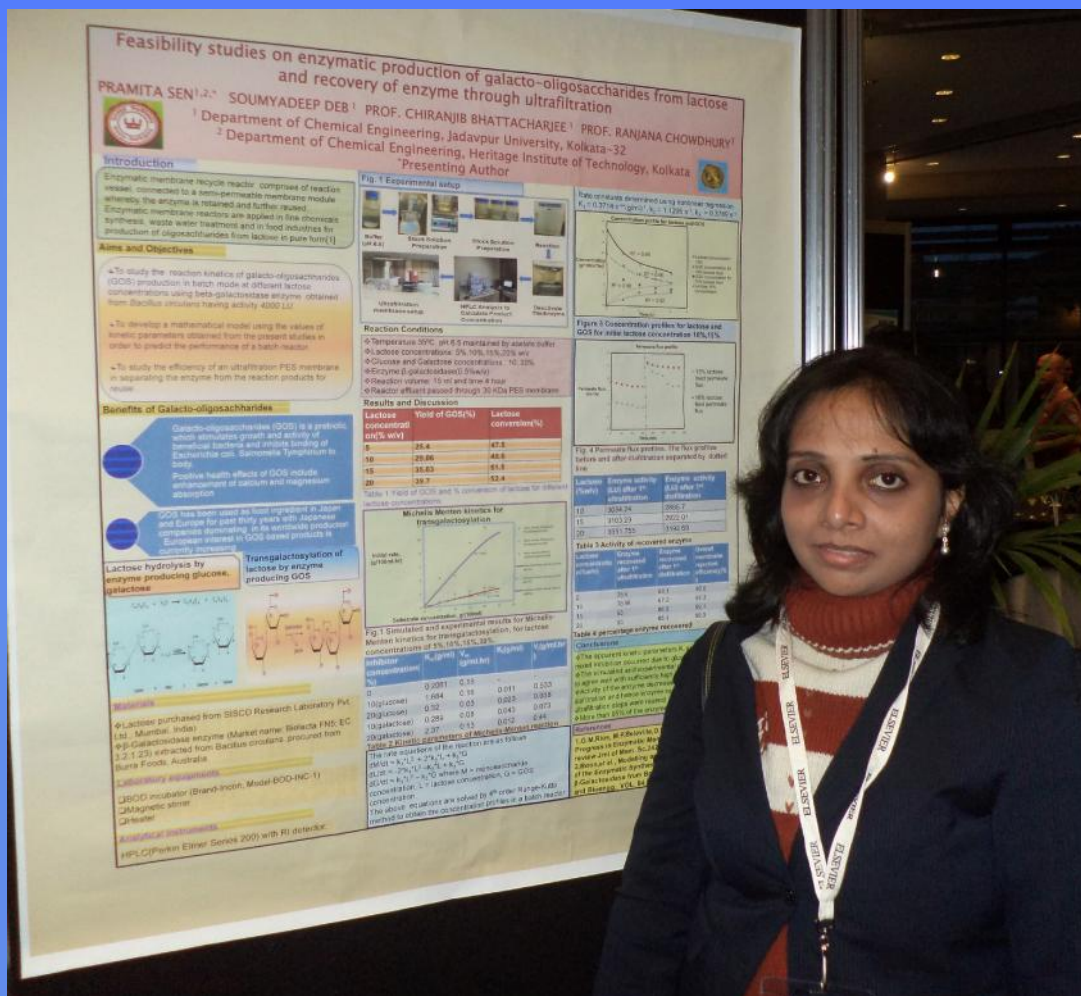
Visit the following link for further details.

<http://www.bbc.com/future/story/20121004-fake-trees-to-clean-the-skies/2>

## EUROMEMBRANE'12.

The Euromembrane 2012 was a conference organized by the Imperial College, London and European Membrane Society held in Queen Elizabeth II Conference Centre, London, UK from 23<sup>rd</sup> September-27<sup>th</sup> September 2012. The aim of the conference was to provide a common platform for scientific exchanges on new ideas and latest research work in the field of Membrane Science and Technology and in other areas where this technology also plays an important role. European Membrane Society is a society in charge of promoting membrane science and technology in new worlds and towards new goals. In 2012, the society was celebrating its 30<sup>th</sup> anniversary. The society has allocated a significant budget to promote membrane-related scientific and educational events throughout the year. The events include organizing summer school in France on Dense polymeric membranes fundamentals & applications: packaging, barriers & industrial separations, Sustainable Water Desalination and Reuse" with the Water Desalination and Reuse Center (WDRC) of the King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, supporting the Honorary session dedicated to the Founding fathers of inorganic membranes at the 12th International Conference on Inorganic Membranes held in Enschede, The Netherlands during July 2012. Previous Euromembrane conferences were held in Paris(1992), Hamburg(2004), Montpellier(2009) etc.

Euromembrane Conference 2012 was a wonderful platform to exchange ideas with fellow research scholars on the latest developments in membrane science and technology, understand the progress and novelty in areas of membrane preparations as well as usage of this technology in process engineering replacing conventional techniques. Currently pursuing work in the area of membrane reactors, the conference immensely helped me gain new ideas in my area of research. The scientific committee of the conference comprised of eminent scientists and professors from all over the world working in this area of research for several years. Prominent names among them include Enrico Drioli, Italy, L. Giorno, Italy, M.N. De Pinho, Portugal, P. Aimar, France, M. Ulbricht, Germany, N. Mckeown and R. Field, UK and many more. There were 4 plenary and 12 keynote lectures delivered by the leading experts in the field. Besides these, there were oral and poster presentation sessions by research scholars and scientists working in this field, of which I had been a part.



Pramita Sen presenting the poster at EUROMEMBRANE '12.

Picture courtesy : Pramita Sen

I was immensely privileged to present a poster on my research work “Feasibility studies on enzymatic production of galacto-oligosaccharides from lactose and recovery of enzyme through ultrafiltration” The aims of the work were to study the reaction kinetics of galacto-oligosaccharides production in batch mode at different lactose concentrations using beta-galactosidase enzyme obtained from *Bacillus circulans*, to develop a mathematical model using the values of kinetic parameters obtained from the present studies in order to predict the performance of a batch reactor and to study the efficiency of an ultrafiltration PES membrane in separating the enzyme from the reaction products for reuse.

Pramita Sen  
 Editor, ChemEdge  
 Assistant Professor,  
 Chemical Engineering Department  
 Heritage Institute of Technology

## Novel Catalytic Procedures for Generation of Biofuels.

Chemical Engineering is a diverse field which encompasses subjects as varying as thermodynamics to project engineering and reaction engineering to materials development and process intensification. Concern for environmental problems is one such important aspect of Chemical Engineering in the modern era. Concerns about the depletion of fossil fuel reserves, the impact of anthropogenic CO<sub>2</sub> emissions, and increasing energy demands have encouraged the exploration of new avenues of generating transportation fuels.

With an abundance of approximately 720 billion tonnes, that is, 40 % of the annual net yield of photosynthesis, cellulose is the world's largest organic raw material resource. Novel catalytic procedures for converting cellulosic biomass into valuable platform chemicals and renewable fuel components are being explored everyday by scientists all over the world. The development of these sustainable catalytic transformations could potentially provide a long-term solution to the industrial dependence on fossil carbon, requiring in 2025 production of up to 30 % of raw materials for the chemical industry from renewable resources.

Several types of novel catalysts have been used for this purpose. These include sulphonated activated carbon, activated carbon supported ruthenium catalysts, sulfonated silica-carbon nanocomposites, layered niobium molybdate (HNbMoO<sub>6</sub>), wormhole-type mesoporous Ta<sub>x</sub>W<sub>10-x</sub> oxides, heteropolyacids (HPAs) such as H<sub>3</sub>PW<sub>12</sub>O<sub>40</sub>, H<sub>4</sub>SiW<sub>12</sub>O<sub>40</sub>, and polyvalent transition metal salts of PW<sub>12</sub>O<sub>40</sub><sup>3-</sup> and acid-functionalized nanoparticles such as sulphonated metal nanoparticles coated with silica yielding perfluoroalkyl-sulfonic acid nanoparticles and alkyl-sulfonic acid nanoparticles.

The effectiveness of these catalysts over the earlier mineral acid catalysts cannot be over-emphasized. Mineral acids like conc. Sulphuric acid, Hydrochloric acid and Nitric acid as well as their dilute solutions pose a very important problem-that of recycling. Recycling of acids and reusing them for future use are both costly and environmentally harmful. On the contrary, the novel catalysts are mostly solids, which can be . . .



## Novel Catalytic Procedures for Generation of Biofuels.

separated from the aqueous reaction medium by easy physical means like filtration. As such these catalytic procedures are eco-friendly and cost-effective, which has led to the spurt in research work in developing these catalysts.

In India, however, not much research is going on for developing such novel catalysts because biomass hydrolysis as a process of generating biofuels has not yet been able to claim its rightful niche in the hierarchy of alternative fuel generation processes. However researches are going on at NCL and Universities like Jadavpur University and University of Calcutta for development of such catalytic procedures for biofuel generation. It is hoped that more and more research will be carried out in this field in the future and I appeal to every student of Chemical Engineering that they at least give a thought about this area of alternative fuel research.

Abhyuday Mallick  
Editor in chief, ChemEdge  
Assistant Professor,  
Chemical Engineering Department  
Heritage Institute of Technology

# Multi disciplinary Encounter!

## Grey Water Treatment for Irrigation

Limited purification of waste water and consumption of high level of pure water for domestic usage leads to a rising problem of scarcity of pure water. Reuse and recycle of grey water is a part of the fundamental solution of many ecological problems. Grey water is house hold waste water mainly generated from domestic activities such as laundry, dishwashing, basins and showers, with the exception of waste water from the toilet which is known as black water. Sometimes kitchen waste water is also referred to as Yellow Water separately. Nevertheless they can be put in the same section. It's a waste to irrigate with great quantities of drinking water when plants can thrive on used waste water containing small bits of compost.

Grey water collected from different resources can be recycled after it undergoes some treatment. After the settlement of undissolved solid, coagulation with calcium hydroxide can be performed to remove pathogen and high molecular weight organic substances. Flocculation can also be done by adding alum and the supernatant liquid can to be treated with Fuller's earth which acts as a natural adsorbent. Further the grey water can be introduced to biologically activated soil layer, where the bacteria helps to remove biological matters and it can be used for irrigation purpose.

Aryama Raychaudhuri

Department of Biotechnology, 4<sup>th</sup> Year.

Heritage Institute of Technology.

# Picture of the Month

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Photo courtesy of First Wind | [www.firstwind.com](http://www.firstwind.com)  
Photographer: Douglas Barnes Photography  
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Seeing people standing on top of a wind turbine really puts into perspective how big these machines really are.

Courtesy : [www.firstwind.com](http://www.firstwind.com)

# Upcoming Events in next month.

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1. Seminar on “Peptide Chemistry and Biology at the Intersection of Drug Design.”
2. Technical Lecture on “Towards Energy Storage Solutions - The Exide India Perspective”

## CREDITS

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