

NEWSLETTER

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Message from a newly appointed Director of Research

M3TC has come a long way since starting its journey in 2007 under the able leadership of Prof. Arun Mujumdar. I am indeed pleased to be a part of this multi-disciplinary research centre and work with NUS colleagues, industry partners and international collaborators. With the enthusiastic support from Singapore Economic Development Board (EDB) and NUS in various forms, M3TC offers arguably one of the best opportunities in this region for impactful R&D related to minerals, metals and materials, based on a foundation of excellence in research. The R & D activities we have been engaged with over the years cover a wide spectrum, including underground coal mining, drying of low-grade coal, production of activated carbon from low-grade coal, design of effective mine air conditioning and ventilation systems, bioleaching of precious metals from low-grade ores, coal-biomass co-combustion, use of remote sensing techniques, computational modeling studies, etc.



While we continue with these activities, we would like to build on our current strength and explore strategic research directions of current interest to make further advances in the context of sustainable development in the industrial sectors of interest to M3TC. Everything we do every day has an impact on our natural as well as human-made resources either negatively or positively. Our goal is to carry out innovative and yet practical R & D projects that will provide solutions to complex problems of direct industry interest as well as societal concern while maintaining economic growth. To achieve this goal, we believe in collaborative, global, and multi-disciplinary research. We conduct seminars, symposia, workshops and conferences to provide appropriate manpower training and to create and share opportunities for problem-driven R&D. We have re-designed our web site this year to make it more interesting and informative (<http://www.eng.nus.edu.sg/m3tc>). We have also added new features and content to keep you up to date with the latest developments in M3TC, thanks to M3TC researchers Dr. Sachin Jangam and Hafiz Osman.

I welcome your interest in M3TC. We are keen to work actively with industry and businesses in our core areas. If we can be of assistance in any of your training, or R&D needs please let us know. We have a strong team of dedicated research and support staff. Likewise, we are always in search of collaboration with academic institutions, government and industry partners to continue and expand our R & D base. As we see the world going through rapid changes, the opportunity for cross-disciplinary, collaborative research has never been better. We invite you to join us in this exciting journey.

We look forward to hearing from you.

A/Prof Rajasekhar Balasubramanian

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M3TC updates

Following are the newly appointed Research staff for various projects at M3TC

Dr. Ganesh Parshetti
Research Fellow

Mr. Jundika Candra Kurnina
Research Engineer
(Project: Use of Modeling and Simulation Tools for Development of an Efficient Mine Ventilation System – Control of Dust and Methane Related Hazards in Coal Mines)

Mr Aung Myat
Research Engineer
(Project: High-grade Activated Carbon from Low Rank Coal)

Conferences attended

Dr. Agus Pulung Sasmito attended two conferences namely 22nd World Mining Congress and Expo during 11-16 September 2011 at Istanbul, Turkey and the 4th Sriwijaya International Seminar on Energy Science and Technology (SISEST) during 5-7 October 2011 at Palembang, Indonesia. He presented several papers and a keynote lecture during these conferences.

Professor Arun Mujumdar and Dr. Sachin Jangam attended the 7th Asia-Pacific Drying Conference (ADC2011) during 18-20 September 2011 at Tianjin, China.

Prof. Arun was the chief guest during the opening ceremony along with other dignitaries such as the Dy. Mayor of Tianjin city and the President of Tianjin University of Science and Technology. Prof. Arun also presented a plenary lecture.

Dr. Sachin presented one oral and one poster presentation.

New Projects

Use of Modeling and Simulation Tools for Development of an Efficient Mine Ventilation System – Control of Dust and Methane Related Hazards in Coal Mines

Contact: Prof. Arun S. Mujumdar, Mechanical Engineering, NUS
Email: mpeasm@nus.edu.sg

A New Integrated Coal Prospecting Tool for SE Asia: A Remote Sensing and Geophysical Approach

Contact: Prof David Higgitt, Geography, NUS
Email: geodlh@nus.edu.sg

Understanding, Testing and Enhancing Mineralized Nanofluid Stability

Contact: Dr Saif A Khan, Chemical and Biomolecular Engineering, NUS
Email: chesakk@nus.edu.sg

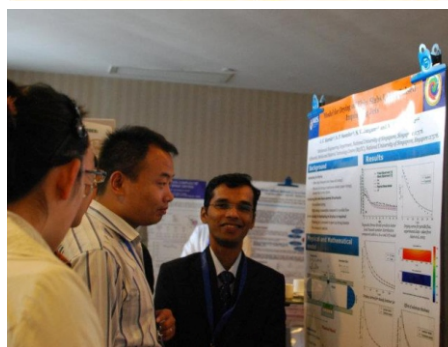
Computational Studies of an Integrated Fluidized Bed Mixer-Dryer System for Pre-Processing of Feedstock for Co-Gasification Processes

Contact: A/Prof Reginald Tan Beng Hee, Chemical and Biomolecular Engineering, NUS
Email: chetanbh@nus.edu.sg

Electrospun Nanomaterials for Environmental Remediation

Contact: Prof Seeram Ramakrishna, Mechanical Engineering, NUS
Email: seeram@nus.edu.sg

Conference photos



Captions (from top left clockwise) - Prof Arun during opening ceremony at ADC2011, Tianjin, China; Dr. Agus at SISEST, Palembang, Indonesia; Dr. Sachin Jangam during poster presentation at ADC, Tianjin China; Dr. Agus at, Mining Conference, Turkey

Brief description of some projects

Activated Carbon from Low-Rank Coal

Activated carbon (AC) is a form of functionalized carbon that has been processed to make it highly porous, i.e. having a large surface area. On account of its high degree of micro-porosity, a single gram (g) of AC can have a surface area in excess of 500 square meters (m²), and some samples may achieve 3000 m². In this project, raw low rank coal (from Kalimantan, Indonesia) is used to produce activated carbon using a physical activation method.

Contact: Prof. K. C. Ng, Mechanical Engineering, NUS
Email: mpengkc@nus.edu.sg

Upgrading of Low-Rank Coal by Drying

Low-rank coal account for 45% of the world's coal reserve but its role in energy production is limited due to high moisture content. This result in high transportation cost, low calorific value, and associated complications in power generation. In this project, a 200 kg/h pilot coal dryer employing indirect heating has been developed to dry low-rank coal to with up 55% moisture to a lower level of around 30%. Interested parties may contact Professor Arun Mujumdar for more details.

Contact: Prof. Arun Mujumdar, Mechanical Engineering, NUS
Email: mpeasm@nus.edu.sg

Academic/Industry Contacts

Visit by Professor Gary Rankin of Mechanical Engineering Department, University of Windsor, Canada.

Date: October 18, 2011

Dr. Christine Render (Executive Manager, Business Development and Strategy, Johannesburg, SA) and Jennifer Zeiss (Executive Manager, Business Performance, Johannesburg, SA) of Sasol Technology (Pty) Ltd., South Africa visited M3TC. Various possibilities for collaborative research were discussed. Prof WANG, Chi-Hwa organized the meeting.

Date: September 23, 2011

Invitation for Seminar

Prof Rajasekhar Bala has been invited to deliver a seminar on "Bioleaching of Precious Metals from Low-Grade Mineral Ores: Current Challenges and Future Prospects" in an international conference on Copper Metallurgy to be held at Krakow, Poland (October 26-28, 2011). This conference is organized by KGHM, a major copper and silver producer in the world. M3TC and KGHM have been actively engaged in a collaborative R & D project that deals with the development of an environmentally-benign technology for extraction of precious metals from low-grade mineral ores.

INASHCO, a Netherlands-based Incinerator Ash Company, visited M3TC on 20 October 2011 to seek collaboration in the area of recovery of valuable metals from bottom ash using a microbially-induced leaching process. The intent of this collaboration is to upgrade the mineral fraction of bottom ash with attractive characteristics for the building and construction industry after the recovery of valuable metals.

Recent workshops/seminars

One-day workshop on
Industrial Drying Technologies-
Principles & Practice

October 01, 2011

Over 90 participants including
from Malaysia and Indonesia

Upgrading of Low-Rank Coal

By Dr. Sachin V. Jangam

October 21, 2011

With 20 industry participants

Upcoming events

One-day workshop
on
Design and Modeling of
Underground Ventilation System

Date: TBA

Two Seminars
on
Clean Coal Technology R&D in
China: Status and Potential
&

Novel Drying techniques for Coal:
Pulse Combustion Drying and
Superheated steam Drying

Date: TBA

Achievements

ADC2011, Tianjin, China

M3TC was given a special recognition with a citation certificate for major leadership role in global R&D in industrial Drying through managing the Drying Technology Journal, numerous seminal books and also several international events and workshops that promote state on industrial drying around the world.

Recent Publications

K. Somasundram, E. Brigeresson and A.S. Mujumdar (2011). Analysis of a model for an electrochemical capacitor. *Journal of the Electrochemical Society*, 158 (11): A1220-A1230.

H. Osman, S.V. Jangam, J.D. Lease, and A.S. Mujumdar (2011). Drying of low-rank coal (LRC) - a review of recent patents and innovations. *Drying Technology*, 29 (15): 1763-1783.

S. V. Jangam (2011). Chemical heat pumps to enhance drying efficiency - some thoughts for new R&D opportunities. *Drying Technology*, 29 (6): 610-611.

T. Tunçal, S.V. Jangam and E. Güneş (2011). Abatement of organic pollutant concentrations in residual treatment sludges: a review of selected treatment technologies including drying. *Drying Technology*, 29 (14): 1601-1610.

Conference Publications

A.P. Sasmito, E. Brigeresson, H. Ly, K.W. Lum and A.S. Mujumdar (2011). Improved total air conditioning system in underground coal mines - a computational study. 22nd World Mining Congress and Expo, Istanbul, Turkey, 11-16 September, 2011.

A.P. Sasmito, E. Brigeresson, H. Ly and A.S. Mujumdar (2011). Design of underground coal mines ventilation systems in a rapid mining development region - a computational fluid dynamic study. 4th SISEST, Palembang, Indonesia, 5-7 October, 2011.

A.P. Sasmito, E. Brigeresson and A.S. Mujumdar (2011). Thermal, water and gas management in PEM fuel cell - a modeling approach. 4th SISEST, Palembang, Indonesia, 5-7 October, 2011.

H. Osman, S.V. Jangam and A.S. Mujumdar (2011). Hydrodynamics and heat transfer characteristics of coal particle in a screw conveyor - DEM simulation results. 4th SISEST, Palembang, Indonesia, 5-7 October, 2011.

H. Osman, S.V. Jangam and A.S. Mujumdar (2011). DEM simulations of flow of coal particles in a screw conveyor dryer configuration. 7th Asia-Pacific Drying Conference (ADC2011), Tianjin, China, 18-20 September, 2011.

W. Zhonghua, W. Long, Z. Li, Y. Xie and A.S. Mujumdar (2011). Atomizing and Drying of Sewage Sludge Using a Helmholtz Pulse Combustor, 7th Asia-Pacific Drying Conference (ADC2011), Tianjin, China, 18-20 September, 2011.

M3TC's one day workshop on Industrial Drying Technologies - Principle and Practices (October 01, 2011)



Speakers of a one-day workshop on Industrial Drying Technologies - Principles and Practice



Attendees of a one-day workshop on Industrial Drying Technologies - Principles and Practice with speakers

Contact Details

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Professor Arun S Mujumdar (Director) - mpeasm@nus.edu.sg
Website - www.serve.me.nus.edu.sg/aron