M3TC Minerals, Metals and Materials Technology Centre (M3TC)
National University of Singapore, Singapore

Quarterly

NEWSLETTER

www.eng.nus.edu.sg/m3tc

September 2011 Vol - 1, Issue - I

Message from the Director

The Minerals, Metals and Materials Technology Centre (M3TC) was established within the Faculty of Engineering at the National University of Singapore (NUS) in 2006, with generous financial support from the Singapore Economic Development Board (EDB) and NUS. Our mission is to contribute to the development of local and regional enterprises and industries active in the minerals, metals and materials sectors. Leveraging on the extensive and globally recognized expertise of over 300 faculty members in ten engineering disciplines, our goal is to assist industry and businesses in enhancing their technology via strategic R&D projects with M3TC.

Aside from R&D, M3TC also performs manpower training in Singapore in areas of interest to the sectors noted earlier. This is accomplished by organizing workshops, short courses and hosting relevant symposia of interest to industry. Results of our research are also disseminated via participation in international conferences and publication in peer-reviewed journals. M3TC has received much global visibility and recognition. I am pleased to add here that we have established close links with a number of esteemed institutions around the world in the mining and minerals processing areas, which is beneficial in enhancing the scope and quality of our R&D.

If you are interested to find out more about any of the Centre's projects, please feel free to contact the Principal Investigators or M3TC office for details. We welcome inquiries from industry and businesses for potential consulting and/or joint R&D projects. We can also assist in designing tailor-made professional development courses or manpower training in selected areas for the minerals and metals industry.

We plan to issue a newsletter on a quarterly basis to keep our partners in academia as well as industry and government posted with the progress as well as outcomes from our R&D effort at M3TC. Our website of course will continually be updated with more details. Readers may contact me or Dr Jeremy Lease for information about M3TC. Queries on specific projects may be addressed to the academic faculty members who conduct the research of interest. Please note that, in view of the vast variety of expertise resident within our Faculty of Engineering at NUS, please do not hesitate to contact us should you wish to explore collaborative R&D possibilities in the mining, mineral and materials processing areas.

Professor Arun S Mujumdar
NUS, Singapore

Inside...

Message from Director
Completed projects
Ongoing projects
Recent events
Upcoming events
Achievements
Publication details
Staff Changes

Editors: Dr. Sachin V. Jangam; Mr. Hafiiz Osman

M3TC updates

Dr. Jeremy Lease named programme manager to look after management of M3TC office, EDA liaison, operational functions and liaison with Pis

Steering committee met on August 5, 2011. A number of valuable suggestions exchanged which will be implemented in the next few months.

Mr. Cavan is now a office-in-charge of M3TC at EDB which initiated the establishment of M3TC at NUS in 2007.

New staff in M3TC office: Ms Claire Lee (Senior Executive); Mrs. Norizan Abdul Majid (Management Assistant Officer) and Ms. Lina Gosali (Senior Executive)

Professor Arun S Mujumdar has been nominated by the Board of the Scientific Council of University of Lyon I, Lyon, France, to receive Doctor Honoris Causa (Honorary Doctorate). The formal function will be held later in 2011.

Director of Rusnas PEBT of Sriwijaya Univesrity, Palembang, Indonesia, Dr. M. Faizal, hosted two M3TC researchers on a very informative field trip to Palembang, Indonesia.

Dr. Sachin and Mr. Hafiiz visited a coal mining project at Tanjung Enim, South Sumatera, Indonesia and also delivered a talk on M3TC activities in Sriwijaya University, Palembang

Completed Projects

Development of Futuristic Tin-based Materials as New Generation Electronic Solders

Contact: Prof. Manoj Gupta, Mechanical Engineering, NUS
Email: mpegm@nus.edu.sg

Metal/Mineral Nanocatalysts for Synthesis of Methanol from Coal

Contact: Prof. Zeng Hua Chun, Chemical and Biomolecular Engineering, NUS
Email: chezhc@nus.edu.sg

Mathematical Modeling of Important Technological Processes in Mineral, Metal and Materials Processing

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

Impact and Morphing Properties of Smart Fibre Metal Laminate

Contact: Prof. Quek Ser Tong, Civil Engineering, NUS
Email: ceeqst@nus.edu.sg

Development of Manufacturing Capabilities for High Quality Cost Effective Structural Composites

Contact: Prof. Tay Tong Earn, Mechanical Engineering, NUS
Email: mpetayte@nus.edu.sg

Advanced Processing for Powder Metallurgy (P/M) - High Performance and Cost Effective Materials

Contact: Prof. Jerry Fuh, Mechanical Engineering, NUS

Removing Natural Organic Matters (NOM) by Integrated Coagulation-Membrane System with Natural Iron Sand

Contact: Prof. Hu Jiangyong, Environmental Science and Engineering, NUS
Email: ceehujy@nus.edu.sg

Capturing of Carbon Dioxide in Liquid Magnesium for Developing Enhanced Performance Materials

Contact: Prof. Manoj Gupta, Mechanical Engineering, NUS
Email: mpegm@nus.edu.sg

A visit to coal mine by Dr. Sachin V. Jangam and Mr. Hafiiz Bin Osman
Date: August 11, 2011; Place: Tanjung Enim, South Sumatera, Indonesia

Ongoing Projects

Coal Gasification for Clean Energy Research
Contact: Prof. Wang Chi-Hwa, Chemical and Bio-molecular Engineering, NUS
Email: chewch@nus.edu.sg

Development of a Cost–Effective and Energy Efficient Technique for Drying of Low Rank Coal (LRC)
Contact: Prof. Arun Mujumdar, Mechanical Engineering, NUS
Email: mpeasm@nus.edu.sg

Development of New Hydrothermal Technology for Producing Biochar for Direct Co-combustion with Coal
Contact: Prof. Rajasekhar Balasubramanian, Environmental Science and Engineering, NUS
Email: eserbala@nus.edu.sg

Mathematical Multi-Scale Framework for Total Air-Conditioning in Mines
Contact: Dr. Karl Erik Birgersson, Chemical and Bio-molecular Engineering, NUS
Email: chebke@nus.edu.sg

High-grade Activated Carbon from Low Rank Coal
Contact: Prof. Ng Kim Choon, Mechanical Engineering, NUS
Email: mpengkc@nus.edu.sg

A Novel Approach for Recovery of Copper and Precious Metals from Low-grade Ores Using a Combination of Microbial Oxidation and Bioleaching Techniques
Contact: Prof. Rajasekhar Balasubramanian, Environmental Science and Engineering, NUS
Email: eserbala@nus.edu.sg

Feasibility Studies of Underground Coal Mining in Indonesia
Contact: Prof. Leung Chun Fai, Civil Engineering, NUS
Email: ceelsy@nus.edu.sg

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

New Projects

A New Integrated Coal Prospecting Tool for SE Asia: A Remote Sensing and Geophysical Approach
Contact: Prof David Higgitt, Geography, NUS

Understanding, Testing and Enhancing Mineralized Nanofluid Stability
Contact: Dr Saif A Khan, Chemical and Biomolecular Engineering, NUS
Email: chesakk@nus.edu.sg

Contact Details

Ms Claire Lee (Senior Executive) - englctc@nus.edu.sg
Dr. Jeremy D. Lease (Programme Manager)) - mpejsl@nus.edu.sg

Website - **www.eng.nus.edu.sg/m3tc**

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

Recent workshops/seminars

Techno-Economic Evaluation (TEE) and Life Cycle Assessment (LCA) of processes

By Dr. Nawshad Haque
CSIRO, Australia
August 03, 2011

Workshop on Mathematical Modeling of Transport Processes

NUS, Singapore
April 09, 2011

Bioethanol production in Brazil: Advances and Challenges

By Prof. Maria A Silva
UNICAMP, Brazil
March 01, 2011

Workshop on Planning and Design for Ground Control in Underground Coal Mines

By Prof. Yoginder Chugh
University of Southern Illinois, USASource
June 29-30, 2010

Upcoming events

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

Venue: NUS, Singapore

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

Venue: NUS, Singapore

Recent Publications

A.P. Sasmito and A.S. Mujumdar. Performance evaluation of a polymer electrolyte fuel cell with a dead-end anode: A computational fluid dynamic study. International Journal of Hydrogen Energy, 36(2011): 10917-10933.

J. Subramanian, C.G. Khoo, J. Kuma and M. Gupta. Feasibility study on utilizing carbon dioxide for the processing of Mg-Al alloys. Journal of Materials Processing Technology, 211(8): 1416-1422.

H. Osman, S.V. Jangam, J.D. Lease, and A.S. Mujumdar. Drying of low-rank coal (LRC) - a review of recent patents and innovations. Drying Technology (accepted for publication).

S. V. Jangam, H. Osman, A.S. Mujumdar, Screw conveyor drying of low-rank coal, coal/biomass mixtures. 7th Asia-Pacific Drying Conference. Tianjin, China, 18-20 September, 2011.

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

C. Fushimi, G. Guan, M. Ishizuka, Y. Nakamura, A. Tsutsumi, Y. Suzuki, W.C. Lim, Y. Cheng, and Chi-Hwa Wang. High-Flux Triple Bed Circulating Fluidized Bed (TCFB) Gasifier for Exergy Recuperative IGCC/IGFC. International Conference of Circulating Fluidized Bed and Fluidized Bed Technology. Oregon, USA, 1-5 May, 2011.

Y. Nakamura, G. Guan, C. Fushimi, M. Ishuzuka, A. Tsutsumi, Y. Suzuki, Y. Cheng, W.C. Lim, and Chi-Hwa Wang. Flow Structure simulation for a novel coal feeding system of a high-density downer reactor. AIChE Annual Meeting, Salt Lake City, Utah, USA, 7-12 Nov. 2010.

K. A. Rahman, W. S. Loh, K. C. Ng, I. Alhamid, and W. G. Chun. Adsorption isotherm of Methane/Maxsorb III pair for a wide range of temperature. Innovative Materials for Processes in Energy Systems (IMPRES2010), Research Publishing, Singapore, 2010, pp. 313-317.

Industry contacts

Dayen Environmental Ltd

KS Natural Resources (KNSR) Pte Ltd

Vestas Technology R&D Singapore Pte Ltd

Holcim (Singapore) Pte Ltd

Changjiang Fertilizer Holdings Pte Ltd

NatSteel Asia Pte Ltd

Varia Engineering & Services

Academic collaborators

University of Tokyo

University of Indonesia

Desert Research Institute

Hong Kong University of Science and Technology

Teesside University

McGill University

University of Southern Illinois

External structure of pilot plant facility located in Chiba, Japan. (This is in collaboration with University of Tokyo)

Participants from "Workshop on Planning and Design for Ground Control in Underground" presented by Professor Yoginder Chugh from University of Southern Illinois.