

## Speaker 1

### **Topic of the talk**

## **Applications of eco-friendly aerogel materials from environmental waste**

**Hai M. Duong**

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This talk will focus on how to reuse the recycled fibers from environmental waste to solve environmental problems. The paper waste, fabric waste and PET bottle waste can be converted into advanced eco-friendly aerogels for several applications such as oil spill cleaning, heat insulation and medical devices. More facile, cost effective, much less time-consuming fabrication methods without gelation processes are innovated. The continuous and large-scale process takes much less time and uses much less non-toxic chemicals than previous aerogel techniques. Water-repellent structures of the aerogels are stable over 6 months in tropical climate. They can absorb oil excluding water 4 times larger than that of the best commercial sorbents. The aerogels can be squeezed to recover over 99% of absorbed crude oil and then reused several times. Thermal jackets using the carbon-based aerogels can maintain ice slurry inside water bottles for up to 4 hours. For the first time, the aerogels can be compressed in the pallet form, which can be effective to be used to haemorrhage control such as gun wound. The talk can help to solve the environmental problem and may inspire others to reuse the waste wisely.

### **Short biography**



Dr. Hai M. Duong received his Ph.D. in Chemical Engineering at Melbourne University in 2004. Since then, he has expanded his research interests in science and applications of light-weight nanomaterials through experiments and computational modelling. He was awarded four postdoctoral fellowships at world-class laboratories: University of Oklahoma, USA; University of Tokyo, Japan; Massachusetts Institute of Technology (MIT), USA and University of Cambridge, UK. Currently, as an Assistant Professor of at

National University of Singapore (NUS), he has awarded 3 global innovational awards in USA, UK and Asia and over \$6.0M for his research interests including a number of emerging fields such as carbon nanotubes (CNTs), aerogels and their applications for aerospace structures, energy devices, environmental treatment, and thermal transport phenomena in small-scale of biological systems. He has 3 commercialized patents, published 9 book chapters, over 150 journal papers and conference proceedings, gave several keynotes and invited talks. Dr. Duong is frequently asked to review the work of his peers for publication in leading internationally circulated journals. Dr. Duong is also the key member of Functional Material Society in Singapore and the editorial member of International Journal of Aeronautical Science and Aerospace Research (IJASAR).

## Speaker 2

### **Topic of the talk**

## **Molecular mechanism of souring caused by *Desulfotignum* species screened from the culture medium of crude oil and seawater**

**Yasunori Tanji**

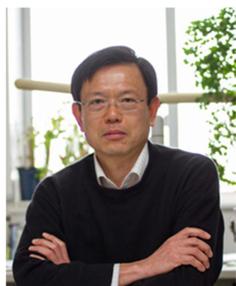
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In the secondary oil-recovery process, seawater is commonly used as the injection water to enhance oil recovery. However, this method is known to cause souring, i.e., sulfide production in oil reservoirs. Souring causes several problems, such as microbiologically influenced corrosion of tubing material and deterioration of crude oil. Sulfate-reducing bacteria (SRB) is one of the microorganisms present in oil fields that induce souring. In this study, *Desulfotignum* species (*Desulfotignum* YB01) was isolated. *Desulfotignum* YB01 can grow on toluene, lactate, acetate and formate as carbon source accompanied by sulfate reduction to produce sulfide. Genus *Desulfotignum*, that was dominant in the culture medium of crude oil and seawater, was suggested to be toluene degrading SRB and also fatty acid sweeper. Those roles are significant in souring. Furthermore, whole genome draft sequence revealed that *Desulfotignum* YB01 possess upper pathway of toluene degradation, which is toluene to benzoyl-CoA pathway of *bss*ABCDEF (benzylsuccinate synthase gene cluster) and *bbs*ABCDEFGH (beta oxidation of benzyl succinate gene cluster). It is similar to gene cluster of *Thauera aromatica* Azoarcus EbN1, well-known facultative anaerobic toluene degrading nitrate reducing bacteria. Genome comparison of *Desulfotignum* YB01 to *Desulfotignum balticum* and *Desulfotignum phosphitoxidans*, as its relatives which show weak ability to use toluene, revealed that *Desulfotignum* YB01 has almost same identity among *bbs* cluster but has different identity among *bss* cluster. This difference makes *Desulfotignum* YB01 grow on toluene.

### **Short biography**



Professor Yasunori Tanji received his Doctor of Engineering at Tokyo Institute of Technology (Japan) in 1985. He has 15 years of experience working for Nippon Kokan Corporation (Japan) and has been as research fellow at leading institutes for biomedical and cancer research in Japan and the USA from 1990 to 1995. Since 1996, he has been an associate professor and full professor at Tokyo Institute of Technology, Japan. His research field is environmental and biochemical engineering.

He has published about 130 scientific papers on many prestige international scientific journals, participated in writing 31 books, registered for 44 Intellectual Properties of Japan and was awarded numerous prizes for his contributions in Science and Technology.

### Speaker 3

#### **Topic of the talk**

## **Multiple neural networks (MNN): techniques and application**

**Ir. Dr. Zainal Ahmad**

In order to improve the generalisation capability of neural network based models, combining multiple neural networks (MNN) is proposed with several combination techniques. Several selective combination techniques like correlation coefficient analysis based technique, forward selection (FS), backward elimination (BE), and data fusion based technique were presented. Correlation coefficient analysis based technique basically excludes the networks that have strong correlation with the networks already selected. In the FS method, individual networks are gradually added to the aggregated or ensemble network until the SSE on the original training and testing data cannot be further reduced by adding more networks. In the BE approach, all the individual networks are initially aggregated and then the individual networks are removed one at a time until the SSE on the training and testing data cannot be further reduced by removing more networks. In data fusion based network selection technique, each network is considered as an information source and a particular network is selected at each sample time using Bayesian inference approach. All the proposed techniques are applied to dynamic nonlinear process modelling. Application results demonstrate that the proposed techniques significantly improve model generalisation and perform better than the individual networks.

#### **Short biography**



Associate Professor Ir. Dr. Zainal Ahmad received his B.Eng (Hons) in Chemical Engineering from University of Surrey, UK in 1998. In 2001, he received M.Sc in Applied Process Control (with distinction) from the University of Newcastle Upon Tyne, UK. He also obtained his PhD from this university in 2005. He worked as a process engineer in a petrochemical plant before joining USM in 2000. Besides being responsible for the undergraduates, Dr Zainal also working together with his postgraduate students in designing and conducting innovative research projects, to continually

enhance his expertise and professional knowledge. In addition to that, his main research interests include artificial neural network, process modeling, model-based control and neural network application in chemical processes. He has guided several Master and PhD students. He has several awards and more than 100 international journal/conferences publications to his credit. Dr Zainal also served as a reviewer for international journal and conferences.

Speaker 4

**Topic of the talk**

**TBA**

**Mr. Nguyen Hoai Son**

Dow Chemical Vietnam LLC