Tsinghua University

Research Center for Eco-environmental Sciences
Chinese Academy of Sciences

Side Event VI
Workshop: Microbiome in Engineered System
-- Methodologies

Background and Objective

Over the past decade, Metagenomics have opened new doors for efforts in inspecting and cataloguing microbes in the soil, air and water, giving scientists the ability to study microrganisms that are difficult to cultivate in the lab. It has been revolutionizing our understanding of the diversity and function of the microbial world on a global scale. Furthermore, the recently developed multi-omic technologies (metagenomics, metatranscriptomics, metaproteomics, metabolomics) has even enabled us to explore in-depth the diversity, composition, structure, function, interaction, dynamics and evolution of "microbiomes" in various habitats, granting us opportunities to gain a great number of unprecedented insights in human/animal health, plant productivity, and environmental quality.

Many of the engineered biological systems now play irreplaceable roles for environmental protection, resource recovery and sustainable development. The application of multi-omic technologies in studying these systems has seen a fast-growing trend. With the rapid development of multi-omic technologies, we are faced with challenging questions that need to be resolved. How do we correctly adopt these high-throughput tools to disclose the internal linking between microbial activity and macro-function of biotechnology processes? How to comprehensively combine the use of these tools and basic biotransformation principles to understand the flow of electrons and elements in biological processes? How to use knowledge of microbial ecology to guild the management of biological industry? These are topics that need to be carefully discussed to benefit researchers and practitioners.

Accordingly, this workshop aims at giving an insight into methodologies for elucidating the microbial communities, their functions in engineered biological systems, and a general view of microbiome regulation under operational conditions. It also delves into how the variation of microbial community and their functions can be utilized to inform the intervention of operating system stability.

Leading professors and researchers will present key lectures and open discussions will be guided to gain valuable suggestions and ideas for future research and application.

Workshop Chairs

Prof. Dr. **Xianghua Wen** (Tsinghua University, China)
Prof. Dr. **Jizhong Zhou** (Oklahoma University, USA)
Prof. Dr. **Ye Deng** (Chinese Academy of Science, China)
Prof. Dr. **Pablo Kroff** (CIRSEE, SUEZ, France)

Invited professors

Prof. Dr. **Jizhong Zhou** (Oklahoma University, USA)
Prof. Dr. **Jim Tiedje** (Michigan State University, USA)
Prof. Dr. **Bruce Rittmann** (University of California, Berkeley, USA)
Prof. Dr. **Ye Deng** (Chinese Academy of Science, China)
Prof. Dr. **Tong Zhang** (The University of Hong Kong, China)
Prof. Dr. **Irini Angelidaki** (Technical University of Denmark， Denmark)
Prof. Dr. **Rolando Chamy** (Pontificia Universidad Católica de Valparaíso, Chile)

Venue: China National Convention Center (CNCC)

Dates: 20th October 2017

Preliminary program

Morning of 20th, October

Jim Tiedje	Development of metagenomics
Jizhong Zhou	Method comparison for metagenomics approaches
Bruce Rittmann	The Microbiome Always Closes the Mass Balance
Tong Zhang	Application of Metagenomics and Metatranscriptomics in Biological Wastewater Treatment
Ye Deng	Species interaction network in environmental engineering ecosystems
Irini Angelidaki	Molecular techniques in anaerobic digestion and industrial scale applications
Rolando Chamy	Engineered microbiomes and full scale assessment of composition

The whole workshop consists of half of day of academic reports. Each talk will be given in 25 minutes and subsequently researchers and students can discuss the topic.

October 20th, 2017 (Friday)		
Time	Room308	Speaker
8:00-8:10	Opening address	Xianghua Wen
8:10-8:15	Chair: Ye Deng	
8:15-8:40	Development of metagenomics	Jim Tiedje
8:40-9:05	Method comparison for metagenomics approaches	Jizhong Zhou
9:05-9:30	The Microbiome Always Closes the Mass Balance	Bruce Rittmann
9:30-9:55	Application of Metagenomics and Metatranscriptomics in Biological Wastewater Treatment	Tong Zhang
9:55-10:10	Discussion	
10:10-10:30	Coffee break	
10:30-10:35	Chair: Pablo Kroff	
10:35-11:00	Species interaction network in environmental engineering ecosystems	Ye Deng
11:00-11:25	Molecular techniques in anaerobic digestion and industrial scale applications	Irini Angelidaki
11:25-11:50	Engineered microbiomes and full scale assessment of composition	Rolando Chamy
11:50-12:00	Discussion	
12:00-13:00	Lunch	

Who should attend the course?

This workshop is oriented towards PhD-students that work on microbial processes, researchers that carry on work in applied metagenomics, operators that want to discover new tools and operational schemes for their plants.

Introduction of the invited professors

TIEDJE Jim, an University Distinguished Professor of Microbiology and Molecular Genetics, and of Plant, Soil and Microbial Sciences, and is Director of the Center for Microbial Ecology at Michigan State University. His research focuses on microbial ecology, physiology and diversity, especially regarding the nitrogen cycle, biodegradation of environmental pollutants and use of molecular methods to understand microbial community structure and function. His group has discovered several microbes that biodegrade chlorinated pollutants and is using genomics to better understand microbial functions in their environment. He has served as Editor-in-Chief of Applied and Environmental Microbiology and Editor of Microbial and Molecular Biology Reviews. He has over 500 refereed publications including seven in Science and Nature. He shared the 1992 Finley Prize from UNESCO for research contributions in microbiology of international significance, is Fellow of the AAAS (The American Association for the Advancement of Science), the American Academy of Microbiology, and the Soil Science Society of America, and is a member of the U.S. National Academy of Sciences. He was President of the American Society for Microbiology and the International Society for Microbial Ecology. He received his B.S. degree from Iowa State University and his M.S. and Ph.D. degrees from Cornell University.

ZHOU Jizhong, a George Lynn Cross Research Professor and a Presidential Professor in the Department of Microbiology and Plant Biology and Director for the Institute for Environmental Genomics, University of Oklahoma, USA; Adjunct Senior Scientist at Lawrence Berkeley National Laboratory; and Adjunct Professor at Tsinghua University, Beijing, China. His expertise is in molecular biology, microbial genomics, microbial ecology, theoretical ecology and genomic technologies. His laboratory has pioneered the development and use of genomic technologies for environmental studies for which Geo-Chip won an R&D 100 Award in 2009. He received a Presidential Early Career Award for Scientists and Engineers in 2001. He is a Fellow of the American Academy of Microbiology and the American Association for the Advancement of Science. He won the Ernest Orlando Lawrence award at 2015, the Lawrence Award is the highest award from the US Department of Energy, one of the few Chinese scholars who have been awarded for nearly 50 years. He has published more than 540 papers in Science, Nature Review Microbiology, Nature Climate Change, Nature Communications, PNAS, Ecology

Letters, ISME Journal, mBio and other important journals with H-index of 91 based on Google Scholar.

RITTMANN E. Bruce, a Regents' Professor of Environmental Engineering and Director of the Biodesign Swette Center for Environmental Biotechnology at Arizona State University. His research focuses on the science and engineering needed to "manage microbial communities to provide services to society." Services include generating renewable energy, cleaning water and soil, and improving human health. Dr. Rittmann is a member of the National Academy of Engineering; a Fellow of AAAS, WEF, IWA, and NAI; and a Distinguished Member of ASCE. Dr. Rittmann was awarded the first Clarke Prize for Outstanding Achievements in Water Science and Technology from the NWRI, the Walter Huber Research Prize and the Simon Freese Award from ASCE, the G.M. Fair Award from AAEES, and the Perry L. McCarty/AEESP Founders Award. Dr. Rittmann has published over 610 journal articles, books, and book chapters, and he has 15 patents. With Dr. Perry McCarty, Dr. Rittmann co-authored the textbook Environmental Biotechnology: Principles and Applications (McGraw-Hill Book Co.).

ZHANG Tong, a Professor in Environmental Biotechnology Laboratory in Department of Civil Engineering, The University of Hong Kong. His researches include anaerobic digestion and bioenergy from wastes/wastewater (cellulosic biomass, sludge, kitchen waste, and wastewater), biological wastewater treatment (N removal and P recovery), biodegradation of emerging pollutants (antibiotics, PPCP and EDCs), antibiotic and antibiotic resistance genes, etc. He has published over 180 peer-reviewed papers on the above topics, and got more than 9000 citations (Google Scholar). He has a H index of 52 and is Top 1% researcher (Essential Science Indicators) for 8 years from 2009 to 2016. He is the editorial board members of a few international peer-reviewed journals, and had served as an advisor for BGI (Beijing Genomics Institute) on Environmental Microbiology and Biotechnology from 2011 to 2014, and ASM (American Society of Microbiology) Country Liaison to China (Hong Kong) from 2012 to 2014. He was Yi Xing Chair Professor of Nanjing University from 2013 to 2016. He won First-Class Award in Natural Science of China Ministry of Education in 2015 and Second-Class Award State Natural Science Award of China State Council in 2016.

DENG Ye, a Researcher at Research Center for Ecological Environment, Chinese Academy of Sciences. He was one of the scientists at Oklahoma University Environmental Genomics Research Institute, the United States, in charge of information analysis team from 2009 to 2014. He was selected as the "Hundred Talents Program Scitentist" at the Chinese Academy of Sciences in 2014. He published more than 80 papers in all kinds of SCI journals (Science, Ecology Letters, Nature Climate Change,

PNAS, etc.) with 400 more citations, the cumulative number of references more than 1600 times. Has been one of the core members of the Geo-Chip microbial functional gene chip development in 2009 to obtain the 2009 US R & D 100 Technology Award. He is the inventor of the microbial molecular ecological network approach, and the builders of multiple high-throughput data analysis platforms. His research direction is to develop and improve high-throughput macro genome molecular technology, including high-throughput sequencing and gene chip method. This new molecular technique is used to study the response and feedback mechanism of microbial communities in regional ecological differences, global environmental changes and pollution, and to reveal the composition, structure and functional diversity of microbial communities, the interaction between species and their living environment, and so on.

ANGELIDAKI Irini, a Professor at the Technical University of Denmark. Her research field is in wastes/wastewater treatment systems. Focus is in development of biotechnological processes for conversion of organic matter to biochemicals and bioenergy. Research in biogas is her core area. Focus in microbiology and processes technology; process optimization; molecular methods for characterization of bacteria; biological production of biochemical and biofuels; microalgae; macroalgae; bioelectrochemistry; and biorefineries. She has served in committees and worked with a range of organizations and research bodies including Member of the Danish Free Research Council, Chair for the Swedish Energy Research (Formas), Member for The Panel 7 under the Swedish Research Council, the European Research Council's (ERC) panel, Irish Research Council as panel member, Chair for the International Task Group for Harmonisation of Biogas potential ABAI (under IWA), board Member for the Specialist Group for Anaerobic Processes (under IWA), etc. She received Brinchs Award for best technical research in Denmark in 2011. She has published over 400 scientific publications with 10000 more citations (H-index=54).

CHAMY Rolando, a Professor and Chair at the Pontifical Catholic University of Valparaíso, Chile, USA. Prof. Chamy is also the Director of the Curauma Biotechnology Nucleus center of applied investigation in biotechnology, which is part of the same university. He is a Biochemical Engineer and Ph.D. in Chemical Engineering from the University of Santiago de Compostela, Spain. He is the Technical Vice President of Inter-American Association of Sanitary and Environmental Engineering and Director of the "Master in CDM and Energy Efficiency". His research interests includes Anaerobic digestion, Renewable energy, Climate Change, Environmental sustainability, Carbon market, Innovation management, Environmental biotechnology, Biological treatment of solid, liquid and gaseous effluents.

Contact Information

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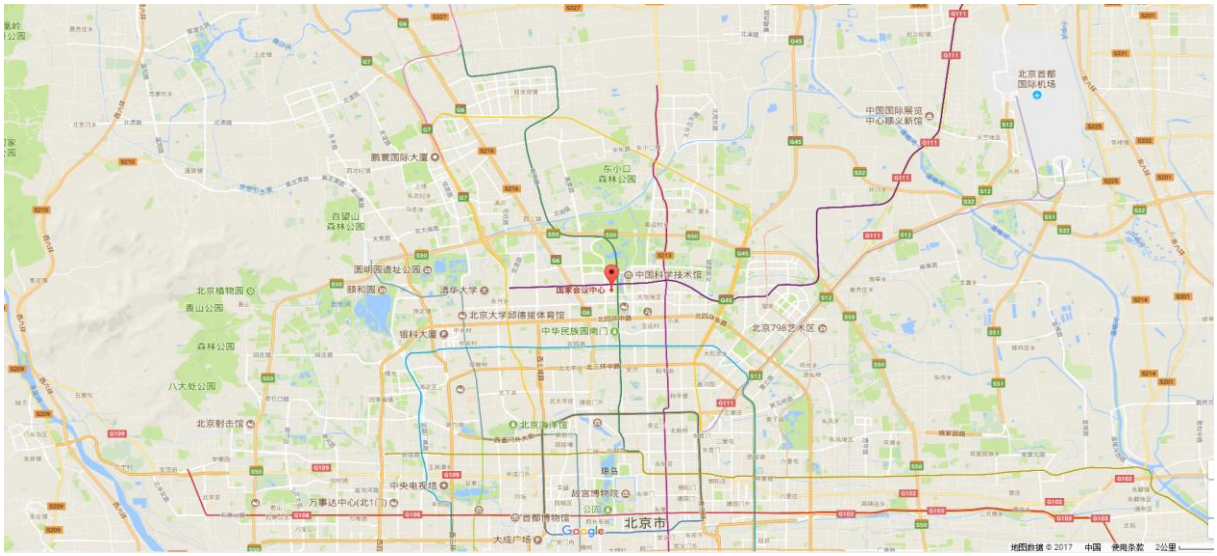
Google map of the meeting Venue



Website of the meeting Venue

http://www.cnccchina.com

Application Table

Name		**Organisation**		
Address		**Academic diplomas**		
Telephone		**E-mail**		
Poster Presentation	**Yes□ No□**	**The topic of the poster**		
Accommodation	**Yes□ No□**	**Accommodation**		**Single room□ Two-bed room□**

				Other□
The time of arriving and leaving hotel		**Arrive:** **Leave:**		
Remarks				

Note:

1. There is no registration fee for the workshop.

2. Please send this application table before 20th September, 2017. The application documents should be sent to Ms. Kaiqin Zhang: kqzhang@tsinghua.edu.cn

Transportation

How do the international participants come to the China National Convention Center Grand Hotel in Beijing, China?

The international participants can take the international flight to Beijing Capital International Airport directly, then take the taxi to the CNCC Grand Hotel by about 50 mins.

During 19th October, there are volunteers in Beijing Capital International Airport to provide the guide help.

Google map of the route of the Beijing Capital International Airport to the China National Convention Center