メルボルン大学-東工大　オンライン合同ワークショップ開催

Joint Workshop on Chemical Engineering and Biomedical Engineering 2022

東京工業大学
Tokyo Institute of Technology

THE UNIVERSITY OF MELBOURNE

Date : 22nd August 2022

On line meeting by way of Zoom
Program:(Japan Standard Time, One hour behind Melbourne Time)

日時：　８月22日（月）
開始時間：日本時間 13:00~
使用言語：英語　*（途中参加可）*

Pre-registration is required. Please sign up at the following URL.
事前登録制です。以下のURLから登録してください。
https://zoom.us/meeting/register/tJIocumgqT0iGNBOWQUCmaBlvszgaKKhx-Ec

13:00-13:05	Opening remarks :	Professor Sandra Kentish, UoM
13:10-13:20	Greeting :	Prof. James McCluskey, Deputy Vice Chancellor Research, UoM
13:20-13:30	Greeting :	Dr. Osamu Watanabe, Executive Vice President, Tokyo Tech.

A presentation period: 30 min. presentation &15 min. discussion. *各30分発表+15分質疑応答*

<u>13:30-14:15 Topic 1</u> Assoc.Prof. **Masayoshi Tanaka** / 田中 祐圭, Tokyo Tech
Explorations of gold mineralization peptides and membrane curvature sensing proteins

<u>14:15-15:00 Topic 2</u> Dr **Vijay Rajagopal**, UoM
Computational physiology from the heart to the cardiomyocyte

(15:00-15:15 Break)

<u>15:15-16:00 Topic 3</u> Prof. **Yusuke Shimoyama** /下山裕介, Tokyo Tech
Supercritical CO2 processing, liposome formation, cocrystallization, microfluidic flow process

<u>16:00-16:45 Topic 4</u> Prof. **Greg Qiao**, UoM
Precision polymer synthesis from synthetic and natural sources for future industry and medical applications

16:45-16:50 Closing remarks : Professor Hidetoshi Sekiguchi, Tokyo Tech

Organized by School of Chemical and Biomedical Engineering, The University of Melbourne (UoM)
School of Materials and Chemical Technology, Tokyo Institute of Technology (Tokyo Tech)
Chairs: Professor Sandra Kentish (UoM)
Professor Hidetoshi Sekiguchi (Tokyo Tech)

Biography of the speakers and Summaries of the topics

Assoc.Prof.Masayoshi Tanaka

Dr. Masayoshi Tanaka received the M.Eng. and D.Eng. degrees from the Tokyo University of Agriculture and Technology, Japan, in 2005 and 2008, respectively. In 2009, he awarded the Newton International Research Fellowship (Royal Society, UK) and worked in University of Leeds (UK) for two years. In 2011, he became an Assistant Professor at the Tokyo University of Agriculture and moved to Tokyo Institute of Technology in 2014. In 2022, he became an associate professor in Tokyo Institute of Technology. He is the author or coauthor of more than 80 papers in international refereed journals. His main research interests are to develop new screening technique of pharmaceutically useful biomolecules, and synthesis technologies for functional nanomaterials by green course.

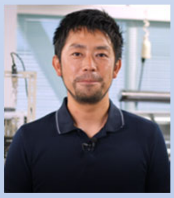
Summary : Nature is often giving us some hints to fabricate useful materials and new techniques, because biological organisms have a range of strategies to respond for diverse environments. Therefore, by advancing our understanding of biological phenomena in microorganisms and animal cells at the molecular level, we seek how to produce novel bionanomaterials/molecules for nanotechnological and biomedical applications. Currently, we are focusing on the development and functional analysis of technologies to identify proteins that deform cell membranes and are implicated in cell division and the generation of intracellular vesicles. Furthermore, we aim to develop an eco-friendly technology for the synthesis of functional nanoparticles using peptides that can mimic mineral formation (biomineralization) by living organisms, as seen in bones and teeth. In this talk, I will present these two topics with current progresses.

Dr Vijay Rajagopal

Dr. Vijay Rajagopal received his PhD in tissue biomechanics from the Auckland Bioengineering Institute, University of Auckland in 2007. He initiated a new research programme in cellular systems biology with an early career fellowship from the Royal Society of NZ. He joined the University of Melbourne as a faculty member in 2014. He leads the Cell Systems and Mechanobiology Lab, with interests in creating physiologically realistic computational models of cells and organs for clinical decision making and pharmaceutical applications.

I will introduce computational physiology, a research field and approach to biophysics and physiology detailed computational models of organs and cells. I will illustrate how this approach has enabled us to create detailed multi-scale computational models of the heart at the organ level that are being used as digital-twins for development of patient specific treatment strategies. I will show how we are now extending this approach to create computational models of cardiac cells to uncover sub-cellular mechanisms involved in heart disease.

Prof.Yusuke Shimoyama



Education: Ph.D. in Chemical Engineering, Kyushu University, 2005. M.S. in Chemical Engineering, Kyushu University, 2003.

Current / Previous positions: (2018.8-current) Professor and (2016.4) Associate Professor in Department of Chemical Science and Engineering, Tokyo Institute of Technology. (2011.4) Associate Professor and (2009.4) Assistant Professor in Department of Chemical Engineering, Tokyo Institute of Technology. (2007.9) Assistant Professor, in Department of Chemical Engineering, Kyushu University. (2004.4) Research Fellowship for Young Scientists, Japan Society for the Promotion of Science.

Summary : Supercritical CO_2 can be applied for material processes as a solvent in the fabrication of pharmaceutical composite, carbon aerogel and liposome. The melting point of solid solute is reduced in high-pressure CO_2. As given in Fig. 1, the stearic acid is liquified in high-pressure CO_2. The liquified lipid can dissolve a pharmaceutical compound and form the composite with the pharmaceuticals. Slug-flow of supercritical CO2 and water phases in microchannel can be applied for the formation of liposome as show in Fig. 2. The water-in-supercritical CO_2 emulsion contacts to a water phase in the microchannel and then the liposome can be formed.

Prof.Greg Qiao

Professor Greg Qiao received his B.En in Donghua University in 1982 and Ph.D. at the University of Queensland in 1996. He joined the University of Melbourne in 1996 and became a full Professor in 2009. He was an Australian Research Council (ARC)'s Future Fellow (2012-2015) and was a Deputy Head of Department for 4 years, a Assistant Dean of The Faculty for 8 years. He was the Acting Associate Dean for research and is the Associate Dean for Research Training since 2020. Prof Qiao is a Fellow of Royal Australia Chemical Institute (RACI) and Royal Society of Chemistry (RSC), London. Prof Qiao was the Chair of Polymer Division of the RACI (2015-2016) and a member of ARC College of Experts (2016-2018). Prof Qiao received RACI Applied Research Award in 2017, ExxonMobil Award in 2015, RACI's Polymer Division Citations in 2011 and 2019 as well as Freehills Award in 2010.

Summary: Professor Greg Qiao has published more than 300 journal papers and is a co-inventor for more than 20 patents. is an international expert in the design, synthesis and engineering of polymers. His research has answered key scientific questions and he has applied this knowledge to address major challenges including: engineering a new generation of peptide-based antimicrobial star polymers to kill antibiotic resistant bacteria, creating polymeric scaffolds optimised for use in corneal transplants, and improving the membrane separation of CO2 from N2 in power plant flue gases.

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