NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

NTU-CEE Distinguished Seminar Series

School of Civil and Environmental Engineering

Singapore Membrane Techonology Centre, NEWRI

College of Engineering

Impacts of a move towards nutrients in a circular economy

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Speaker: Professor Hokyong Shon

University of Technology Sydney (UTS), Australia

Moderator: Asst. Prof. SHE Qianhong

Date: 26 January 2023

Time: 3 pm - 4 pm (GMT+8)

About the seminar

Increasing population growth and rapid urbanisation is placing increasing pressure on existing water infrastructure and agricultural food productivity to meet future supply and demand. The World Bank predicts that by 2050, the global population will be nine billion, placing a 50% increase in agricultural food productivity and 15% increase in water withdrawals. With these fertilise shortages, there is a strong market driver for bioavailable nutrients through a renewable approach. Decentralising the treatment of our wastes is especially interesting as it has the potential of making an industry, notoriously thirsts in energy, water and raw materials, a net producer. It was also demonstrated that the integration of source-separation of urine, faeces and greywater would help to achieve this goal, while also opening new opportunities for building a more flexible and resilient urban wastewater network. Urine valorisation is attractive due to its low volume, high nitrogen (N) and phosphorus (P) concentrations (80% of N and 50% of P inputs into sewers), and relative ease of collection and storage. As such, it has often proven to be a suitable raw material from the production of fertiliser, energy and water (this last one mainly on board of the International Space Station). However, conventional technologies often struggle in dealing with urine alkalinity, high NH_3 and dissolved organic carbon concentration (i.e. 5 to 10 g.L-1) and high salinity (i.e. 4 to 9%). That is why, the strong chemical resistance, small footprint, tuneable selectivity and versatility in the operation of processes makes them an ideal technology to extract value from human urine. This presentation will cover four main research themes from the ARC Research Hub for Nutrients in a Circular Economy (ARC NiCE Hub) in terms of economic, commercial, environmental and societal benefits.

About the speaker

Professor Hokyong Shon is the Head of Discipline, Environmental & Water Engineering, the Director of ARC Research Hub for Nutrients in a Circular Economy at the School of Civil and Environmental Engineering at the University of Technology Sydney (UTS) in Australia, a member of College of Experts of Australian Research Council (ARC), and an Editor-in-Chief of the Desalination journal. His research interests include circular economy, sustainability, resource recovery, desalination and water treatment. He has co-authored 1 book, 25 book chapters, numerous publications with an h-index of 76, total citations of >20,150. Over the last 20 years, he has successfully attracted numerous projects. He received numerous awards including the recent Tony Fane's Award from the Membrane Society of Australasia. He is currently supervising 2 research fellows, 8 PhD students, and several engineering undergraduate students. Thirty PhD and four MSc students by research have successfully completed their degree under his supervision. His research students produce high quality research publications, complete their tasks on time, and numerous students have won prizes internationally and nationally.

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