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DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

Waste Conversion and Resource Recovery from Wastewater by Ion Exchange Membranes

by

Prof. Yang ZHANG

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Date: September 10, 2019 (Tuesday)

Time: 10:00 a.m. – 11:00 a.m.

Venue: Room 6-12B, Haking Wong Building, The University of Hong Kong

ABSTRACT

Traditional wastewater treatment focuses on removing of pollutants, while ignoring the recovery of potential resources. This leads to over consumption of energy and chemicals. It is reported that wastewater treatment plants consume more than 5% of global electricity. Furthermore, nutrients from wastewater are accumulated in sewage sludge, and disposal of the sludge results in dispersion of the nutrients into aquatic environment. A new concept focuses on recovering of resources. In this concept, wastewater is regarded as a renewable source to provide products or energy by resource recovery systems (RRS).

Water recovery becomes more important in water shortage locations, which focuses on the maximum recovery of water from wastewater with water loop closure (WLC) or zero liquid discharge (ZLD) concept. However, both WLC and ZLD require intensive energy input. Capturing energy from wastewater may significantly reduce the energy consumption for the above mentioned concepts.

This work reviews the recent development of ion exchange membranes on waste conversion and resource recovery with regard to the frame of reuse and recovery of water, resources and energy from wastewaters. Besides electro-dialytic processes, recent development of physical-chemical, electro-chemical, and biological processes, like Reverse Electrodialysis (RED), Microbial Fuel Cell (MFC), Microbial Electrolysis Cell (MEC), Microbial Electrosynthesis System (MES) etc., which utilize ion exchange membranes as a key component, will also be reviewed in this work. Last but not least, prospective on the development of ion exchange membranes used in waste conversion and resource recovery from wastewater will be discussed.

ABOUT THE SPEAKER

Prof. Dr. Yang ZHANG is a group leader at Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT), and an awardee of “100-Talent Program” of Chinese Academy of Sciences (CAS). His group “Waste Valorization and Water Reuse (WVWR)” focuses on organic waste, inorganic salts and wastewater valorization (energy and resource recovery) by developing microbial and physico-chemical processes. Dr Zhang has 15 years research experience on membrane processes (ultrafiltration, nanofiltration, electrodialysis etc.) and wastewater reuse, by serving in international companies and research institutes such as DOW Chemical, KU Leuven, Flemish Institute for Technological Research (VITO), University of Illinois at Urbana-Champaign (UIUC) and Chinese Academy of Sciences (CAS).

When Dr. Zhang was in VITO, he worked as task and work package leader in the area of water loop closure, bioprocessing and resource recovery (FP7 BioConSept, Flemish project Memprorec, FP7 E4-Water and FP7-Reapower). Now he is leading various projects in China on resource recovery and wastewater reuse. Dr. Zhang has published 30 peer-reviewed articles and book chapters, 2 European patents and 21 Chinese patents. He received “2018 Class of Influential Researcher” by Industrial & Engineering Chemistry Research, American Chemical Society.

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