11th World Congress and Expo on **Recycling**

June 13-14, 2019 | Edinburgh, Scotland

Recycling dredged sediment and potential energy harvest by nitrate induced biostimulation

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Marine and river sediments have been subject to urban, industrial, agricultural and various anthropogenic contaminations. High concentration of nutrients and pollutants are often found, resulting in sticky sediment. One of the common practices to deal with the sediment in Hong Kong is regular dredging and followed up either marine dumping or landfill disposal depending on the contamination level of the sediment. Recycling sediment is not a common way, not until recent years. In view of the possible marine contamination and scarcity of land for landfill, beneficial reuse of dredged sediment is encouraged as a sustainable alternative in Hong Kong. For feasible engineering applications, on-site application of sediment means the saving transportation and disposal costs.

In addition to dredging, in-situ remediation method has also been another way out. By stimulating the growth of denitrifying bacteria, the addition of nitrate has been found to suppress the odor from the sediment. By introducing a sediment microbial fuel cell technology into the remediation process, energy was harvested through continuous research studies.

In this seminar, the achievements and experiences of sediment remediation projects in Hong Kong will be shared. The remediation techniques and their corresponding environmental concerns will also be discussed. The case studies will unveil the latest development of sediment remediation technology in Hong Kong and provide insights for the next move of sustainable development.

Recent Publications

1. Jin, S., Guan, W., Tsang, C.W., Yan, D.Y.S., Chan, C.Y., Liang, C. (2017) "Enhanced Hydroconversion of Lignin-Derived Oxygen-Containing Compounds Over Bulk Nickel Catalysts Though Nb2O5 Modification" Catalysis Letters, 147 (8), 2215-2224.

2. Wu, B., Yan, D.Y.S., Khan, M., Zhang, Z., Lo, I.M.C. (2017) "Application of Magnetic Hydrogel for Anionic Pollutants Removal from Wastewater with Adsorbent Regeneration and Reuse" ASCE Journal of Hazardous and Toxic Waste, 21 (1), 04016008.

3. Dong, Y.H., An, K.J. Yan, D.Y.S., Yi, S. (2017) "Hong Kong's Greenhouse Gas Emissions from the Waste Sector and its Projected Changes by Integrated Waste Management Facilities." Journal of Cleaner Production, 149, 690–700.

4. Liu, T.Z., Zhang, Z., Mao, Y., Yan, D.Y.S. (2016) "Induced Metal Redistribution and Bioavailability Enhancement in Contaminated River Sediment during In-situ Bio-chemical Remediation" Environmental Science and Pollution Research, 23, 6352 – 6362.

5. Woon, K.S., Lo, I.M.C., Chiu, S.L.H., Yan, D.Y.S. (2016) "Environmental Life Cycle Assessment of Food Waste Valorization in Producing Biogas for Various Types of Energy Use" Waste Management, 55, 290 – 295.

Biography

Dickson Yan is the Program Leader of the Environmental Engineering and Management Program at Technological and Higher Education Institute of Hong Kong (THEi), a member institute of the Vocational Training Council (VTC) of Hong Kong. He is also the research manager of the Research Centre for Waste and Resource Management at THEi. Dr. Yan obtained his PhD in Environmental Engineering at the HKUST and is a certified carbon auditor professional. His research interests lie primarily in the areas of contaminated groundwater, soil and sediment remediation, beneficial reuse of waste material, hazardous waste management and energy recovery from waste. He has published more than 30 peer-refereed articles in leading journals and international proceedings in environmental engineering. .

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