

Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2021-102
Project Title:	Study of high purity oxygen aeration for biological polishing of chemical enhanced primary treated sewage effluent and cellulase production from sludge
Principal Investigator:	Dr Leu Shao Yuan Ben, Department of Civil and Environmental Engineering, The Hong Kong Polytechnic University
Total Approved Grant:	\$1,999,800
Duration:	1/11/2022 to 31/10/2025
Project Status/Remarks:	On-going
Project Scope:	Chemical enhanced primary treatment (CEPT) is a highly effective sewage treatment strategy applied in Hong Kong, but CEPT effluent still contains considerable amount of rapidly degradable organics which needs to be removed biologically. To tackle the critical oxygen transfer issue for potential upgrade of bioreactor at limited footprint, three types of next generation aeration systems will be investigated with high purity oxygen (HPO) for polishing the CEPT effluent. Oxygen transfer efficiencies (OTEs) of (i) a high-gravity rotating packed-bed; (ii) ultra-fine pore diffusers; and (iii) hollow fibre membrane aerator, will be investigated in lab-scale tanks under both standard methods and processing conditions using off-gas monitoring technique. The experimental results will be applied in a modified self-coded Activated Sludge Model III (ASM3) to clarify the relationship among important water quality indexes (i.e., oxygen demands, nutrients, salinity, and surfactants) and operational conditions (i.e., alpha-factor, air flow rate, and sludge retention time). In addition, HPO will be used to enhance the production of cellulase from CEPT sludge, which may be applied in the recovery of ferric and polymers after enzymatic hydrolysis of the biosolids.
Summary of the Findings/Outcomes:	To be available upon completion of the project