



# 2019「中技社科技獎學金」

2019 CTCI Foundation Science and Technology Scholarship

## 境外生研究獎學金

Research Scholarship for International Graduate Students



### APPLICATION OF INNOVATIVE MEMBRANE BIOREACTOR FOR WASTEWATER RECLAMATION AND REUSE AND NUTRIENT RECOVERY



National Taipei University of Technology  
Institute of Environmental Engineering and Management

Le Quang Huy (2<sup>nd</sup> year PhD. Student), Advisor: Prof. Shiao- Shing Chen

huy1q@dlu.edu.vn, f10919@ntut.edu.tw

Institute of Environmental Engineering and Management, National Taipei University of Technology

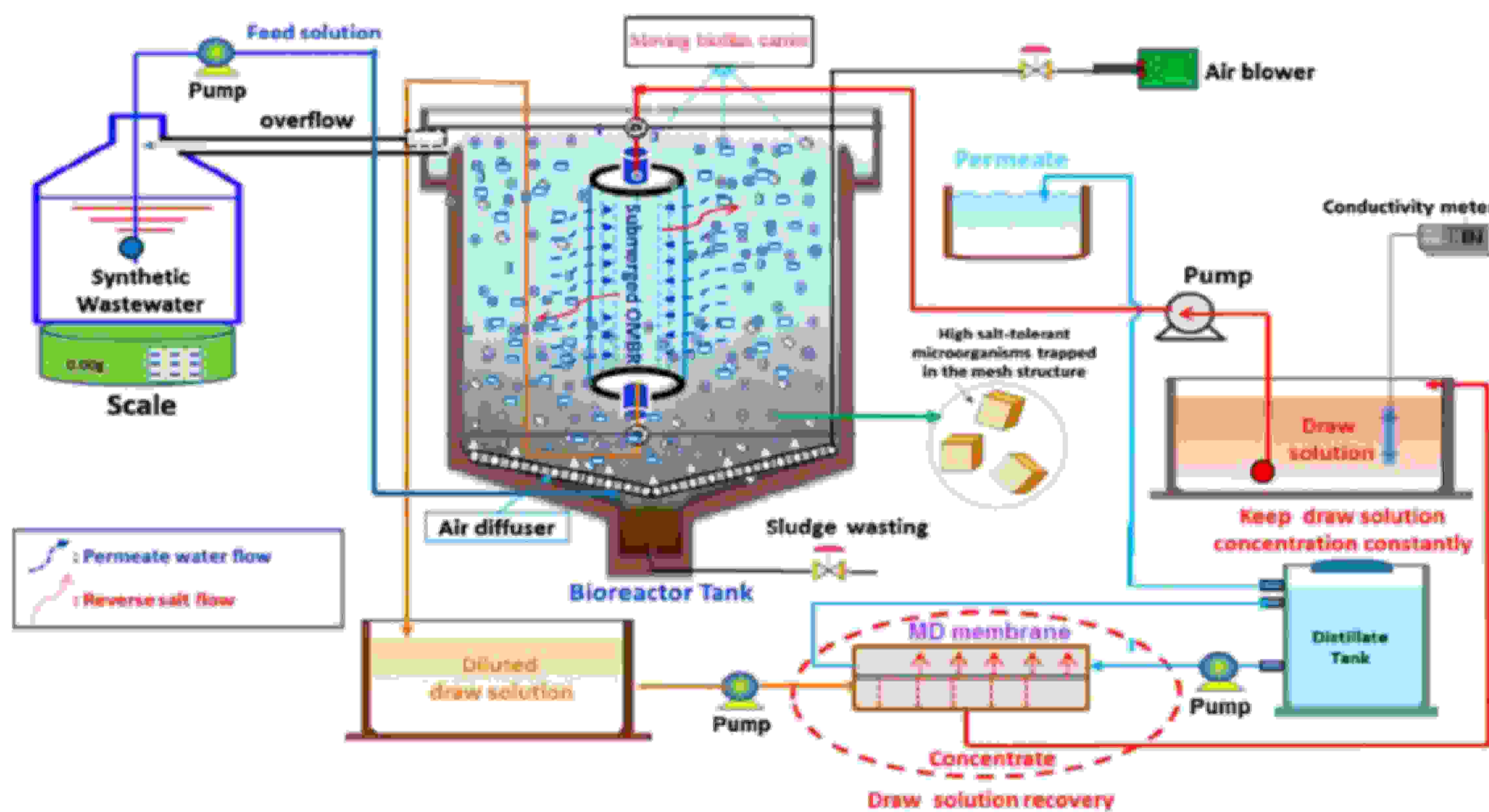
#### RESEARCH TOPIC

Wastewater reclamation and reuse is being increasingly emphasized as a core strategy for safeguarding against aquatic environmental deterioration. Among the proposed technologies, membrane bioreactor (MBR) has become one of the most effective options for improving water sustainability. However, conventional MBRs pose operational as well as research and development problems such as membrane fouling and limited nutrient removal capability. To overcome these problems, mitigating membrane fouling by antifouling-membranes fabrication or application of advanced high retention MBR, which integrate forward osmosis (FO) or membrane distillation (MD) and biological processes in a combined process known as an osmotic MBR (OsMBR) and MDBR are promising solutions.

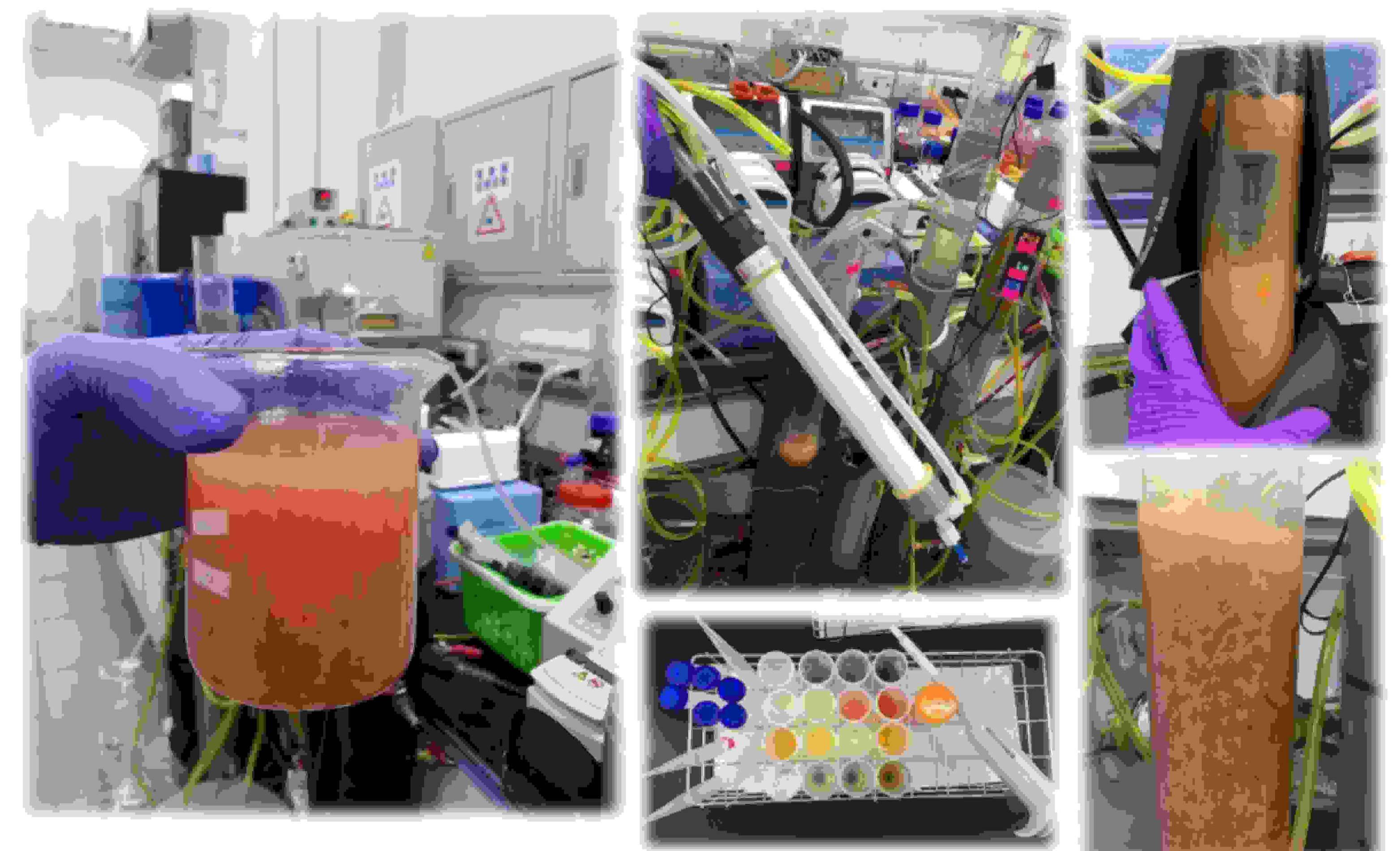
#### RESEARCH FORCUS

- Membrane surface modification or antifouling-membranes fabrication for mitigating membrane biofouling.
- Application of a novel Osmotic Membrane bioreactor (OsMBR) system for synthetic municipal wastewater treatment and nutrient recovery.
- Application of new draw solution for OsMBR and new technology for draw solute recovery.
- Application of a novel thermophilic aerobic submerged membrane distillation bioreactor (ThAeSMDBR) system for synthetic municipal wastewater treatment and nutrient recovery.

#### RESEARCH RESULTS

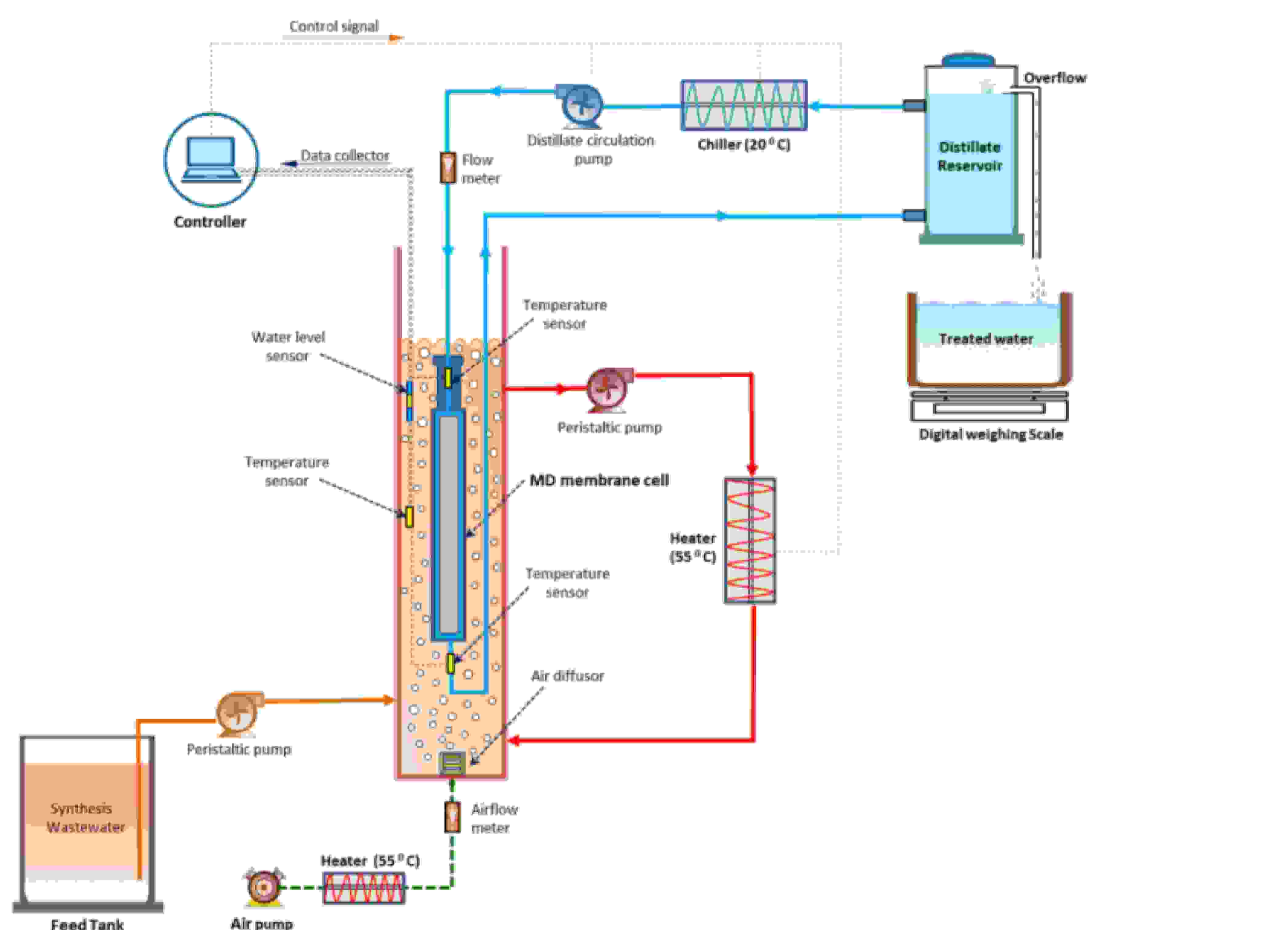


An integrated moving sponge biocarrier-osmotic membrane bioreactor MD system for saline wastewater treatment using highly salt-tolerant microorganisms

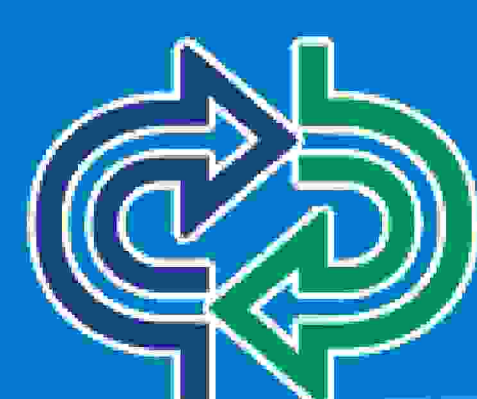


#### SELECTED JOURNAL PUBLICATIONS

- N.C. Nguyen, S.-S. Chen, H.T. Nguyen, Y.-H. Chen, H.H. Ngo, W. Guo, S.S. Ray, H.-M. Chang, Q.H. Le, Applicability of an integrated moving sponge biocarrier-osmotic membrane bioreactor MD system for saline wastewater treatment using highly salt-tolerant microorganisms, *Separation and Purification Technology*, 198 (2018) 93-99. (<http://doi.org/10.1016/j.seppur.2017.01.011>)
- H.Q. Le, A. Sowe, S.-S. Chen, C.C. Duong, S.S. Ray, T.N.-D. Cao, N.C. Nguyen, Exploring Nanosilver-Coated Hollow Fiber Microfiltration to Mitigate Biofouling for High Loading Membrane Bioreactor, *Molecules*, 24 (2019) 2345 (DOI: 10.3390/molecules24122345)
- Le, Huy Quang, Thi Xuan Quynh Nguyen, Shiao-Shing Chen, Chinh Cong Duong, Thanh Ngoc-Dan Cao, Hau-Ming Chang, Saikat Sinha Ray, and Nguyen Cong Nguyen. "Application of progressive freezing on forward osmosis draw solute recovery." *Environmental Science and Pollution Research* (2019): 1-11. (DOI : 10.1007/s11356-019-06079-w)



A novel Hyperthermophilic Aerobic Submerged Membrane Distillation Bioreactor for High-strength Wastewater Treatment with a Tube-shaped Membrane Module



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