ARC Linkage Project – LP100100056
Optimisation of Nutrient Removal, Membrane Fouling and Sludge Dewatering in Hybrid Coagulation/Submerged Membrane Bioreactor of Wastewaters

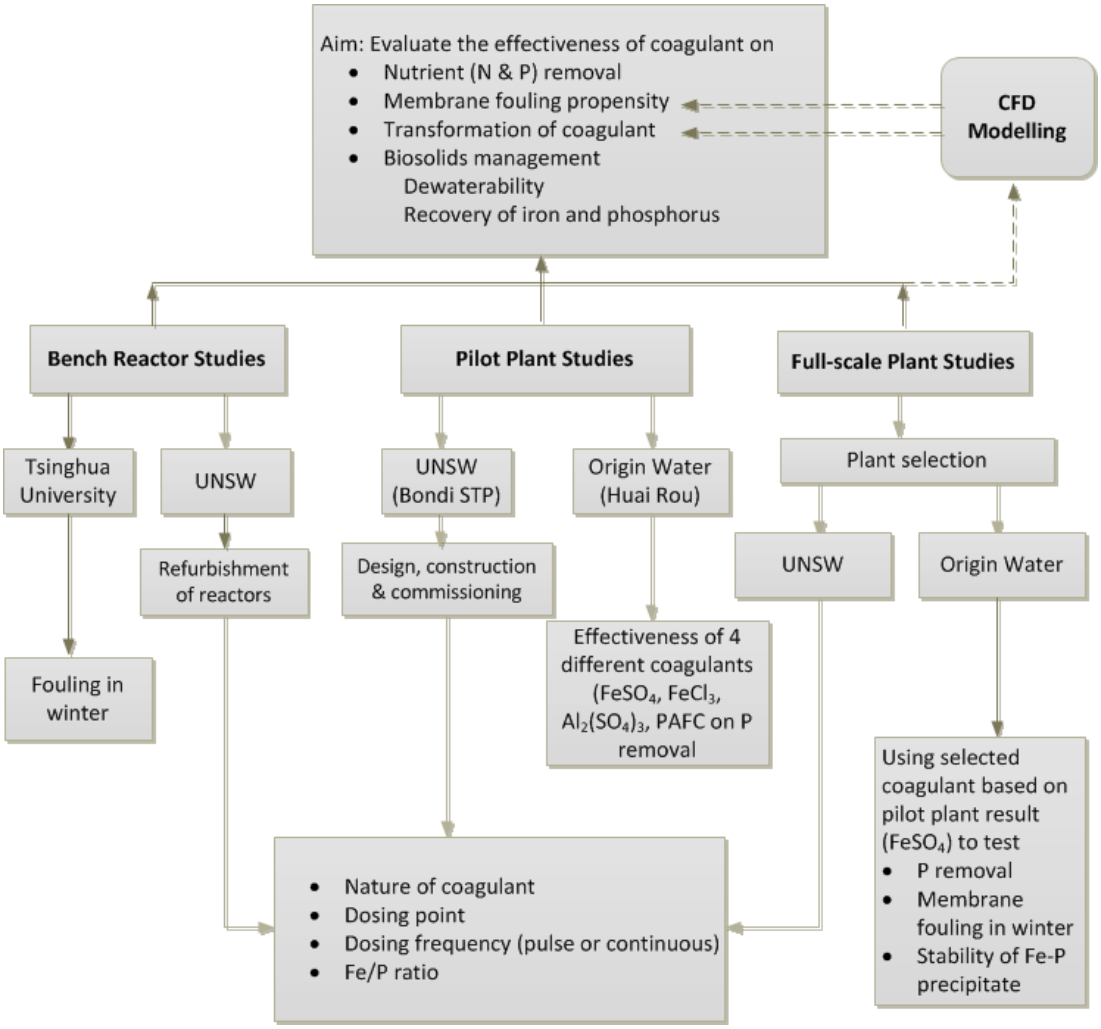
In this issue, you will find an overview on the project activities and research resources

PROJECT OVERVIEW

Iron salts, either in the form of ferric (FeIII) or ferrous (FeII), are used widely in Australian wastewater treatment plants for 1) odour control; and 2) P removal to reach target value (<0.03 mg/L). However, the high $FeCl_3$ addition is toxic to nitrifiers which may affect N removal and may also increase membrane fouling propensity.

The project involves testing different coagulant addition regimes at laboratory, pilot and full scale MBRs using synthetic and real wastewaters with emphasis on:

- The nature of the coagulant, i.e. Fe(II) vs. Fe(III) salts, monomeric vs. polymeric Fe(III) salts
- Dosing point (anoxic, aerobic or filtration zone)
- Dosing frequency (continuous vs. pulsed)



Schematic representation of project plan

The Australian Research Council (ARC) has awarded a linkage grant for this project, which is undertaken with the collaboration of Sydney Water; Water Quality Research Australia(WQRA); Beijing Origin Water Technology; and Tsinghua University in China.

This project commenced in July 2010 and will run for 3 years. In addition to the ARC research funding, Sydney Water, WQRA and Beijing Origin Water also contribute cash and in-kind to the project.

ORGANISATIONS

THE UNIVERSITY OF NEW SOUTH WALES

SYDNEY · AUSTRALIA water@UNSW water research centre

Centre for Membrane Science and Technology

Industry Partners

WQRA water quality research australia

Sydney WATER

OriginWater 碧水源科技

University Partner

TSINGHUA UNIVERSITY 1911

Contact Details

UNSW
Prof. David Waite
d.waite@unsw.edu.au

A/Prof. Greg Leslie
g.leslie@unsw.edu.au

Dr. Yuan Wang
yuan.wang@unsw.edu.au

Tsinghua University
Prof. Xianghua Wen
xhwen@tsinghua.edu.cn

Industry representatives:

WQRA
Dr David Halliwell
David.halliwell@wqra.com.au

Sydney Water
Dr Heri Bustamante
Heri.Bustamante@sydneywater.com.au

Beijing Origin Water
Dr Jing Guan
bsy_guanjing@126.com

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EXPECTED OUTCOMES

- Methodology to efficiently dose coagulants and protocols to operate MBR to:
    1. Maximise P removal while minimise negative impact on N removal
    2. Extend operation time before need for membrane cleaning
    3. Provide better dewaterability
- Identifying the mechanism for P removal (the form of Fe-P complexes in various compartments of MBR)
- Development of Computational Fluid Dynamics (CFD) tools that will assist in optimisation of MBR design and operation

BENCH and PILOT SCALE STUDIES

Three bench scale MBRs are operating at UNSW (picture left) and a pilot plant is operating at Sydney Water's Bondi STP (picture right). More details about bench and pilot scale studies can be found in Fact Sheet No.2.

Bench scale MBRs at UNSW

Pilot scale MBR at Bondi STP

PROJECT PERSONNEL

Chief investigators

- Scientia Professor T. David Waite, Head of School, Civil & Environmental Engineering, The University of New South Wales (UNSW)
- Associate Professor Greg L. Leslie, Deputy director, UNESCO Centre for Membrane Science & Technology, School of Chemical Engineering, UNSW

Partner investigators

- Dr Heri Bustamante, Project manager, Science & Technology, Sydney Water
- Dr Jing Guan, Deputy director, Research & Development, Beijing Origin Water
- Prof. Xianghua Wen, Department of Environmental Science & Engineering, Tsinghua Uni.
- Prof. Xia Huang, Department of Environmental Science & Engineering, Tsinghua Uni.

Researchers

- Research Fellow: Dr Yuan Wang, Water Research Centre, School of Civil & Environmental Engineering, The University of New South Wales
- APAI funded PhD students: Ms Sophie (Xuefei) Liu and Mr Zhenghua Zhang
- UNSW funded PhD students: Mr Yongjia Xin, Mr Pradeep Maheshwari, Mr Hao Wu
- Research assistant: Mr Han Tng

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UNSW
Prof. David Waite
d.waite@unsw.edu.au

A/Prof. Greg Leslie
g.leslie@unsw.edu.au

Dr. Yuan Wang
yuan.wang@unsw.edu.au

Tsinghua University
Prof. Xianghua Wen
xhwen@tsinghua.edu.cn

Industry representatives:

WQRA
Dr David Halliwell
David.halliwell@wqra.com.au

Sydney Water
Dr Heri Bustamante
Heri.Bustamante@sydneywater.com.au

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Dr Jing Guan
bsy_guanjing@126.com