



Advanced Nitrogen Removal Research Collaboration Opportunity

Background

Biological Nitrogen Removal (BNR) is an important part of wastewater treatment and consists of two separate biological processes, nitrification and denitrification. The mutually exclusive environments conducive to the bacteria that drive these respective processes have resulted in existing wastewater treatment processes with detrimental performance issues. For example, they provide either suboptimal (ie compromise) conditions for both bacteria to exist in the same biomass, resulting in wastage of oxygen and carbon sources and attrition of the bacterial communities, or in separated biomass systems they suffer from problems with pH drift, holding tank requirements and ammonia retention, typically requiring solutions with a significant cost.

Competitive Advantage

The Advanced Nitrogen Removal technology developed at Murdoch University is a separated biomass system that has demonstrated up to 94% removal of N (not merely NH_3 or NO_3^-) and up to 96% COD (Chemical Oxygen Demand) removal in a lab-scale batch process on synthetic wastewater, providing treatment superior to a mixed biomass system. However this technology is also superior to alternative separated biomass systems as it obviates costly industry standard solutions to pH drift etc and is potentially cheaper in construction costs as holding tank requirements are potentially reduced.

Field of use

The technology would be suitable for a range of sources of wastewater, such as

- small scale domestic applications,
- cluster housing,
- grey, black and stormwater
- mining effluent
- agricultural effluent
- chemical and manufacturing processes

It is also suitable for returning to the natural environment ie aquifer recharge applications.

Advantages

- Increased N removal (94% compared to industry standard 80%)
- pH stabilisation
- improved oxygen use efficiency
- ammonia retention eliminated
- reduced loss of organic carbon, allowing the treatment of waste water with low levels of carbon that previously was considered unable to be treated by bacterial methods
- N_2O byproduct (a greenhouse gas) is minimised.
- Potential to remove phosphate and sulphur
- Potentially reduced costs including energy costs.

The Opportunity

To date this novel process has been undertaken on a lab-scale batch process on synthetic wastewater. The next stage of development is to prove the technology on a larger scale plant. We are seeking an industry partner for a collaborative research and potentially commercialisation project to demonstrate the technology in actual conditions including the construction and engineering of a pilot plant and quantification of Opex and Capex. The process also has the potential to be developed into a continuous process, eliminating the requirement for storage tanks.

IP Status

An Australian Provisional Patent application has been filed with a priority date of 4 January 2008.

Research Team/Track Record

The Advanced Nitrogen Removal Technology was jointly developed by Leonie Hughes (PhD candidate) and her supervisor Dr Ralf Cord-Ruwisch at Murdoch University. Ms Hughes has submitted her thesis for examination on this topic and has already published several articles in the wastewater treatment area, including a poster presentation at the Biofilm Technologies Conference in Singapore in January 2008. Ms Hughes is currently a lecturer and early career researcher with Murdoch University. Dr Cord-Ruwisch is a senior researcher and lecturer with Murdoch University, with current research interests in Industrial Microbiology and Environmental Biotechnology. With over 20 years of research experience, Dr Cord-Ruwisch is a named inventor on several pending patents and is well published in his field. Dr Cord-Ruwisch was also instrumental in setting up the Centre of Excellence for Organic Waste Management (COWM) at Murdoch University in 2000 and under his direction as Director from 2006, it has developed from simple waste management to an environmental biotechnology and bioprocessing centre, with a high-tech laboratory and expertise capable of providing services to industry, CRC and Government.

Contact Details

Sam Dymond
Commercialisation Manager

Email: s.dymond@murdoch.edu.au
Telephone: +61 8 9360 7481

DISCOVERERS WELCOME

www.murdoch.edu.au