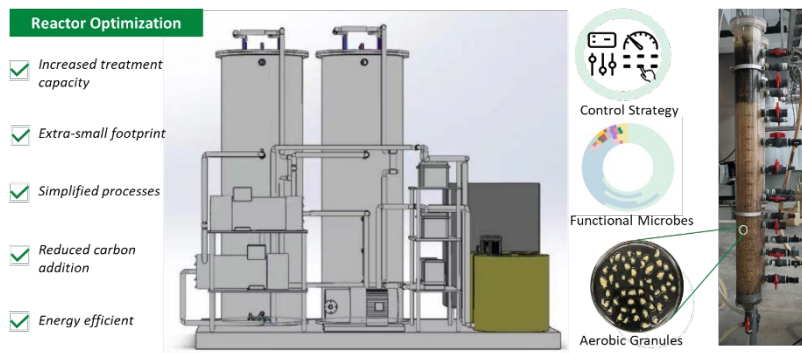


A Cost-Effective Sustainable Wastewater Treatment Technology for Ammonia-Rich Sludge Thickening Lagoon Supernatant Treatment

Energy efficient and reliable high-ammonia wastewater treatment processes are needed to reduce nitrogen loading in wastewater discharge for protected natural water systems. The University of Alberta is collaborating with The City of Calgary to develop cost-effective and energy efficient processes and control strategies for ammonia-rich sludge liquor treatment. Pilot-scale granular sludge reactor (GSR) will be operated and optimized for enhanced ammonia reduction and reduced energy consumption. The team will employ biochemical and molecular tools to advance the knowledge of physicochemical and biological properties and activities of the microbial granular sludge under various operation and control conditions.



RECIPIENT:
University of
Alberta



PARTNERS:
City of Calgary,
ACWA, NSERC



TOTAL BUDGET:
\$1,204,000



AI FUNDING:
\$300,000



PROJECT DATES:
SEP 2021 –
AUG 2024



PROJECT TRL:
Start: 4
End: 7

APPLICATION

The technology developed in this project features stable and robust ammonia reduction under shock loading conditions, thus can be applied for cost-effective ammonia reduction from wastewater of a wide range of ammonia concentrations and presents a high potential for the treatment of different types of wastewater from municipalities and industries. Further, the reduced energy consumption and GHG emission of the developed technology present a good alternative for wastewater treatment plants seeking to reduce their environmental impact.



ALBERTA INNOVATES CLEAN RESOURCES

ENVIRONMENTAL INNOVATION

WATER INNOVATION

PROJECT GOALS

- Supporting the development of energy-efficient and robust technology for ammonia removal
- Developing novel treatment processes for side-stream high ammonia lagoon supernatant / centrate
- Demonstrating GSR-based nitrification/denitrification and nitrification/anammox processes for high ammonia wastewater nitrogen removal
- Establishing suitable and real-time control strategies for improved process stability, enhanced treatment efficiency and reduced costs
- Advancing knowledge of the physicochemical and biological properties and activities of the microbial granular sludge under various operation and control conditions
- Training highly qualified personnel comfortable of designing and operating novel nutrient reduction reactors

BENEFITS TO ALBERTA

- Solutions to economically upgrade existing wastewater treatment processes as regulations on effluent quality become more stringent
- Knowledge sharing and technology transfer in wastewater treatment plants with similar needs in Canada and globally
- Reduction in energy consumption and GHG emission
- Training of highly skilled personnel with expertise on the operation of GSR to assist wastewater treatment industries to transition to more sustainable wastewater treatment processes
- Continue partnership between The City of Calgary, ACWA and the research group at the University of Alberta to further develop energy efficient and environmentally sustainable wastewater treatment processes



4 Publications



4 Students
Trained

CURRENT STATUS

OCT 2022

Significant progress has been made. Cost-effective operational and control strategies have been developed and verified using laboratory-scale reactors for high-rate ammonia removal from side-stream ammonia-rich wastewater. Additional semi-pilot-scale reactors have been operated to evaluate reactor startup strategies. These findings will ensure a fast and smooth startup for the pilot-scale reactor and help reduce operational risks.