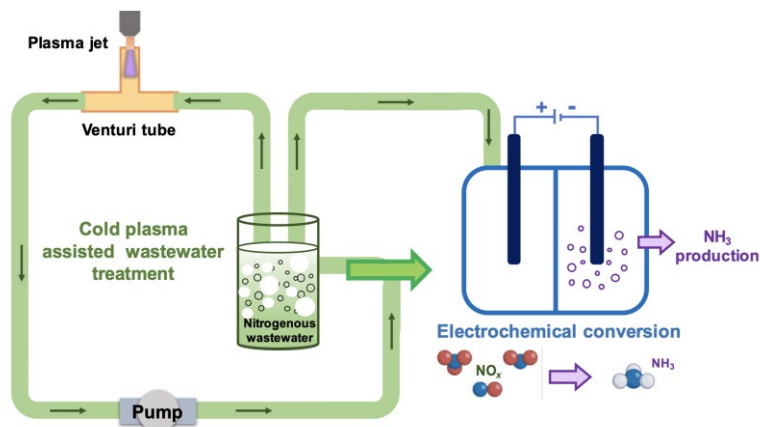


Microbubble-Enhanced Cold Plasma Nitrogen Fixation as Sustainable Hydrogen Carrier

Ammonia is emerging as a promising hydrogen carrier for clean energy applications due to its high hydrogen content and ease of transport and storage. This project aims to revolutionize ammonia synthesis by utilizing cold plasma activation and electrocatalysis. The new technology is a green and ecofriendly approach for green ammonia synthesis with low energy consumption. The approach can eliminate the need for hydrogen feedstock in ammonia synthesis and produce ammonia on demand in decentralized facilities. The successful implementation of cold plasma technology for ammonia synthesis may have the potential to revolutionize the production of this vital chemical.

The goal of the project is to develop a cutting-edge cold plasma technology for on-site production of green ammonia. Integrated with electrocatalysis, this revolutionary approach harnesses the power of cold plasma for nitrogen fixation, producing green ammonia from water, air and electricity.



RECIPIENT:
University of Alberta



PARTNERS:
NSERC



TOTAL BUDGET:
\$651,400



AI HCOE FUNDING:
\$423,400



PROJECT DATES:
FEB 2024 –
JAN 2026



PROJECT TRL:
Start: 3
End: 6

APPLICATION

The cold plasma technology enables decentralizing ammonia synthesis in conversion of nitrogen in air to hydrogen carrier. The clean technology to be developed in this project may position Alberta as a leader in sustainable ammonia and hydrogen production, attracting investments and creating job opportunities.



CLEAN RESOURCES

CLEAN TECHNOLOGY

HYDROGEN CENTRE OF EXCELLENCE

PROJECT GOALS

- The anticipated outcomes include knowledge generation from understanding of the mechanisms of the cold plasma – driven nitrogen fixation and nitrate reduction by electrocatalysis, and analysis of energy yield, production rate, scalability, feasibility and environmental impact of plasma-driven ammonia synthesis,
- Small-scale standalone, cold plasma devices may enable localized production of ammonia.
- The outcomes of the project will promote clean and sustainable ammonia production and produce ammonia on demand in decentralized facilities.

BENEFITS TO ALBERTA

- The green ammonia synthesis can be a pathway for Alberta to become a leader in sustainable ammonia and hydrogen production.
- One of the primary environmental benefits of cold plasma synthesis is the potential for reduced greenhouse gas (GHG) emission.
- Talent attraction, training of highly qualified personnel and communication of the findings.
- Economic benefits will be generated through job creation, increased investments, and market expansion.
- The manufacturing, distribution, and maintenance of these devices could create job opportunities.



5 Publications



3 Students Trained



1 Patent



2 Project Jobs



2 Future Jobs



2 New Products/Services



5 kt/yr Project GHGs Reduced



2,500 kt/yr Future GHGs Reduced

CURRENT STATUS

MAY 2024

The project has recently kicked off. The first milestone will be completed in April 2024.