

**TECH OFFER**

**Water Treatment and Resource Recovery using Electrocatalytic System**



**KEY INFORMATION**

TECHNOLOGY CATEGORY:

Environment, Clean Air & Water - Biological & Chemical Treatment

Waste Management & Recycling - Food & Agriculture Waste Management

Waste Management & Recycling - Industrial Waste Management

TECHNOLOGY READINESS LEVEL (TRL): **TRL7**

COUNTRY: **HONG KONG**

ID NUMBER: **TO174921**

**OVERVIEW**

Excessive use of nitrogen-based fertilizers leads to nutrient runoff into water bodies, which can severely harm aquatic ecosystems and cause eutrophication. Therefore, it is important to treat wastewater containing these nutrients.

This technology takes an innovative step by not only removing nitrogen from wastewater but also recovering it and converting it into ammonia, the key ingredient in fertilizers.

Using electrocatalysis technology and cost-effective non-precious metal catalysts, nitrogen is recovered from municipal and industrial wastewater. The technology is suitable for businesses with space constraints, as it comes in a decentralized and

scalable device.

The technology provider is looking for partners to test-bed the technology, including but not limited to owners of green roofs, urban farms, greenhouses, and household planting sites, as well as wholesalers and retailers of plants.

## TECHNOLOGY FEATURES & SPECIFICATIONS

A new flow-based electrocatalytic technology has been developed to remove, treat, and upcycle aqueous nitrates and nitrites ( $\text{NO}_x$ ) from agricultural and municipal waste streams. The technology **uses non-precious metal complexes and nanoparticles to reduce  $\text{NO}_x$  to  $\text{NH}_4^+$  under electrocatalytic conditions in a flow device**, achieving **efficient conversion of unwanted  $\text{NO}_x$  into ammonia ( $\text{NH}_4^+$ )**.

The technology works best in wastewater with nitrogenous compounds of 2000 ppm. The removal efficiency of nitrogen is 62.4% and the ammonia selectivity is near 100%. The technology has been proven to handle wastewater flows of  $10 \text{ m}^3/\text{day}$ . No NPK formulation is required prior to the use of fertilizers in the farms.

The development of this technology has the potential to significantly reduce the environmental impact of wastewater treatment, while also providing a valuable source of ammonia for fertilizer production.

## POTENTIAL APPLICATIONS

The system is a decentralized product, meaning it can be applied to agricultural sites of any scale and type. This includes farms, lawns, rooftop gardens, balconies, and more. Ideal initial test bedding sites are corporate green roofs or hydroponic systems, as the water flow infrastructure in these settings is most convenient for implementing our system.

## UNIQUE VALUE PROPOSITION

The technology can close the artificial nitrogen cycle by recovering nitrogen from wastewater and producing ammonia. The decentralized system is only  $1 \text{ m}^2$  in size and is scalable, meaning it can be easily expanded to meet the needs of larger applications.