

SUCCESS STORY

EC Flow System

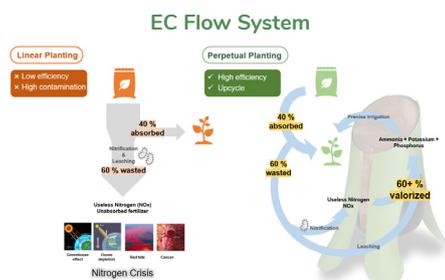
By removing toxins from wastewater, a newly invented on-site fertilizer system benefits human health, marine ecosystems, water quality and greenhouse gas emissions, as well as offering cost savings and enabling improvements to urban municipal discharge processes.



EC Innovation Limited



Keeping agricultural land free from toxins is important for protecting human health and for avoiding environmental degradation that can affect plant health. Toxins such as nitrogen oxides (NO_x), for example, are mainly emitted during the burning of fossil fuels. When they make their way into the ecosystem, they can cause impaired lung function, breathing difficulties and eye irritations, among other problems. In agricultural land, nitrates and nitrites (NO_x^-) can lead to acidification of soil and surface water, which reduces the nutrition available to plants and damages vegetation. The toxins also contribute to ozone depletion and add to the greenhouse warming effect.

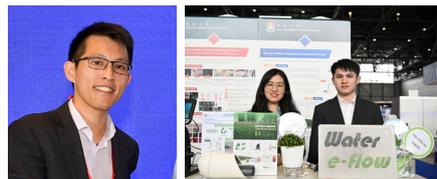


Green cleaning

Removing these toxins is now possible thanks to a newly developed energy-neutral system. The EC Flow System offers important ecological, quality and cost benefits. The system is able to detect

and remove a range of toxic residual nitrates and nitrites from soil. At the same time, the system separates clean water from agricultural waste water, resulting in a saving of water resources.

In the convertor, NO_x^- is converted into NH_4^+ through electrocatalysis. This process allows agricultural wastewater to be converted into a nitrogen-rich water solution that can be used for irrigation and fertilization. Two tanks collect clean water and fertilizer-rich water.



Dr. Edmund Tse (left to right) Wanying Wang and Jackson Yip

Research Team

The invention was created by Dr Edmund Tse and Wanying Wang of the Department of Chemistry at the University of Hong Kong, and was commercialised with the assistance of Yip Jackson Ho So.

The goal of the invention was to lower toxin levels in municipal waste and reduce the ecological burden of urban sewage systems by improving urban municipal discharge practices and the local marine environment.

The invention was commercialised by EC Innovation Limited, whose mission is "to remove waste that is harmful to the

environment and utilize cost-effective non-precious metal catalysts to transform waste into reusable goods [...]"

Counting the benefits

This upcycling directly contributes to a reduction in greenhouse gas emissions, improvement in water quality, recovery of marine eco systems and reductions in fertilizing costs.

Using the EC Flow System results in a 40 percent reduction in nitrogen emissions from agricultural wastewater, a 50 percent reduction in carbon emissions resulting from fertilizer production and transportation, and a 40 percent reduction in the cost of fertilizing for customers.

An Energy-neutral solution

As well as offering extensive environmental benefits, the system operates using renewable energy and is fully compatible with solar panels and battery storage systems.

TTO supported the team by assisting with IP filing and applications; lining up potential partners to commercialise the invention; arranging for the company to take part in global and local exhibitions, including the Geneva International Inventions Exhibition in April 2023 and the 2023 editions of InnoCarnival and TechExpo. The TTO also assisted with funding support through the TSSSU@HKU 2023/24 award scheme.

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