Tufts University Filtering Technology Leads To Cleaner Water, Fewer Clogs

Tufts University

Boston-area startup ZwitterCo, Inc., has scaled up and commercialized a revolutionary water and wastewater treatment membrane developed at Tufts University's Department of Chemical and Biological Engineering. The company's name refers to zwitterions, unique molecules harnessed by researchers to reduce the risk that wastewater filtration membranes will become clogged by contaminants like fats, oils and proteins.

Food production and processing, industrial businesses, and bioprocessing produce billions of gallons of wastewater daily. Most companies invest resources to haul wastewater away to be treated or dumped into sewers or rivers. ZwitterCo's membrane-based treatment, which has been commercially available for more than a year, cleans polluted water so that it can be reused or can create revenue streams for wastewater-derived co-products.

A key component of effective water filtration is the use of membranes with tiny channels that allow water to pass through but keep out most pollutants. With traditional processes, however, the materials that are filtered out will build up on the surface of the membrane, reducing its effectiveness and durability.

Ayse Asatekin, Associate Professor of Chemical and Biological Engineering at Tufts, addressed this problem using zwitterions—molecules with negatively and positively charged components that keep membrane channels clear for continued water flow while resisting the build-up of organic compounds.

Tufts alum Alex Rappaport, ZwitterCo's co-founder and CEO, came across Asatekin's research on zwitterionic filtration membranes while earning a Master of Science in Innovation and Management (MSIM) at the university. After earning first place in the Tufts $100K New Ventures Competition in 2018, ZwitterCo raised more than a million dollars, much of it from a network of Tufts angel investors.

The Tufts office for Technology Transfer and Industry Collaboration (TTIC) signed an exclusive license with ZwitterCo for the technology in 2019. TTIC originally licensed four patent families to ZwitterCo, and the TTIC staff have continued to support the company's endeavors.

"Our technology was initially developed at Tufts, and we appreciate the relationship and support we get from Tufts," Rappaport said. "We are looking forward to continuing our collaboration as ZwitterCo grows."

Through nondilutive grants from the Massachusetts Clean Energy Center, the National Science Foundation and the US Department of Energy, and in close collaboration with Asatekin's lab, ZwitterCo has built a suite of zwitterion-based membrane products that solve the toughest water and wastewater treatment challenges. In the past three years the company has progressed from pilot projects to testing the filtration membranes in real-world conditions to capturing more than 20 commercial orders. ZwitterCo has moved from the Greentown Labs incubator in Somerville, MA, to a larger facility in Woburn, MA.

To date, the company has licensed twelve Tufts University patent families. In 2022, ZwitterCo raised $33 million, one of the largest Series A funding rounds for a water technology company.

This story was originally published in 2023.

To see available technologies from research institutions, click here to visit the AUTM Innovation Marketplace.