

## TECH OFFER

### Durable Filtration Membranes and Systems for Challenging Wastewater



#### KEY INFORMATION

TECHNOLOGY CATEGORY:

Environment, Clean Air & Water - Filter Membrane & Absorption Material

TECHNOLOGY READINESS LEVEL (TRL): **TRL6**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO175394**

#### OVERVIEW

Industrial wastewater treatment faces persistent hurdles, especially in oil and gas, petrochemical, metal finishing, and food processing industries. Conventional membranes suffer from rapid fouling when exposed to high oil and grease loads, degrade under extreme chemical cleaning, and struggle to maintain flux recovery. This often results in frequent downtime, costly replacements, and an inability to consistently meet discharge compliance.

The technology is a next-generation ultrafiltration (UF) membrane engineered for highly aggressive industrial environments. Built from military-grade, chemical-resistant polymers, the hollow fiber design achieves high flux with low fouling, even under extreme conditions such as pH 1–14, temperatures up to 80 °C, high salinity, and oily streams containing up to 5% oil.

Unlike conventional polymer membranes, this solution maintains long-term performance through repeated high-caustic (pH 14+) and chlorine (10,000+ ppm) cleanings. It consistently delivers over 95% flux recovery after aggressive NaOH and NaOCl cleaning, preventing irreversible fouling and reducing replacement frequency. Optimized porosity and geometry allow the membranes to

handle heavy oil loads while validated cleaning protocols ensure rapid regeneration and stable long-term operation. The proprietary polymer chemistry and crosslinking techniques that form the basis of the membrane provide a competitive edge and ensure consistent performance.

The technology owner seeks collaboration with Institutes of Higher Learning, large industrial players with ongoing water reuse, wastewater, or zero-liquid-discharge initiatives, and engineering, and construction firms with opportunities for R&D collaboration, test-bedding, and licensing.

## TECHNOLOGY FEATURES & SPECIFICATIONS

The ultrafiltration membranes are engineered for superior performance in chemically aggressive and high-fouling industrial environments. Constructed from military-grade, chemically inert polymers, the membranes withstand extreme cleaning cycles and deliver long-term operational stability.

- **Chemical Resistance:** Compatible with pH ranges from 1 to 14, including exposure to high-concentration cleaning agents such as NaOH (caustic soda) and NaOCl (sodium hypochlorite) at levels exceeding 10,000 ppm chlorine.
- **Flux Recovery:** Regular chemical cleaning restores more than 95% of original flux, ensuring sustained throughput and reduced downtime.
- **Oil Handling Capacity:** Effectively processes feed streams with up to 5% oil content without pore blinding or irreversible fouling.
- **Thermal Tolerance:** Operates reliably at temperatures up to 80°C, making it suitable for high-temperature effluents.
- **Salinity Resistance:** Designed to handle high total dissolved solids (TDS) in brines, leachates, and process waters.

## POTENTIAL APPLICATIONS

- **Energy and Petrochemicals:** Refinery effluent treatment and reuse, oil and gas produced water management.
- **Heavy Industry:** Metal finishing, electroplating wastewater recovery, and chemical recovery/concentration processes.
- **High-Salinity Waste Streams:** Landfill leachate treatment and high-TDS brine management for water reuse.
- **Food and Agriculture:** Wastewater from food and rendering (blood, fats, oils) and vegetable oil separation/recovery.

## UNIQUE VALUE PROPOSITION

- Built for extreme wastewater conditions: high oil, salinity, and chemical loads
- Cuts operating costs with longer membrane life and optimized cleaning
- Boosts plant efficiency and reliability
- Offered as standalone membranes or complete systems