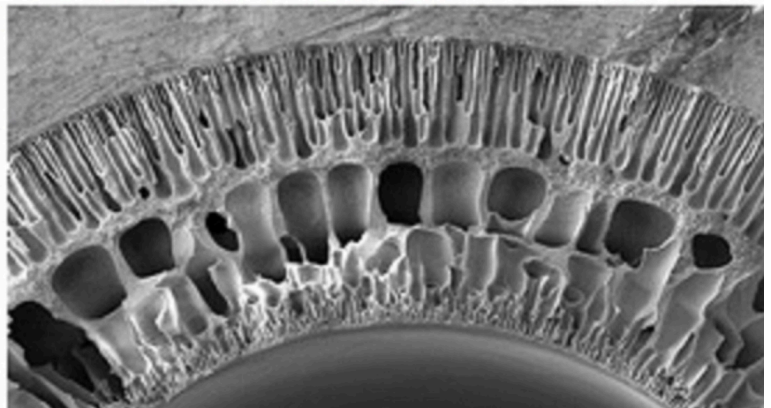


TECH OFFER

## Bipolar Nanoporous Compact Filter for Charged Particles Removal



### KEY INFORMATION

TECHNOLOGY CATEGORY:

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

TECHNOLOGY READINESS LEVEL (TRL): **TRL5**

COUNTRY: **SINGAPORE**

ID NUMBER: **TO174917**

### OVERVIEW

Heavy metal pollution is a significant environmental issue with detrimental health effects even at low concentrations. The bipolar nanoporous membrane features a triple-layer structure, comprising a **membrane base layer**, a **selective layer**, and a **protective layer**.

This technology relates to a compact, bipolar nanoporous membrane that effectively removes dissolved heavy metal ions from industrial wastewater and drinking water. This configuration allows the membrane to efficiently adsorb and reject charged pollutants and heavy metal ions while minimizing fouling through its antifouling properties.

To implement this technology, a portable water filtration bottle has been specifically designed, fabricated, and evaluated. The filtration bottle incorporates a single-stage bipolar nanoporous membrane module, serving as a reusable filter. The technology demonstrates rejection rates (>95%) for divalent and trivalent heavy metal ions such as Arsenic (As), Copper ( $\text{Cu}^{2+}$ ), Cadmium ( $\text{Cd}^{2+}$ ), Lead ( $\text{Pb}^{2+}$ ), and Chromium ( $\text{Cr}^{3+}$ ) at concentrations ranging from 20 ppm to 100 ppm.

The compact and low-pressure nature of this technology makes it highly versatile and suitable for various applications. It offers a convenient and reusable filtration solution for industrial wastewater treatment and the purification of drinking water. By effectively addressing the challenge of heavy metal pollution, this technology contributes to environmental protection and safeguarding human health.

Overall, this advanced water filtration solution combines the advantages of a bipolar nanoporous membrane and a portable filtration system. Its exceptional rejection capabilities, energy efficiency, and versatility make it a promising tool in mitigating heavy metal contamination and ensuring access to clean and safe water.

The technology provider is looking for interested parties from the water industry to license or acquire this technology.

## TECHNOLOGY FEATURES & SPECIFICATIONS

The developed technology for the removal of dissolved heavy metal ions using a compact, bipolar nanoporous membrane offers the following key features and specifications:

- **Triple Layer Configuration:** The bipolar nanoporous membrane utilizes a triple layer structure, comprising a membrane base layer, a selective layer, and a protective layer. This configuration enables efficient adsorption and rejection of charged pollutants and heavy metal ions while minimizing fouling.
- **High Rejection Rates:** The technology demonstrates high rejection rates (>95%) for divalent and trivalent heavy metal ions, including Arsenic, Copper, Cadmium, Lead, and Chromium. It effectively removes these contaminants from wastewater and drinking water sources.
- **Low-Pressure Operation:** The portable filtration system operates at a low working pressure of less than 1.5 bar, making it energy-efficient and suitable for various applications.
- **Wide Concentration Range:** The technology can effectively remove heavy metal ions at concentrations ranging from 20 ppm to 100 ppm, providing versatility in different water treatment scenarios.
- **Compact and Portable Design:** The technology is incorporated into a compact, low-pressure portable water filtration bottle, enabling convenient and on-the-go purification of drinking water.

These features and specifications emphasize the efficiency, versatility, and convenience of the technology, making it a valuable solution for the removal of dissolved heavy metal ions in drinking water applications.

## POTENTIAL APPLICATIONS

The developed technology for the removal of dissolved heavy metal ions using a compact, bipolar nanoporous membrane has potential applications in various industries and sectors. Some of the industries where this technology can be deployed include:

- **Residential and Consumer Use:** The portable water filtration bottle equipped with bipolar membrane technology can be marketed for consumer use, allowing individuals to purify their drinking water at home, during travel, or in outdoor activities.
- **Food and Beverage:** The technology can be applied in the food and beverage industry to ensure the removal of heavy metal contaminants from water sources used in production and processing, ensuring the safety and quality of the final products.
- **Healthcare and Pharmaceuticals:** Hospitals, laboratories, and pharmaceutical manufacturing facilities can utilize this technology to remove heavy metals from their wastewater, ensuring environmental protection and compliance with regulations.

## UNIQUE VALUE PROPOSITION

- High rejection rates (>95%) for divalent and trivalent heavy metal ions.
- Low-Pressure Operation
- Concentrations ranging from 20 ppm to 100 ppm
- Compact and Portable Design for portable water filtration bottle.
- Reusability and Cost-Effectiveness