

TECH OFFER

High-Performance Boron Absorbents With Flexibility and Minimal Environmental Footprint



KEY INFORMATION

TECHNOLOGY CATEGORY:

Sustainability - Sustainable Living

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

TECHNOLOGY READINESS LEVEL (TRL): **TRL4**

COUNTRY: **SINGAPORE**

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OVERVIEW

Boron is an essential micronutrient necessary for the growth and development of plants, animals, and humans, while also playing a critical role in industries such as manufacturing, agriculture, and semiconductors. However, while beneficial in trace amounts, excessive boron levels can be toxic. High concentrations in drinking water pose significant health risks, particularly to reproductive and developmental systems, while boron contamination in industrial water supplies can degrade process efficiency and product quality.

Current methods for boron removal, such as reverse osmosis and ion exchange, face significant limitations. Reverse osmosis struggles to remove boron efficiently, especially in seawater desalination, often requiring multiple stages and high energy consumption to achieve acceptable levels. Ion exchange resins pose low loading capacity and require massive harsh chemicals for regeneration.

The proposed boron absorption technology provides a solution that efficiently removes boron from diverse water sources, including seawater and wastewater. It effectively reduces boron levels to meet stringent standards, such as drinking water limits of less than 0.5 mg/L. The technology aligns with sustainability goals, consuming fewer chemicals and exhibiting strong recovery stability. Additionally, the proposed absorbent is flexible, customizable and compatible with various water treatment applications.

The technology owner seeks partnerships to integrate this solution into existing water treatment systems or collaborate on industrial-scale demonstration projects to address boron contamination across multiple sectors.

TECHNOLOGY FEATURES & SPECIFICATIONS

- **High Efficiency:** Effectively reduces boron concentrations in various water sources, including seawater and wastewater, meeting stringent standards (e.g., <0.5 mg/L for drinking water).
- **Sustainability:** Consumes trace chemicals during the process and offers robust regeneration stability.
- **Flexible & Customizable:** Sponge-like composite, elastic and flexible, allowing easy scalability for large-scale applications.
- **Cost-Effective:** The technology lowers operational costs due to its high performance and reduced chemical usage.

POTENTIAL APPLICATIONS

- **Desalination Plants:** Particularly useful in seawater desalination, where boron concentrations must be reduced to meet drinking water standards.
- **Drinking Water Systems:** Ensures that water meets strict regulatory standards.
- **Industrial Wastewater Treatment:** Removes boron from industrial effluents, especially in sectors that release boron-laden waste, ensuring compliance with environmental regulations.
- **Semiconductor Industry:** Used to purify water in semiconductor manufacturing, where trace amounts of boron can affect production quality.

UNIQUE VALUE PROPOSITION

- **Superior Boron Removal Efficiency:** Achieves boron concentrations below 0.5 mg/L, meeting stringent drinking water standards, which is a challenge for existing methods like reverse osmosis and ion exchange.
- **Cost-Effectiveness:** The high-performance absorbent minimizes chemical input during regeneration, contributing to both cost reduction and sustainability.
- **Robust Recovery and Stability:** Exhibits strong regeneration stability over >15 cycles, maintaining its high performance.