

High performing, sustainable metal organic framework (MOF) membranes and uses thereof

Structuring Metal Organic Framework into High Performance, Sustainable Membranes

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Innovative MOF-Cellulose nanomaterials membrane technology: a membrane technology with exceptional proton conductivity for various applications



Cost-effective for mass production: membranes are designed for low-cost, large-scale applications



Collaboration opportunities: seeking research collaboration or licensing partnership



PCT application filed

Background

Metal-Organic Framework (MOFs) are network solids made from metal ions/clusters bridged by organic ligands, have spectacular features such as high porosity, high thermal and chemical stabilities etc. However, MOFs are formed as crystalline powders with particles on micron and submicron scale. Typically, they form brittle solids and are difficult to fabricate into robust films. Hence, novel, and feasible approaches for fabricating proton-conducting MOFs into solid-state electrolytes as membranes are being pursued. Cellulose nanocrystals and cellulose nanofibers are nano-sized particles isolated from cellulose source materials, such as wood pulp and cotton, which are commercially produced worldwide.

Researchers at the University of Calgary have invented a platform technology to integrate MOFs with cellulosic nanomaterials, resulting in robust, free-standing membrane with thickness ranging from 300-50 μm . These membranes not only exhibit superior performance and sustainability, but are also designed for large scale applications. Researchers have already achieved production up to A4 paper size.

Competitive Advantages

- Unmatched super proton conductivity in free-standing MOF-based membrane
- Exceptional thermal and water stability
- Versatile membrane fabrication methods applicable to various MOFs
- Environment friendly composition and production process

Areas of Application

- Proton exchange membrane in fuel cell
- CO₂ capture and other gases absorption and storage
- Chemical and photochemical catalyses
- Sensing and pollutant elimination

Publication and Resources

- Publication: [Chem 9, 1-14, September 14, 2023](#)
- Patent Publication: [WO2023000111 - Metal organic framework film and method of making](#)
- Researcher Profile: [Prof. Milana Trifkovic](#)
- Lab website: [The Trifkovic Research Group](#)

**Interested in using this technology to help your business grow?
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