

(CMI Critical Materials Institute

An Energy Innovation Hub

Treatment of Mineral Processing Waste Streams and Recovery of Water Using Sorption, Passive, and Active Microfiltration

Objective

Develop filtration devices that will assist in the recovery and/or re-use of processed water streams in mining or recycling activities. The Benchtop Filtration System is able to:

Test flat sheet or tubular porous metal membranes for water recovery from solutions that contain insoluble particulates including organic residues/contaminates.



Computer Data

Feed container with

pressure transducers

flow meters and

Acquisition

- Minimize fouling by creating a hydrophobic surface on the ceramic membrane using organo- and perfluoroorgano- silicates.
- Develop embedded ceramic membranes in a porous metal support that extends operation of filtration membranes.

Embedded Membrane Development

A project goal is to fabricate a metal oxide (ceramic) embedded membrane into a porous metal support.



STERLITECH www.sterlitech.com **Tubular Cell (Graver Filter Tube)** Flat Sheet Cell **Surface Modification** Porous Meta

A project goal is to fabricate a hydrophobic surface on the ceramic membrane using organo- and perfluoroorganosilicates.



Proposed Embedded Membrane

Note: Very difficult to erode due to the

-lat Sheet Porous Metal with **Embedded Membrane**

Achievement

Industrial Collaboration Research

Molycorp's Chlor-Alkali Plant water and chemical recovery process

- Main problem is residual organics present in the feed streams at Molycorp's chlor-alkali plant. These organic contaminates shorten plant operation time due to system fouling.
- Our project is delivering methods that can quickly and effectively reduce these organic contaminates.



- Surface modification shows water tensions greater than 100° (hydrophobic) on flat sheet and tubular modules.
- Water filtration tests show the modified membranes can filter organics and reduce silt caking in the surface.

Accomplishments

- Collaboration with industrial partner, Molycorp and other **CMI** Focus Areas.
- Preliminary embedded membranes have been made on flat sheets.
- Successful hydrophobic modifications of ceramic membranes surfaces to flat sheet and tubular modules.
- Improved filtration system for small-scale analysis and testing of flat sheet or tubular cells
- Graver Technology tubular modules acquired and tubular housing assembled for use in future testing.





