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.
- Minimize fouling by creating a hydrophobic surface on the ceramic membrane using organo- and perfluoroorganosilicates.
- 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.

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 contaminants shorten plant operation time due to system fouling.
- Our project is delivering methods that can quickly and effectively reduce these organic contaminants.

Surface Modification

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

- 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.