

## **Water Treatment and Reclamation – Mechanical Processing**

The Department of Mechanical Engineering has recognized that sustainable water management is a cornerstone feature in the efforts of the government and University to protect our natural resources and improve efficient industrial use of these resources while striking a manageable balance with our desire to mitigate the environmental footprint and adverse impact of industry operations. As a result, the Department is positioning itself to contribute to research and development that will support efficient and innovative next-generation water treatment products and processes in collaboration with academic, government, and industry partners.

The research philosophy of the Department of Mechanical Engineering in the area of water treatment and reclamation is on the physical, mechanical separation of the constituents of contaminated industrial water/wastewater, rather than by way of chemical or biological treatments. The Department has honed strengths in the manufacturing of advanced functional membrane materials to enable physical separation processes with an emphasis on steam-assisted gravity drainage (SAGD), the next-generation method for oil sands extraction and processing. This has further enabled the Department to develop strengths in membrane-based hybrid processes, such as membrane distillation, electro-membrane technologies, forward osmosis/reverse osmosis, ultrafiltration/nanofiltration, as well as nano-enabled materials for water reclamation, including thin-film nanocomposites and micro/nano-patterned substrates.

The Department has strong expertise, capacity, and research projects in core areas of advanced manufacturing of membrane technology by way of 3-D printing, electrospinning, and industrial thermal spraying; performance testing of manufactured membranes; and techno-economic analyses on the economic benefits, greenhouse gas (GHG) emission mitigation, and environmental impact of membranes used to replace current industrial water filtration techniques.

In an effort to make substantive and impactful contributions to water use conservation, efficiency, and productivity, and water quality protection, the Department has engaged with other university departments (for example, Civil and Environmental Engineering) and faculties (for example, Agricultural, Life, and Environmental Sciences), government agencies (for example, InnoTech Alberta), and industry partners (for example, Suncor Energy, Devon Energy, and ConocoPhillips) to create a cross-sectoral, multi-faculty, and multi-stakeholder research effort around water treatment.

To learn more about the capabilities, expertise, and experts in this area in the Department, please visit <http://awrl.ca/> and [www.uab.ca/enen](http://www.uab.ca/enen).