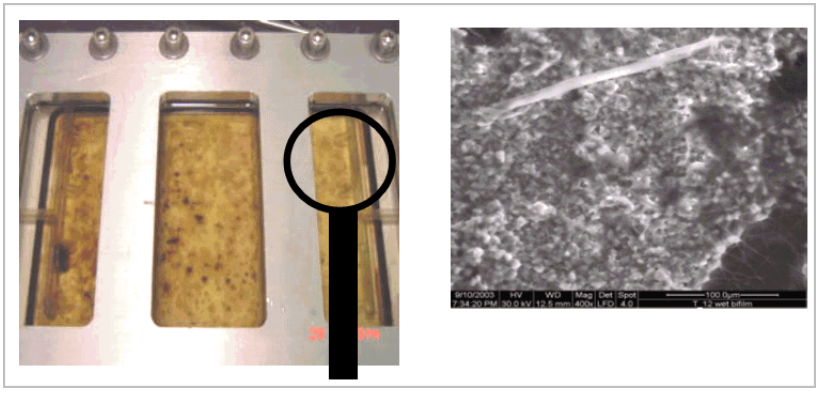
Center for Membrane and Applied Science and Technology (MAST)

University of Colorado, University of Cincinnati

Dr. Alan Greenberg, Director
Phone: 303-492-6613
E-mail: alan.greenberg@colorado.edu

Acoustical Method of Characterizing Membrane Fouling and Cleaning

Center researchers have developed an acoustical method of characterizing the operational fouling and cleaning of membranes used in a wide variety of industrial processes. Membranes are used in separations processes to separate materials from liquid feedstreams. Such processes include water desalination operations, food and beverage processing, waste treatment processing, and pharmaceutical operations. Membranes used for these purposes may become fouled, causing a decrease in membrane permeability and a corresponding decline in process efficiency. Previous methods of detecting fouling have been done primarily by means of membrane permeability measurements, which provide an average over the entire membrane surface area--they are not site specific. The acoustical sensor developed at the Membrane and Applied Science & Technology Center uses low-energy, high frequency sound waves to detect levels of fouling and cleaning in a site-specific manner. The sensor provides a non-destructive, non-contact testing method that can be done on line, in real time. A U.S. patent has been issued, and significant industrial interest in the technology has been shown. Licensing negotiations with a major company are currently in progress. This technology was developed in response to a project that was submitted by a center sponsor (TACOM-TARDEC, U.S. Army) in 1993. For more information, contact Alan Greenberg 303-492-6613; e-mail: alan.greenberg@colorado.edu or Gary Amy, 303-492-6274; e-mail: gary.amy@colorado.edu.



Above: Photograph showing the membrane surface after the onset of biofouling on the left; environmental electron scanning micrograph that shows the growth of the biofouling layer on the membrane surface on the right.

Solid supported membranes (SSM) for reconstitution of ion channels

The Center Researchers have developed devices that contain ion channels on synthetic membranes. Ion channels are biological proteins that span cell membranes and generate electrical currents when ions pass through a highly selective pore within the channel. Many ion channels have evolved to generate currents in response to binding of biological and environmental toxins and pharmaceutical agents. Sensors for environmental and biological toxins and screening procedures for pharmaceutical agents would benefit from technologies that use the electrical signals generated by ion channels. The potential advantages of these devices over other methods are low cost and high specificity. A U.S. patent has been prepared. This technology was developed in response to a project that was submitted by a center sponsor (Procter and Gamble) in 2000.