

Seeking Companies interested in the Commercialization of a Charged Membrane Technology

The Center for Dairy Research (CDR) (www.cdr.wisc.edu) is seeking a company interested in the further development of a charged membrane technology that allows manufacturers to perform ultrafiltration more efficiently by using less water and chemicals at a higher permeate flux rate, and at the same protein retention as uncharged membranes. If your company is interested in the development of this technology, please contact CDR for more information and assistance. We encourage you to find out more about how your company can benefit from working with CDR.

Technology

- UW-Madison researchers Mark Etzel, Ph.D and Abhiram Arunkumar along with the assistance of CDR Senior Instrumentation Technologist Mike Molitor and financial support from Dairy Management Inc. (DMI), recently developed a negatively charged ultrafiltration membrane that will provide improved concentration of milk protein, milk serum protein or cheese whey.

This patent pending technology, currently licensed with the Wisconsin Alumni Research Foundation (WARF), addresses the permeability-selectivity tradeoff of membrane pores, which is an issue, faced by whey protein concentrate (WPC) and milk protein concentrate (MPC) manufacturers.

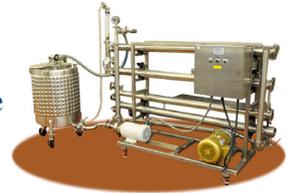
The science behind this technology relies on the rules that surround the protein isoelectric point and electrostatic repulsion. Consider that when two like charges meet, they are repelled by each other. This idea is the key to charged membrane technology. In this case, when milk and cheese whey proteins are in a solution at a pH greater than about 5, the proteins are generally negatively charged. By putting these negatively charged proteins through an element that contains a negatively charged membrane, the proteins are repelled, thus preventing protein loss. All other material easily passes through the membrane. So, by using this method, the nominal pore size of the membrane can be dramatically larger, which allows for greater flow rates without the loss of proteins. Selectivity is not sacrificed to get high permeability.

Functional/Economic Benefits

- To date, this method has been tested within the CDR pilot plant and at a bench top level. Both have proven to be quite successful. In general, when proceeding with WPC 80, the flow rate through the charged membrane went up two to four times without losing protein. In regards to MPC, flow rate generally increased by fivefold. Additionally, thanks to the larger pore sizes, sugars and minerals were more easily eliminated which in turn requires less diafiltration water. Less fouling of the membranes also meant that researchers needed to use less water to flush and chemicals in the cleaning process. Thanks to these many benefits, less membrane area is needed in general, which also contributes to the improved bottom line.

Pros and Cons

- While this technology can offer less water use, less fouling, a need for less membrane area and essentially a more environmentally and financially friendly method of ultrafiltration, there are several challenges that a company adopting this technology may face. In particular, this technology needs to have more evaluations completed, utilizing spiral elements in the pilot plant followed by trials conducted in a commercial facility. Through the TURBO program, potential partners are able to come into the CDR pilot plant to test this technology. We have one spiral element available for use within the pilot plant. Partners are also welcome to make an appointment to investigate the bench top equipment and visit with Dr. Etzel. Additionally, a company wishing to adopt this technology would need to partner with a membrane manufacturer in order to produce the elements as CDR and the University do not actually manufacture the membranes or elements. All partnering companies will need to license this technology through WARF and follow their procedures.



Applications:

- WPI
- MPC
- WPC
- Fluid UF milks
- Glycomacropetide (PKU foods)
- Purification of beta casein by-products

How can I learn more?

- CDR is an internationally known dairy research center and the largest within the United States. Access to world class food scientists/technologists, and a licensed, operating dairy plant along with CDR's client confidentiality commitment provides applied research results at a minimal cost. This technology is currently available for licensing from Wisconsin Alumni Research Foundation (WARF).

CDR will assist in this technology adoption for a nominal fee. For further information, please contact CDR Senior Instrumentation Technologist, Mike Molitor, molitor@cdr.wisc.edu