Tufts TECH TRANSFER

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Fouling Resistant Membrane Coating for Purification

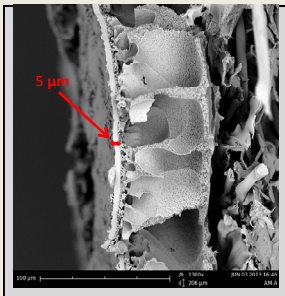
Available Technologies:

- T001978

Features and Applications:

- High fouling resistance
- High water permeability
- Narrow selectivity and tunable pore size
- Easy processing, stability and scalability of manufacturing
- Water purification/ ultrafiltration
- Separation technology for complex mixtures

Rapidly decreasing fresh water supply makes clean water a scarce commodity. There is a global need for development of inexpensive and effective water purification systems which are robust and fouling resistant. Existing water filtration membranes suffer from poor selectivity, low permeability (reduced flux) and fouling. Researchers at Tufts University have developed a new material which is a highly permeable and selective membrane coating with inherent anti-fouling properties. Several of these new co-polymers were coated onto porous supports by methods well-understood in the membrane industry. These new membrane coatings showed promise as novel selective layers for the development of cheap, robust, fouling-resistant selective membranes for the separation of small-molecule solutes (e.g. pharmaceuticals, water contaminants, dyes).



Novel Membrane Coating
SEM image of a composite membrane with a 5 µm thin layer of copolymer coating on a PVDF400 ultrafiltration base membrane

These new membranes are made by coating polymers with zwitterionic and hydrophobic repeats onto supporting surfaces or preexisting membranes. Inclusion of zwitterionic repeat units within the selective layer of the membrane ensures high permeability (equal or above 10 L/ m^2.h.bar) while imparting fouling resistance. The presence of hydrophobic repeat units prevents the dissolution of the membrane in water, and loss of selectivity due to the swelling of the zwitterionic domains. These water-permeable membranes have pore sizes of 0.5-5 nm and a MWCO around 1000 Da. The membranes can be utilized in removal of organic pollutants from water and the separation and purification of organic molecules dissolved in water, such as pharmaceuticals, nutriceuticals, and plant extracts.

Summary

Novel fouling resistant and highly selective membranes have been developed. These membranes are prepared by coating copolymers containing zwitterionic and hydrophobic moieties onto porous ultrafiltration or other membrane supports. Membranes show high water permeability. Experiments demonstrate size-based selectivity for dye molecules with a diameter of ~1 nm, with limited rejection of salts. The membranes can be readily used in water filtration systems as well as in food and pharmaceutical industries for purification of biopharmaceutical and natural products. Additionally, the increase of membrane permeability and minimization of fouling lead to better filtration efficiency and reduction of operational and maintenance costs.

An IP positions are now available for licensing from Tufts University. Check out a full description of the technology at [http://techtransfer.tufts.edu/]

Contact: Erika Bechtold, Office for Technology Licensing & Industry Collaboration (Erika.Bechtold@tufts.edu)