

최신 미국특허 등록 목록

■ United States Patent 7,226,541

• **Title** : Membrane polymer compositions

• **Abstract**

The invention relates to a terpolymer of tetrafluoroethylene (TFE) monomer, polyvinylidene fluoride (PVDF) monomer and hexafluoropropylene (HFP) monomer for forming an ultrafiltration or microfiltration membrane, method of forming said membranes, and to the ultrafiltration or microfiltration membranes themselves. The invention also relates to a method of forming a polymeric ultrafiltration or microfiltration membrane including preparing a leachant resistant membrane dope which incorporates a leachable pore forming agent, casting a membrane from the dope and leaching the pore forming agent from the membrane. The invention also relates to a method of preparing a polymeric ultrafiltration or microfiltration membrane of improved structure including the step of adding a nucleating agent to the membrane dope before casting.

• **Inventors** : Muller; Heinz-Joachim (Thornleigh, AU), Mulette; Daniel (Westmead, AU)

• **Assignee** : Siemens Water Technology Corp. (Warrendale, PA)

• **Filed date** : December 16, 2003

• **Issued date** : June 5, 2007

■ United States Patent 7,223,341

• **Title** : Positively charged membrane

• **Abstract**

The present invention provides a positively charged microporous membrane having a protein binding capacity of about 25 mg/ml or greater comprising a hydrophilic porous substrate and a crosslinked coating that provides a fixed positive charge to the membrane. The present invention further provides a positively charged microporous membrane comprising a porous substrate and a crosslinked coating comprising pendant cationic groups. The membranes of the present invention find use in a variety of applications including ion-exchange chromatography, macromolecular transfer, as well as detection, filtration and purification of biomolecules such as proteins, nucleic acids, endotoxins,

and the like.

• **Inventors** : Wu; Xiaosong (Pensacola, FL), Hou; Chung-Jen (Pensacola, FL), Dharia; Jayesh (Pensacola, FL), Konstantin; Peter (Boulder, CO), Yang; Yujing (Newton, MA)

• **Assignee** : Pall Corporation (East Hills, NY)

• **Filed date** : July 6, 2006

• **Issued date** : May 29, 2007

■ United States Patent 7,220,358

• **Title** : Methods for treating membranes and separation facilities and membrane treatment composition

• **Abstract**

A method for treating a separation facility is provided according to the invention. The separation facility includes a plurality of membranes for providing separation of a feed product. The method includes steps of providing liquid flow through a plurality of membranes; treating the plurality of membranes with a multiple phase treatment composition comprising a gaseous phase and a liquid phase at a volumetric ratio of the gaseous phase to the liquid phase of at least about 5:1; and providing a liquid flow through the plurality of membranes.

• **Inventors** : Schacht; Paul F. (Oakdale, MN), McBroom; Amy B. (St. Paul, MN), Hei; Robert D. P. (Baldwin, WI), Staub; Richard K. (Lakeville, MN), Krack; Ralf (Duesseldorf, DE), Fernholz; Peter J. (Burnsville, MN), Somayajula; Srinivas (Woodbury, MN)

• **Assignee** : Ecolab Inc. (St. Paul, MN)

• **Filed date** : February 23, 2004

• **Issued date** : May 22, 2007

■ United States Patent 7,217,304

• **Title** : Electric power generation with heat exchanged membrane reactor

• **Abstract**

This invention is directed to a heat exchanged membrane reactor for electric power generation. More specifically, the

invention comprises a membrane reactor system that employs catalytic or thermal steam reforming and a water gas shift reaction on one side of the membrane, and hydrogen combustion on the other side of the membrane. Heat of combustion is exchanged through the membrane to heat the hydrocarbon fuel and provide heat for the reforming reaction. In one embodiment, the hydrogen is combusted with compressed air to power a turbine to produce electricity. A carbon dioxide product stream is produced in inherently separated form and at pressure to facilitate injection of the CO₂ into a well for the purpose of sequestering carbon from the earth's atmosphere.

- **Inventors** : Deckman; Harry W. (Clinton, NJ), Fulton; John W. (Randolph, NJ), Grenda; Jeffrey M. (Clinton, NJ), Hershkowitz; Frank (Liberty Corner, NJ)
- **Assignee** : ExxonMobil Research and Engineering Company (Annandale, NJ)
- **Filed date** : October 29, 2004
- **Issued date** : May 15, 2007

■ United States Patent 7,216,529

• **Title** : Method for controlling the integrity of a nanofiltration or reverse osmosis module, or module system

• **Abstract**

The invention concerns a method for controlling a nanofiltration or reverse osmosis module system designed for treating a supply fluid or for detecting living micro-organism leaks, each module comprising nanofiltration or reverse osmosis membranes and joints connecting said membranes, including steps which consist in: selecting in the supply fluid a dissolved compound present in significant amount but normally highly retained by the membranes; measuring the concentration value of said compound in a downstream zone of a module of said system; comparing said measured value with a reference value; and recognising the existence of a fault in said zone of the system when said measured value is higher than the reference value.

- **Inventors** : Ventresque; Claire (Colombes, FR), Gisclon-Lallemand; Valerie (Poissy, FR), Bablon; Guy (Feucherolles, FR), Chagneau; Ge (Paris, FR)
- **Assignee** : Veolia Eau - Compagnie Generale des Eaux (Paris, FR), Syndicat des Eaux d'ile de France (SEDIF) (Paris, FR)
- **Filed date** : June 1, 2001

- **Issued date** : May 15, 2007

■ United States Patent 7,208,200

• **Title** : Process of forming multilayered structures

• **Abstract**

The present invention provides for a method of producing an integral multilayered porous membrane by simultaneously co-casting a plurality of polymer solutions onto a support to form a multilayered liquid sheet and immersing the sheet into a liquid coagulation bath to effect phase separation and form a porous membrane. The support can be a temporary support or form an integrated support for the membrane. The plurality of layers may be of the same polymer or different, same concentration or viscosity or different and may be subjected to the same processing conditions or different ones to form unique structures.

- **Inventors** : Kools; Willem (Winchester, MA)
- **Assignee** : Millipore Corporation (Bedford, MA)
- **Filed date** : August 6, 2003
- **Issued date** : April 24, 2007

■ United States Patent 7,198,721

• **Title** : Cyclic aeration system for submerged membrane modules

• **Abstract**

An aeration system for a submerged membrane module has a set of aerators connected to an air blower, valves and a controller adapted to alternately provide a higher rate of air flow and a lower rate of air flow in repeated cycles. In an embodiment, the air blower, valves and controller, simultaneously provide the alternating air flow to two or more sets of aerators such that the total air flow is constant, allowing the blower to be operated at a constant speed. In another embodiment, the repeated cycles are of short duration. Transient flow conditions result in the tank water which helps avoid dead spaces and assists in agitating the membranes.

- **Inventors** : Cote; Pierre Lucien (Dundas, CA), Janson; Arnold (Burlington, CA), Rabie; Hamid R. (Mississauga, CA), Singh; Manwinder (Burlington, CA)
- **Assignee** : Zenon Technology Partnership (Wilmington, DE)

- **Filed date** : November 15, 2004

- **Issued date** : April 3, 2007

■ United States Patent 7,195,921

- **Title** : Adhered membranes retaining porosity and biological activity

- **Abstract**

An assay pad for measuring the concentration of HDL-associated cholesterol in a sample, a method for using the pad, and a diagnostic assay device for carrying out the method are described. The assay pad includes a polymer adhesive or heat laminate bond. The assay design prevents interference by reagents used for such removal with the HDL quantification reaction or with other assays carried out on the same sample. If desired, removal of non-HDL lipoproteins and assay of HDL cholesterol can be carried out without interruption of the assay.

- **Inventors** : Jones; Ronald M. (Mountain View, CA)

- **Assignee** : Cholestech Corporation (Hayward, CA)

- **Filed date** : April 1, 2004

- **Issued date** : March 27, 2007

■ United States Patent 7,186,343

- **Title** : Cyclic aeration system for submerged membrane modules

- **Abstract**

A process for supplying bubbles to a membrane module and cleaning an aerator producing the bubbles includes, in repeated cycles, steps of producing bubbles from an aerator and reducing pressure in the aerator such that water in the tank enters the aerator.

- **Inventors** : Rabie; Hamid R. (Mississauga, CA), Cote; Pierre Lucien (Dundas, CA), Singh; Manwinder (Burlington, CA), Janson; Arnold (Burlington, CA)

- **Assignee** : Zenon Technology Partnership (Wilmington, DE)

- **Filed date** : July 11, 2005

- **Issued date** : March 6, 2007

■ United States Patent 7,186,323

- **Title** : Electrolyzed water production system

- **Abstract**

An electrolytic ion-water production apparatus in which purified water without residual chlorine is electrolyzed to produce alkaline-ion water without any chloride smell of lime in use of the apparatus, and in which a mixture of purified water treated by a water purifier and tap water containing residual chlorine is electrolyzed to produce alkaline-ion water containing sodium hypochlorous acid (NaOCl) of low concentration and to retain the produced alkaline-ion water in an introduction passage for reliably preventing propagation of microbes.

- **Inventors** : Yasuo Hara (Aichi, JP)

- **Assignee** : Hoshizaki Denki Kabushiki Kaisha (JP)

- **Filed date** : January 27, 2004

- **Issued date** : March 6, 2007

■ United States Patent 7,182,894

- **Title** : Process for the preparation of free standing membranes

- **Abstract**

The invention discloses a method for synthesizing hollow structured freestanding membrane having pore size of 2 to 200 nm which provides long-term stability that makes it viable for many practical applications such as protein separation and drug delivery.

- **Inventors** : Kumar; Pandian Senthil (Maharashtra, IN), Kannan; Periasamy Selva (Maharashtra, IN), More; Arvind (Maharashtra, IN), Shingte; Rahul (Maharashtra, IN), Wadgaonkar; Prakash (Maharashtra, IN), Sastry; Murali (Maharashtra, IN)

- **Assignee** : Council of Scientific & Industrial Research (New Delhi, IN)

- **Filed date** : March 12, 2004

- **Issued date** : February 27, 2007

■ United States Patent 7,172,699

- **Title** : Energy efficient wastewater treatment for nitrogen and phosphorus removal

- **Abstract**

In a wastewater treatment plant, the liquid side of the plant

has preferably four stages for nitrification and/or denitrification, prior to further treatment such as a clarifier. Energy requirements are reduced by reducing aeration requirements. Four or more tanks/zones comprise serial anoxic and aerobic stages, but in the anoxic stages simultaneous nitrification/denitrification takes place in accordance with the known process of U.S. Pat. No. 5,906,746. By this arrangement the system can achieve a volume ratio of about 20% aerobic tankage to the total tankage volume, as compared to a much higher ratio in a typical prior art system of serial aerobic/anoxic stages, and greatly reducing aeration requirements.

- **Inventors** : Trivedi; Hiren K. (Cedar Park, TX), Porteous; James (Austin, TX)
- **Assignee** : Eimco Water Technologies LLC (Salt Lake City, UT)
- **Filed date** : October 13, 2004
- **Issued date** : February 6, 2007

■ United States Patent 7,179,370

- **Title** : Energy-efficient biological treatment system with filtration membrane

- **Abstract**

A membrane filtration system comprising one or more submerged ultrafiltration or microfiltration membrane assemblies at ambient pressure, each membrane assembly positioned 100-240 mm from a nearest wall, baffle, or adjacent membrane assembly and no more than 1 meter above a floor and at least 150 mm below the liquid level. Mixed liquor is discharged underneath each membrane assembly to create a vertical flow velocity in a range of 1-8 mm/second along an entire length of the membrane assembly. In a sequenced batch reactor system, a coarse bubble air diffuser for scouring each membrane assembly is supplied with air only during the backwash cycle of the filtration system and not during the filtration cycle. In a membrane bioreactor system, the biological treatment section is physically separated from the filtration section and fine bubble air diffusion is used in the biological treatment section.

- **Inventors** : Dimitriou; Michael A. (Richmond, VA), Krall; Joseph G. (Grafton, WI), Rice; David (Port Washington, WI), Yogendran; Velupillai (Warwickshire, GB), Byrne; Roger J. (Mequon, WI), George; Kenneth P. (Grafton, WI), Koch, III; John E. (Wauwatosa, WI)
- **Assignee** : ITT Manufacturing Enterprises, Inc.

(Wilmington, DE)

- **Filed date** : May 23, 2006
- **Issued date** : February 20, 2007

■ United States Patent 7,160,463

- **Title** : Methods of minimizing the effect of integrity loss in hollow fibre membrane modules

- **Abstract**

A method and apparatus for reducing the effect of integrity loss in a hollow fiber membrane module, said module including a plurality of hollow fiber membranes (5), at least one end of the fiber membranes (5) being supported in a pot (6), the method including the step of increasing flow resistance of the liquid through the lumen (8) of the fiber membrane (5) in the region of the pot (6).

- **Inventors** : Beck; Thomas William (North Richmond, AU), Johnson; Warren Thomas (Grose Vale, AU)
- **Assignee** : U.S. Filter Wastewater Group, Inc. (Warrendale, PA)
- **Filed date** : December 16, 2004
- **Issued date** : January 9, 2007

■ United States Patent 7,160,469

- **Title** : System and method for efficient and low energy desalination of water

- **Abstract**

Many areas in the world already suffer shortages of water, and others will suffer from it in the coming years. Therefore more efficient water sweetening is essential for our survival on this planet. The most commonly used water sweetening methods are: Reversed osmosis, distillation, electrolysis, and partial freezing. However, these methods suffer from low efficiency and high energy consumption, thus making them significantly more expensive than naturally obtained water. The present invention describes a system & method for efficient and low energy sweetening of water, based on borderline fast fluctuation between liquid to gaseous state and back, by using centrifugal forces to make water droplets fly at a high speed, so that they evaporate for a split second, the salt is separated, and they condense again. The present invention tries to make the process energy-efficient by enabling the use of lower speeds and smaller droplet

sizes and solving various problems involved with that.

- **Inventors** : Mayer; Yaron (Jerusalem 92151, IL), Dechovich; Boris (Jerusalem 97543, IL), Gadassi; Haim (Jerusalem 93114, IL)
- **Assignee** : -
- **Filed date** : December 26, 2002
- **Issued date** : January 9, 2007

■ United States Patent 7,157,175

- **Title** : Solid polymer electrolyte membrane fuel cell electrode catalyst layer

• Abstract

A solid polymer electrolyte membrane fuel cell electrode catalyst layer comprises Pt particles carried on a carbon carrier and a solid polymer electrolyte, wherein a center-to-center distance dimension (L_{pt-pt}) between the Pt particles carried on the carbon carrier is made to substantially coincide with the sum of a double of a total dimension resulting by adding the length (L_{pes}) of a side chain having an ion-exchange group to the diameter (D_{pem}) of a main chain of the solid polymer electrolyte and the diameter (D_{pt}) of the Pt particle.

- **Inventors** : Komura; Takashi (Wako, JP), Asano; Yoichi (Wako, JP), Ise; Masahiro (Wako, JP), Takahashi; Ryoichiro (Wako, JP), Yoshida; Hiromichi (Wako, JP)
- **Assignee** : Honda Motor Co., Ltd. (Tokyo, JP)
- **Filed date** : November 25, 2003
- **Issued date** : January 2, 2007

■ United States Patent 7,144,511

- **Title** : Two stage nanofiltration seawater desalination system

• Abstract

The present invention is directed to a method and apparatus for desalinating seawater utilizing a two stage seawater desalination system, a first stage including at least one high performance nanofiltration membrane to receive seawater feed pressurized by a first stage pump sufficiently and to produce a first permeate, and a second stage including at least one high performance nanofiltration membrane to receive the first permeate pressurized by a second stage pump to between about 200 psi and about 300 psi to pro-

duce potable water.

- **Inventors** : Vuong; Diem Xuan (San Clemente, CA)
- **Assignee** : City of Long Beach (Long Beach, CA)
- **Filed date** : May 2, 2002
- **Issued date** : December 5, 2006

■ United States Patent 7,138,058

- **Title** : Acid stable membranes for nanofiltration

• Abstract

Semi-permeable membranes are described that allow for the efficient processing of many liquid based feed solutions, particularly those that contain acids. The membranes of this invention are able to process such feeds with high permeate rates while maintaining excellent retention of dissolved metals, cations, and organic compounds, even in the presence of hot concentrated acids. The semi-permeable membranes of this invention are able to conduct such separations for a useful period of time due to their chemical stability towards acids and their ability to permeate acids.

- **Inventors** : Kurth; Christopher J. (St. Louis Park, MN), Kloos; Steven D. (Chanhassen, MN), Peschl; Jessica A. (Minneapolis, MN), Hodgins; Leonard T. (Closter, NJ)
- **Assignee** : GE Osmonics, Inc. (Minnetonka, MN)
- **Filed date** : November 22, 2002
- **Issued date** : November 21, 2006

■ United States Patent 7,125,493

- **Title** : Highly asymmetric, hydrophilic, microfiltration membranes having large pore diameters

• Abstract

The present invention relates to the field of synthetic polymeric microfiltration membrane materials that are fabricated to separate liquids from solids contained therein. One aspect of the invention relates to a highly asymmetric, hydrophilic microfiltration membrane with high surface porosity. The membrane is rendered hydrophilic through co-casting the sulfone polymer with a hydrophilic polymer, such as polyvinylpyrrolidone. The membranes of the invention are highly useful in testing devices for the quick detection of properties or components contained in liquid samples, such as diagnostic applications, as well as for other filtration applications that demand relatively large pore sizes,

thick membranes, high asymmetry, and/or high lateral wicking speeds.

- **Inventors** : Wang; I-Fan (San Diego, CA), Morris; Richard A. (Encinitas, CA), Zepf; Robert F. (Solana Beach, CA)
- **Assignee** : Pall Corporation (East Hills, NY)
- **Filed date** : August 16, 2004
- **Issued date** : October 24, 2006

■ **United States Patent 7,112,233**

- **Title** : Honeycomb filter and ceramic filter assembly
- **Abstract**

A ceramic filter assembly having improved exhaust gas

processing efficiency. The ceramic filter assembly (9) is produced by adhering with a ceramic seal layer (15) outer surfaces of a plurality of filters (F1), each of which is formed from a sintered porous ceramic body. The seal layer (15) has a thickness of 0.3 mm to 3 mm and a thermal conductance of 0.1 W/mK to 10 W/mk.

- **Inventors** : Ohno; Kazushige (Gifu, JP), Shimato; Koji (Gifu, JP), Tsuji; Masahiro (Gifu, JP)
- **Assignee** : Ividen Co., Ltd. (Gifu, JP)
- **Filed date** : September 26, 2003
- **Issued date** : September 26, 2006