

## 최신 미국특허 등록 목록

- Capacitive micromachined ultrasonic transducer(CMUT) with varying thickness membrane
  - 등록 번호 : 7615834
  - 발명자 : Khuri-Yakub, Burtis (Palo Alto, CA, US), Ergun, Arif Sanli (Mountain View, CA, US), Yaralioglu, G. Göksevenin(Mountain View, CA, US), Huang, Yongli (San Jose, CA, US), Hansen, Sean (Sunnyvale, CA, US)
  - 출원인 : The Board of Trustees of the Leland Stanford Junior University (Palo Alto, CA, US)
  - 초록 : Structure for capacitive micromachined ultrasonic transducer (CMUT) device or other vibrating membrane device having non-uniform membrane so that membrane mass and stiffness characteristics may be substantially independently adjusted. CMUT having trenched membrane and/or membrane with non-uniform thickness or density. Method for operating transducer or vibrating membrane device. Array of devices at least some of which have non-uniform membrane properties. CMUT comprising substrate, support for membrane, and membrane extending over support to create cavity, membrane having non-uniform membrane thickness resulting from at least one of: thickening on upper surface of the membrane outside of cavity, thickening on lower surface of membrane inside cavity, trench on upper surface of membrane, trench on lower surface of the membrane, and any combination of two or more of these. Method for fabricating CMUT or vibrating membrane device having non-uniform membrane. High mechanical sensitivity transducer for sensor, microphone, and/or transmitter.
- Membrane electrode assembly for a fuel cell
  - 등록 번호 : 7615306
  - 발명자 : Haufe, Stefan (Goettingen, DE), Reiche, Annette (Goettingen, DE), Kiel, Suzana (Goettingen, DE), Maehr, Ulrich (Berlin, DE), Melzner, Dieter (Goettingen, DE)
  - 출원인 : Elcomax Membranes GmbH (Munich, DE)
  - 초록 : A membrane electrode assembly (MEA) for a fuel cell, which has a planar polymer membrane. This membrane, in a tangentially inner area, is coated on both sides with electrode structure, and, in a tangentially outer area projecting at least on one side beyond the electrode structure coating, is connected to a sealing member. A marginal zone of the polymer membrane is embedded in the elastomer sealing member. The sealing member extends tangentially inward to a transition area that lies tangentially between the outer area and the inner area, where it overlaps the electrode structures on outer faces of the electrode structures, on both of the sides of the polymer membrane.
- Development of novel proton-conductive polymers for proton exchange membrane fuel cell (PEMFC) technology
  - 등록 번호 : 7615300
  - 발명자 : Bae, Chulsung (Las Vegas, NV, US)
  - 출원인 : The Board of Regents University and Community College System of Nevada on Behalf of the University of Nevada (Las Vegas, NV, US)
  - 초록 : New thermally and chemically stable

sulfonic acid-containing polymers are synthesized via post-sulfonation of aromatic polymers. These new polymers provide unique benefits to proton exchange membrane fuel cell technology ("PEMFC"). As a sulfonic acid moiety can be easily installed into an aromatic ring via electrophilic sulfonation, even in the presence of an electron-withdrawing substituent such as -F, rigid polymers consisting of aromatic rings at either the side chain or main chain can be prepared with a wide range of substituents and flexibility in properties. Novel synthetic procedures are provided for synthesis of the polymers.

■ Separation membrane

- 등록 번호 : 7615105
- 발명자 : Odaka, Yoshifumi (Shiga, JP), Nakamatsu, Osamu (Shiga, JP), Kumo, Ichiro (Shiga, JP)
- 출원인 : Toray Industries, Inc. (Tokyo, JP)
- 초록 : It is an object of the present invention to provide a separation membrane in which a film-forming solution can be prevented from reaching a rear surface of a porous support in a step of forming a film, the adhesion between a functional film for separation and the porous support is high, and the thickness can be reduced. In the present invention, the separation membrane includes a porous support having a rough rear surface and a functional film for separation, and the functional film is disposed on a front surface of the porous support and extends into the porous support.

■ Selection of bacterial inner-membrane anchor polypeptides

- 등록 번호 : 7611866
- 발명자 : Georgiou, George (Austin, TX, US), Jeong, Ki Jun (Austin, TX, US), Harvey, Barrett R. (Souderton, PA, US), Iverson, Brent L. (Austin, TX, US)

- 출원인 : Board of Regents, The University of Texas System (Austin, TX, US)
- 초록 : The invention overcomes the deficiencies of the prior art by providing a rapid approach for isolating polypeptides capable of anchoring heterologous polypeptides to a bacterial inner membrane. In the technique, libraries of candidate anchor polypeptides are expressed as fusions with a heterologous polypeptide that is capable of being detected when bound to the inner membrane. In bacteria expressing a functional anchor sequence, the heterologous polypeptide becomes bound to outer face of the inner membrane. Bacteria with the functional anchor sequence can be identified by removing the outer membrane to remove non-anchored heterologous polypeptide followed by detection of anchored heterologous polypeptide. Such bacteria may be detected in numerous ways, including use of direct fluorescence or secondary antibodies that are fluorescently labeled, allowing use of efficient techniques such as fluorescence activated cell sorting (FACS).

■ UV treated membranes

- 등록 번호 : 7611629
- 발명자 : Doucoure, Abdoulaye (Levittown, NY, US), Salinaro, Richard F. (Hastings on Hudson, NY, US), Mizuno, Yoshiki (Ibaraki, JP)
- 출원인 : Pall Corporation (Port Washington, NY, US)
- 초록 : A first surface and a second surface and a thickness and bulk defined by the first and second surfaces, the microporous PTFE membrane modified by subjecting the microporous PTFE membrane to non-coherent broadband UV irradiation while pores of the membrane are impregnated with a liquid, the membrane having a critical wetting surface tension (CWST) of at least about 40 dynes/cm (0.40 erg/mm<sup>2</sup>) through the thickness and bulk of the microporous PTFE membrane, a wetting/dewetting ratio of at least about 0.7 for 2 or more cycles,

and wherein the first and second surfaces each have a fluorine/carbon (F/C) ratio of about 1.5 or more and an oxygen/carbon (O/C) ratio in the range of from about 0.01 to about 0.15.

#### ■ Aligned nanotubule membranes

- 등록 번호 : 7611628
- 발명자 : Hinds, III, Bruce J. (Lexington, KY, US)
- 출원인 : University of Kentucky Research Foundation (Lexington, KY, US)
- 초록 : A method is provided for producing a permeable membrane, comprising the steps of aligning a plurality of hollow nanotubules to form a mat, coating the mat with a continuous polymer matrix to form a membrane. The membrane is etched (a) to open the plurality of hollow nanotubules and form pores and (b) to oxidize the carboxyl groups to carboxylate groups. At least one additional functional unit having at least one available amine group to bind the at least one additional functional unit to the nanotubule end carboxylate group may be provided. Membranes fabricated in accordance with the method of the invention are provided also.

#### ■ Membrane module as well as a method for making a membrane module

- 등록 번호 : 7611627
- 발명자 : Terpstra, Rinse Alle (Schaarland 11, NL-5663 JR, Geldrop, NL), Dirrix, Ruud Wilhelmus Johannes (Heezerweg 83, NL-5614 HB, Geldrop, NL), Everstein, Sander Johannes (Tsarenh of 71, NL-2402 DR, Alphen aan den Rijn, NL)
- 출원인 : Terpstra, Rinse Alle
- 초록 : The membrane module according to the invention is characterized in that it has concrete flanges. This membrane module is made by first sealing a bundle of ceramic fiber

membranes at one end using a viscous sealant and then pressing it into a fluid mass of concrete in a mould. After the mass of concrete has hardened the process is repeated with the other end of the bundle. Finally the ends of the fiber membranes are opened by sawing off a slice of the flanges.

#### ■ Ion conducting polymer membranes

- 등록 번호 : 7608356
- 발명자 : Risen, Jr., William M. (87 Miller Ave., Rumford, RI, US), Zhang, Pu (Urbana, IL, US)
- 출원인 : Risen, Jr. William M. (Rumford, RI, US)
- 초록 : Modified ion-conducting membranes (10), and a method for making the same, which increases the membrane (10) surface area, and, optionally, incorporates mono- and multi-metal ion-containing catalysts for both fuel consumption catalysis in fuel cells as well as catalysis of reactions to ameliorate the effects of CO and other impurities in fuel cells. The membranes (10) modified by these methods can find application in catalysis and transport applications.

#### ■ Preparation and storage of membrane and electrode assemblies

- 등록 번호 : 7608350
- 발명자 : Murphy, Oliver J. (Bryan, TX, US), Salinas, Carlos (Bryan, TX, US)
- 출원인 : Lynntech, Inc. (College Station, TX, US)
- 초록 : Protecting a membrane and electrode assembly in an electrochemical cell having one or more electrocatalysts in intimate contact with the membrane during storage or shipment of the cell. The membrane may be provided in either the non-proton form of a dry or hydrated cation exchange membrane, such as an alkali metal cation form or an ammonium cation form; the wet or dry pre-

cursor form of a cation exchange membrane, such as the non-ionically conducting sulfonyl-fluoride polymer membrane; or the dry proton form of a cation exchange membrane. These membrane surfaces are not acidic under open circuit conditions experienced during storage or shipment of the cell. Since some electrocatalysts are degraded during contact with the acidic surface of a hydrated membrane, the non-acidic surface of the membrane protects these electrocatalysts. The method may be used on newly assembled electrochemical cells, on cells being taken out of service, and on membrane and electrode assemblies.

■ **Method of manufacturing ceramic porous membrane**

- 등록 번호 : 7608298
- 발명자 : Tanaka, Kei (Gifu-prefecture, JP)
- 출원인 : NGK Insulators, Ltd. (Nagoya, JP)
- 초록 : A method of manufacturing a ceramic porous membrane on inner wall surfaces of through holes of a porous base member. The through holes of the base member are arranged in a vertical direction, a ceramic sol liquid having a temperature difference of 50°C, or less between the sol liquid and the base member is supplied to the inner wall surface of the base member, the liquid supply is stopped when the sol liquid exceeds an upper end portion of the base member, and then the sol liquid is extracted from the bottom of the base member. After the sol liquid is completely extracted, a pressure difference is created so that a pressure on the side of an outer peripheral surface of the base member is lower than that on the side of the inner wall surface of the base member.

■ **Use of outer membrane protein a in treatment/prevention/diagnosis of bacterial infection in central nervous system and/or peripheral blood circulation**

- 등록 번호 : 7608247
- 발명자 : Yang, Yi-Yuan (Taipei, TW), Wu,

Hsueh-Hsia (Taipei, TW), Leu, Sy-Jye (Taipei, TW), Huang, I-Jen (Tainan County, TW), Shih, Neng-Yao (Taipei, TW), Liu, Ko-Jiunn (Taipei, TW), Chen, Mei-Ru (Taipei, TW), Hsieh, Wen-Shyang (Taipei, TW), Lee, Chi-Hsin (Taipei, TW)

- 출원인 : Taipei Medical University (Taipei City, TW)
- 초록 : The present invention provides a method for the treatment and/or prevention of bacterial infection in central nervous system and/or peripheral blood circulation in a mammal by administering effective amount of outer membrane protein A (OmpA) or its derivatives to a mammal. Also provided is an antibody binding to OmpA that can assay OmpA levels in a biological sample and detect or diagnose bacterial infection in central nervous system and/or peripheral blood circulation.

■ **Vacuum enhanced direct contact membrane distillation**

- 등록 번호 : 7608188
- 발명자 : Cath, Tzahi Y. (Reno, NV, US), Adams, V. Dean (Reno, NV, US), Childress, Amy E. (Reno, NV, US)
- 출원인 : Board of Regents of the Nevada System of Higher Education (Reno, NV, US)
- 초록 : The present disclosure provides methods and systems for purifying an impaired liquid. In a particular example, the disclosure provides methods and systems for purifying water containing a solute. A feed stream of solute containing water is introduced in a flow chamber. A permeate stream of water at least substantially free of the solute is placed in the flow chamber. A hydrophobic membrane is placed between the feed stream and the permeate stream. A vacuum is applied to the permeate stream. A vapor pressure differential causes water to vaporize from the feed stream, pass through the hydrophobic membrane, and condense in the permeate stream.

■ **Coated asymmetric membrane system having oleophobic and hydrophilic properties**

- 등록 번호 : 7608186
- 발명자 : Bansal, Vishal (Overland Park, KS, US), Duong, Hieu Minh (Ballston Lake, NY, US)
- 출원인 : General Electric Company (Schenectady, NY, US)
- 초록 : A porous membrane assembly includes, in an exemplary embodiment, a porous membrane substrate having hydrophobic properties. The membrane substrate includes a first side, an opposing second side and a plurality of pores extending therethrough. The membrane substrate also includes a discontinuous layer of an oleophobic coating applied to the first side so that the plurality of pores in the first side are substantially free of the oleophobic coating, and a continuous layer of an amine containing hydrophilic polymer coating applied to the second side of the membrane substrate.

■ **Hollow fiber membrane modules for use in distillation systems**

- 등록 번호 : 7608185
- 발명자 : Liao, Xiaohong (South Windsor, CT, US), Ma, Zidu (Ellington, CT, US), Irish, James R. (Vernon, CT, US)
- 출원인 : Hamilton Sundstrand Corporation (Rockford, IL, US)
- 초록 : A membrane module comprising an outer casing having an interior region, a seal disposed within the outer case, thereby dividing the interior region into a first chamber and a second chamber, and a plurality of hollow fiber membranes extending through the first chamber and the second chamber, where at least a portion of the plurality of hollow fiber membranes have first segments located within the first chamber and second segments located within the second chamber, the first segments being configured to allow

vapor transmission therethrough, and the second segments being configured to substantially prevent vapor transmission therethrough, and further configured to allow transmission of thermal energy therethrough.

■ **Preconditioning fuel cell membrane electrode assemblies**

- 등록 번호 : 7608118
- 발명자 : Anderson, Bradley P. (Andover, MN, US)
- 출원인 : 3M Innovative Properties Company (Saint Paul, MN, US)
- 초록 : A method is presented for preconditioning fuel cell membrane electrode assemblies for use in fuel cell systems which includes exposure to saturated steam at superatmospheric pressures, typically for at least 10 minutes and more typically at least 25 minutes. Typically, the preconditioning method according to the present invention results in reduction of the start up or conditioning time required when the MEA's are first installed in a fuel cell system and improvement of overall performance, as reflected in the achievement of high current density at relatively high voltage. The method may additionally include the step of enclosing the fuel cell membrane electrode assembly in a container which is substantially impervious to water before the fuel cell membrane electrode assembly returns to ambient temperature.

■ **Method and morphologically adaptable apparatus for altering the charge distribution upon living membranes with functional stabilization of the membrane physical electrical integrity**

- 등록 번호 : 7608035
- 발명자 : Farone, William (Irvine, CA, US)
- 출원인 : Gradient Technologies, LLC (Memphis, TN, US)

• 초록 : Method and morphologically adaptable apparatus for altering the charge distribution upon living membranes with functional stabilization of the membrane physical electrical integrity further comprising a method for using quadripolar, circular, center charged, energy balanced magnetic device in a four (4) magnet array of alternating polarity in which the magnetic poles are in multiple planes and are separated by a predetermined distance which provide an effective magnetic sphere of influence on all adjacent poles to suppress the firing of action potentials of mammalian sensory neurons. The method and apparatus further provides a static magnetic device for production of a magnetic field for treatment of various disorders that can be focused at the site of pain or edema to deliver a gradient in the magnetic field to prevent or reduce charge flow. Further there is provided a static magnetic device for production of a magnetic field for treatment of disorders wherein the device provides a static magnetic field such that the focused magnetic field gradient is oriented To be perpendicular to the neuron or membrane charge flow providing maximum deflection of the ion or charge flow.

■ Rooftop vent for reducing pressure under a membrane roof

- 등록 번호 : 7607974
- 발명자 : Jones, James R. (Blacksburg, VA, US), Telionis, Demetri (Blacksburg, VA, US), Vlachos, Pavlos (Blacksburg, VA, US), Grant, Elizabeth (Blacksburg, VA, US), Rullan, Jose (Blacksburg, VA, US), Johnson, Charles S. (Wytheville, VA, US)
- 출원인 : Virginia Tech Intellectual Properties, Inc. (Blacksburg, VA, US)
- 초록 : Membrane roofs are susceptible to damage in high winds. Wind can lift a membrane roof from a building and cause it to tear or become damaged. The present roof vent prevents liftoff and damage by reducing the air pressure under the membrane during high winds. The present roof vent has two opposed

convex domes separated by a gap. Wind blowing across the roof flows between the domes where it accelerates and creates a region of low pressure according to the Venturi effect. The lower dome has an opening at the gap so that the low pressure is applied to the space under the membrane roof. Therefore, when wind blows across the roof, the vent draws air from under the membrane and the membrane is pressed against the roof, preventing liftoff.

■ Electrolyte membrane, membrane electrode assembly using this and fuel cell

- 등록 번호 : 7604887
- 발명자 : Mino, Norihisa (Nara, JP), Hojo, Nobuhiko (Neyagawa, JP), Tanaka, Aoi (Osaka, JP), Akiyama, Takashi (Minoo, JP), Okada, Yukihiro (Katano, JP), Yuasa, Kohji (Hirakata, JP), Inatomi, Yuu (Moriguchi, JP), Yamamoto, Taisuke (Osaka, JP)
- 출원인 : Panasonic Corporation (Osaka, JP)
- 초록 : The electrolyte membrane of the present invention is an electrolyte membrane (1) having ionic conductivity that includes a base material (2) and organic molecules having ion exchange groups, wherein the organic molecules are chemically bonded to the surface of the base material (2) to form an organic layer (3), and ions are conducted via the ion exchange groups in the organic layer (3). By providing this type of electrolyte membrane, it is possible to obtain an electrolyte membrane having ionic conductivity whose configuration is different to that of a conventional electrolyte membrane.

■ Polymer membrane for fuel cell, method of preparing the same, and stack for fuel cell and fuel cell system comprising the same

- 등록번호 : 7604886
- 발명자 : Kim, Hee-Tak (Suwon-si, KR), Yoon, Hae-Kwon (Suwon-si, KR), Suh, Jun-

Won (Suwon-si, KR)

- 출원인 : Samsung SDI Co., Ltd. (Suwon-si, Gyeonggi-do, KR)
- 초록 : The polymer electrolyte membrane of the present invention includes a porous supporter having pores, and a metal ion adsorptive material and a proton conductive polymer which are present in the pores of the porous supporter.

#### ■ Pervaporation composite membranes

- 등록번호 : 7604746
- 발명자 : Childs, Ronald F. (Burlington, CA)  
Yu, Jie (Hamilton, CA)
- 출원인 : McMaster University (Hamilton, Ontario, CA)
- 초록 : The present application discloses a composite membrane comprising (a) a support member that has a plurality of pores extending through the support member and (b) a cross-linked copolymer comprising (i) a cationic monomer and an anionic monomer and/or (ii) a zwitterionic monomer, which cross-linked copolymer fills the pores of the support member, the cross-linked copolymer having a permeability for a fluid that is dependent on the polarity of the fluid, wherein the permeability increases with increasing polarity. The present application also discloses a process for the preparation of the composite membrane, a pervaporation apparatus comprising the composite membrane, and methods for the use of the composite material in separation and dehydration processes.

#### ■ Composite material for ultra thin membranes

- 등록번호 : 7604690
- 발명자 : Smirnov, Valery K. (Yaroslavl, RU),  
Kibalov, Dmirti S. (Yaroslavl, RU)
- 출원인 : Wostec, Inc. (San Francisco, CA, US)

- 초록 : A composite material that may be used for a thin membrane is disclosed. This composite material includes first material that has a quasi-periodic system of vertical trenches (nanotrenches) with wavelength period that may be in the range between 20 and 500 nm. These nanotrenches are formed as openings between bordering elongated elements. The nanotrenches are at least partially filled with a second material that has physical-chemical characteristics substantially different from the first material.

#### ■ Flat membrane element and regeneration method thereof

- 등록번호 : 7604130
- 발명자 : Takemura, Kiyokazu (Chiyoda-ku, JP), Noto, Kazuhiko (Chiyoda-ku, JP), Hatanaka, Mitsuru (Matsudo, JP), Fujimoto, Takashi (Matsudo, JP), Tagashira, Tatsuaki (Matsudo, JP)
- 출원인 : Hitachi Plant Technologies, Ltd. (Tokyo, JP)
- 초록 : To reuse support plate and to fix a membrane sheet by the same method both in a new product manufacturing and in regeneration. In a flat membrane element including a deposit fixed portion formed by lapping a membrane sheet performing solid-liquid separation onto a support plate supporting the membrane sheet and by emitting a laser to a circumferential edge of the membrane sheet to deposit fix the member sheet onto the support plate, and making an inside of the membrane sheet surrounded by the deposit fixed portion be a solid-liquid separating area; an embrocaation having laser absorption property is applied on the surface of the membrane sheet of the deposit fixed portion. At the time of regeneration, such a portion of the membrane sheet that corresponds to the solid-liquid separating area is cut off and, after that, a new membrane sheet is lapped

on the embrocation and the new membrane sheet and the embrocation are deposit fixed by a laser.

■ **Polymer electrolyte membrane and fuel cell**

- 등록번호 : 7601448
- 발명자 : Hidaka, Yasuaki (Edogawa-ku, JP), Iwasaki, Katsuhiko (Tsukuba, JP)
- 출원인 : Sumitomo Chemical Company, Limited (Osaka, JP)
- 초록 : A polymer electrolyte membrane having outstanding water resistance and high thermal resistance, moreover having practical strength required for use as a polymer electrolyte membrane of a solid polymer electrolyte type fuel cell at low price, and a method for producing the polymer electrolyte membrane are provided. A polymer electrolyte comprising a block copolymer comprising one or more of blocks in which sulfonic acid groups are introduced and one or more blocks in which sulfonic acid groups are not substantially introduced wherein at least one block in the block copolymer is a block having aromatic rings in polymer chain, and a porous membrane, and a fuel cell using the membrane are provided. And moreover the present invention provides a method for producing a polymer electrolyte membrane comprising the steps of, (i) impregnating some of pores of a porous membrane with a solution (1) of a poly-

mer electrolyte having a contact angle of less than  $90^\circ$  to said porous membrane, (ii) impregnating a remaining part in the pores of the porous membrane with a solution (2) of a polymer electrolyte having a larger contact angle than that of the solution (1) to said porous membrane, and (iii) removing a solvent.

■ **Sulfonic acid group-containing, proton-conducting polymer composition, a solid electrolyte membrane and a solid polymer fuel cell**

- 등록번호 : 7597980
- 발명자 : Cooray, Nawalage Florence (Kawasaki, JP), Takei, Fumio (Kawasaki, JP), Sawatari, Norio (Kawasaki, JP), Tomoi, Masao (Yokohama, JP)
- 출원인 : Fujitsu Limited (Kawasaki, JP)
- 초록 : A solid electrolyte membrane for solid polymer fuel cells, or the like is provided that is chemically stable in a strong acid atmosphere, and has low methanol cross-over as well as high proton conductivity. The solid electrolyte membrane is manufactured, using an electrolyte composition comprising a sulfonic acid group-containing polymer having a specific triazine structure. This polymer can be synthesized, for example, from a sulfonic acid group-containing dihydroxy compound having a triazine structure, and a difluoride.