

## 최신 미국특허 등록 목록

### ■ Gas separation membrane module assembly with residue manifold

- 등록번호 : 7918921
- 발명자 : Wynn, Nicholas P(Redwood City, CA, US)
- 출원인 : Membrane Technology and Research, Inc(Menlo Park, CA, US)
- 초록 : A gas-separation membrane module assembly and a gas-separation process using the assembly. The assembly includes a set of tubes, each containing gas-separation membrane elements, arranged within a housing. The housing contains tube sheets that divide the space within the housing into three separate, gas-tight spaces, with the tubes mounted in the central space. Feed gas enters the tubes through apertures positioned to feed multiple membrane elements within a tube in parallel, and one or more manifolds are used to collect residue gas from the membrane elements and direct the gas to the residue port or to a second group of membrane elements within the tube. The assembly can be used in various ways to carry out gas separation processes.

### ■ Polymer hybrid membrane structures

- 등록번호 : 7914875
- 발명자 : Jiang, Dayue D(Painted Post, NY, US), Liu, Wei(Richland, WA, US)
- 출원인 : Corning Incorporated(Corning, NY, US)
- 초록 : Hybrid membrane structures that include: an inorganic porous support that includes first and second ends, and a plurality of inner channels having surfaces defined

by porous walls and extending through the support from the first to the second ends; optionally, one or more porous inorganic intermediate layers coating the inner channel surfaces; and a polymeric amine-containing membrane.

### ■ Selective membrane having a high fouling resistance

- 등록번호 : 7913857
- 발명자 : Koo, Ja-Young(Billerica, MA, US), Hong, Sung Pyo(Kyungbuk, KR), Lee, Jong Hwa(Seoul, KR), Ryu, Kwan Young(Seoul, KR)
- 출원인 : Woongjin Chemical Co., Ltd. (Gyeongsangbuk-Do, KR)
- 초록 : A selective membrane having a high fouling resistance. In one embodiment, the selective membrane is a composite polyamide reverse osmosis membrane in which a hydrophilic coating is applied to the polyamide layer of the membrane, the hydrophilic coating being made by covalently bonding a hydrophilic compound to residual acid chlorides of the polyamide membrane, the hydrophilic compound including (i) at least one reactive group that is adapted to covalently bond directly to the polyamide membrane, the at least one reactive group being at least one of a primary amine and a secondary amine; and (ii) at least one non-terminal hydroxyl group.

### ■ Isolated gas sensor configuration

- 등록번호 : 7913542
- 발명자 : Pendergrass, Robert(Saugus, CA, US)

- 출원인 : H2Scan Corporation(Valencia, CA, US)
- 초록 : A gas sensor assembly detects a constituent in a gaseous stream. The assembly comprises: (a) a mounting surface, (b) a sensor mounted on the mounting surface and sensor capable of generating a detectable signal in the presence of the constituent, and (c) an enclosing structure. The enclosing structure comprises: (i) a walled component having a pair of vertically spaced ends and mounted at one end on the mounting surface so as to circumscribe the sensor, and (ii) a gas-permeable membrane attached at the other end of the walled component, thereby defining an interior volume within said enclosing structure. Flowing the gaseous stream across the membrane infuses a portion of the gaseous stream into said interior volume containing the sensor.

■ Polymer electrolyte membrane and method for producing polymer electrolyte membrane

- 등록번호 : 7910237
- 발명자 : Kubota, Makoto(Yokohama, JP), Kobayashi, Motokazu(Yokohama, JP), Abe, Keiko (Kawasaki, JP)
- 출원인 : Canon Kabushiki Kaisha(Tokyo, JP)
- 초록 : The present invention can provide a polymer electrolyte membrane having power generation characteristics with a high output and long life and a polymer electrolyte fuel cell using the same. The present invention provides a polymer electrolyte membrane having a porous polymer film and a proton conducting component present in a hole of the porous polymer film, characterized in that the proton conducting component has a compound having a proton conducting group and a bicyclo ring structure.

■ Method and system for monitoring reverse osmosis membranes

- 등록번호 : 7910004
- 발명자 : Cohen, Yoram(Los Angeles, CA , US), Uchymiak, Michal(Naples, FL , US)

- 출원인 : The Regents of the University of California (Oakland, CA, US)
- 초록 : A monitoring system and a method for monitoring a reverse osmosis (RO) membrane in an RO unit is capable of detecting the formation of mineral salt crystals on the surface of the RO membrane. The monitoring system includes a reverse osmosis monitoring cell coupled to the RO unit so as to receive a sample stream taken from either the feed stream to, or the concentrate stream from, the RO unit. The cell has a visually observable RO membrane that is visible to an imaging system that creates and collects images of the visually-observable RO membrane, and that conveys an image data signal to a data processing system that is operable to translate the image data signal into visual images for display, and to correlate the data in the image data signal with a scaling condition on the RO membrane in the RO unit.

■ Polysulfone and poly(N-vinyl lactam) polymer alloy and fiber and filter materials made of the alloy

- 등록번호 : 7910003
- 발명자 : Ferrer, Ismael(Minneapolis, MN, US), Cardinal, Richard S.(Minneapolis, MN, US), Kalayci, Veli(Farmington, MN, US)
- 출원인 : Donaldson Company, Inc.(Minneapolis, MN, US)
- 초록 : A polymer alloy has been developed comprising a polysulfone and a vinyl lactam polymer. The resulting alloy has excellent thermal characteristics and even in the presence of substantial quantities in vinyl lactam polymers, has solvent resistance to both organic and aqueous solvent materials. The materials, when dissolved in solvents, can be spun from a variety of solvents into a variety of useful fiber materials. The resulting fine fiber, microfiber and nanofiber materials have excellent thermal and chemical resistance for a variety of fiber applications. The polymer alloys of the invention can be spun into nanofiber mats that can act as a filtration media

and can also be combined into conventional substrate materials for fabrication into filter structures.

■ **Process for recovering heavy oil utilizing one or more membranes**

- 등록번호 : 7909098
- 발명자 : Minnich, Keith R(Pewaukee, WI, US), Banerjee, Kashi(Moon Township, PA, US)
- 출원인 : HPD, LLC(Plainfield, IL, US)
- 초록 : An oil recovery process utilizes one or more membranes to remove silica and/or oil from produced water. In one method, the process includes separating oil from produced water and precipitating silica. The produced water having the precipitated silica is directed to a membrane, such as a ceramic membrane, which removes the precipitated silica from the produced water. In some cases, residual oil is present and is also removed by the membrane.

■ **Ion mobility spectrometer and method for operation**

- 등록번호 : 7902501
- 발명자 : Landgraf, Jürgen(Gutenberg, DE)
- 출원인 : Bruker Daltonik GmbH(Bremen, DE)
- 초록 : A method for operating an ion mobility spectrometer comprises supplying an analyte substance into a reaction chamber of an ion mobility spectrometer having a closed internal gas circuit and at least one membrane inlet having an inner membrane chamber, changing at least one of flow resistances and gas paths in the closed internal gas circuit, and controlling at least one of a quantity and a concentration of analyte-containing gas flowing from the inner membrane chamber to the reaction chamber.

■ **Ion-exchange membranes structured in the thickness and process for manufacturing these membranes**

- 등록번호 : 7901831
- 발명자 : Brunea, John A.(Brussels, BE)
- 출원인 : SOLVAY (Société Anonyme)(Brussels, BE)
- 초록 : Monolayer ion-exchange membrane structured in the thickness comprising ion-exchange sites covalently bonded to a support polymer, the membrane comprising two surface zones located on either side of a mid-zone, each surface zone having a thickness of not more than 15% of the total thickness of the membrane, in which the surface zones have a mean ion-exchange site density  $D_{\text{surface}}$  calculated on the thickness of the surface zones of at least  $D_{\text{total}}$ .

■ **Brackish and sea water desalination using a hybrid ion exchange-nanofiltration process**

- 등록번호 : 7901577
- 발명자 : SenGupta, Arup K.(Bethlehem, PA, US), Sarkar, Sudipta(Bethlehem, PA, US)
- 출원인 : SenGupta Arup K.(Bethlehem, PA, US)
- 초록 : Desalination is carried out by a hybrid ion exchange-nanofiltration process in which ion exchange is followed by pressure-driven nanofiltration. Monovalent ions of sodium and chloride of saline water are exchanged for equivalent concentrations of poly-valent ions (for example, sodium ions for magnesium ions or chloride ions for sulfate ions) when passed through ion exchangers in the form of those poly-valent ions. The resultant solution has a lower osmotic pressure than the initial solution containing monovalent sodium and chloride ions, and requires less transmembrane pressure for membrane desalination compared to traditional reverse osmosis. The concentrated reject stream from the mem-

brane process is used as regenerant for the exhausted ion exchanger, which has been converted to monovalent anionic or cationic form.

■ **Process for preparing acrolein or acrylic acid or a mixture thereof from propane**

- 등록번호 : 7897812
- 발명자 : Machhammer, Otto(Mannheim, DE), Mueller-Engel, Klaus Joachim (Stutensee, DE), Dieterle, Martin (Ludwigshafen, DE)
- 출원인 : BASF Aktiengesellschaft(Ludwigshafen, DE)
- 초록 : A process for preparing acrolein or acrylic acid or a mixture thereof as the target product from propane, in which propane is partially dehydrogenated under heterogeneous catalysis in a reaction zone A, molecular hydrogen formed is at least partly combusted to water, any water present in the product gas A formed in reaction zone A is removed therefrom and product gas A is otherwise used to charge a reaction zone B in which propylene formed in reaction zone A is partially oxidized in the presence of remaining propane to give the target product. The target product is removed from the product gas B formed in reaction zone B and propane present in the remaining residual gas is absorbed therefrom into a solvent and, after release from the absorbate, recycled into reaction zone A.

■ **Sulfonated perfluorocyclobutane block copolymers and proton conductive polymer membranes**

- 등록번호 : 7897692
- 발명자 : Mackinnon, Sean M(West Henrietta, NY, US), Fuller, Timothy J.(Pittsford, NY, US), Coms, Frank(Fairport, NY, US)
- 출원인 : GM Global Technology Operations, Inc.(Detroit, MI, US)
- 초록 : A sulfonated aromatic perfluorocyclobutane block copolymer comprises a hydrophobic perfluorocyclobutane ether chain segment and a

hydrophilic sulfonated perfluorocyclobutane ether chain segment. The sulfonated perfluorocyclobutane copolymer may be used to make proton conductive membranes and membrane electrode assemblies in fuel cells. Processes of making the block copolymer through thermal coupling reactions are also disclosed.

■ **Proton exchange membranes for fuel cell applications**

- 등록번호 : 7897691
- 발명자 : MacKinnon, Sean M(West Henrietta, NY, US), Fuller, Timothy J.(Pittsford, NY, US), Coms, Frank(Fairport, NY, US), Schoeneweiss, Michael R.(W. Henrietta, NY, US)
- 출원인 : GM Global Technology Operations, Inc.(Detroit, MI, US)
- 초록 : A proton conductive graft polymer comprises at least a structure unit of a sulfonated polymer side chain covalently attached to a hydrophobic perfluorocyclobutane polymer main chain. The sulfonated condensation polymer side chain has a high local ion exchange capacity while the main polymer chain is substantially free of sulfonic acid group. A membrane made from the graft polymer can provide good mechanical properties and high proton conductivity at wide range of humidity and temperatures.

■ **Ionically conductive polymers for use in fuel cells**

- 등록번호 : 7897650
- 발명자 : Sayre, Jay R.(Gahanna, OH, US), Lalgudi, Ramanathan S.(Westerville, OH, US), Vijayendran, Bhima R.(Dublin, OH, US)
- 출원인 : -
- 초록 : An ionically conductive polymer is a copolymer including first and second polymer segments. The first polymer segments have a hydrophobic character and a high oxygen permeability. The second polymer segments have a

hydrophilic character and a low oxygen permeability. The copolymer has an ionic conductivity of at least about  $1 \times 10^{-5}$  S/cm at any point within a temperature range of from 30°C. to 150°C. and a relative humidity range of from 20% to 100%. The ionically conductive polymer can be used in an electrochemical device such as a fuel cell, for example, used as a binder in an electrode or used to produce a membrane.

#### ■ Oxygen monitoring apparatus

- 등록번호 : 7897109
- 발명자 : Labuda, Lawrence L.(Coupeville, WA, US), Blazewicz, Perry R.(Tacoma, WA, US), Mace, Leslie E.(Mercer Island, WA, US), Apperson, Jerry R.(Lake Forest Park, WA, US), Cooke, Walter A.(Monroe, WA, US)
- 출원인 : RIC Investments, LLC(Wilmington, DE, US)
- 초록 : Apparatus or systems which employ luminescence quenching to produce an oxygen concentration indicative signal. Components of such systems include: (1) an airway adapter, sampling cell, or the like having a sensor which is excited into luminescence with the luminescence decaying in a manner reflecting the concentration of oxygen in gases flowing through the airway adapter or other flow device; (2) a transducer which has a light source for exciting a luminescable composition in the sensor into luminescence and a light sensitive detector for converting energy emitted from the luminescing composition as that composition is quenched into an electrical-signal indicative of oxygen concentration in the gases being monitored; and (3) subsystems for maintaining the sensor temperature constant and for processing the signal generated by the light sensitive detector. Sensors for systems of the character just described, methods of fabricating those sensors, and methods for installing the sensors

in the flow device.

#### ■ Membranes for separation of carbon dioxide

- 등록번호 : 7896949
- 발명자 : Ku, Anthony Yu-Chung(Rexford, NY, US), Ruud, James Anthony(Delmar, NY, US), Ramaswamy, Vidya(Niskayuna, NY, US), Willson, Patrick Daniel(Latham, NY, US), Gao, Yan(Niskayuna, NY, US)
- 출원인 : General Electric Company(Niskayuna, NY, US)
- 초록 : Methods for separating carbon dioxide from a fluid stream at a temperature higher than about 200°C. with selectivity higher than Knudsen diffusion selectivity include contacting a porous membrane with the fluid stream to preferentially transport carbon dioxide. The porous membrane includes a porous support and a continuous porous separation layer disposed on a surface of the porous support and extending between the fluid stream and the porous support layer. The porous support comprises alumina, silica, zirconia, stabilized zirconia, stainless steel, titanium, nickel-based alloys, aluminum-based alloys, zirconium-based alloys or a combination thereof. Median pore size of the porous separation layer is less than about 10 nm, and the porous separation layer comprises titania, MgO, CaO, SrO, BaO, La<sub>2</sub>O<sub>3</sub>, CeO<sub>2</sub>, HfO<sub>2</sub>, Y<sub>2</sub>O<sub>3</sub>, VO<sub>z</sub>, NbO<sub>z</sub>, TaO<sub>z</sub>, ATiO<sub>3</sub>, AZrO<sub>3</sub>, AAl<sub>2</sub>O<sub>4</sub>, A<sup>1</sup>FeO<sub>3</sub>, A<sup>1</sup>MnO<sub>3</sub>, A<sup>1</sup>CoO<sub>3</sub>, A<sup>1</sup>NiO<sub>3</sub>, A<sup>2</sup>HfO<sub>3</sub>, A<sup>3</sup>CeO<sub>3</sub>, Li<sub>2</sub>ZrO<sub>3</sub>, Li<sub>2</sub>SiO<sub>3</sub>, Li<sub>2</sub>TiO<sub>3</sub>, Li<sub>2</sub>HfO<sub>3</sub>, A<sup>4</sup>N<sub>1-y</sub>O<sub>z</sub>, Y<sub>x</sub>N<sub>1-y</sub>O<sub>z</sub>, La<sub>x</sub>N<sub>1-y</sub>O<sub>z</sub>, HfN<sup>2-y</sup>O<sub>z</sub>, or a combination thereof;
  - o wherein <sup>1</sup>is La, Ca, Sr or Ba; <sup>2</sup>is Ca, Sr or Ba; <sup>3</sup>is Sr or Ba; <sup>4</sup>is Mg, Ca, Sr, Ba, Ti or Zr; <sup>1</sup>is V, Nb, Ta, Cr, Mo, W, Mn, Si or Ge; <sup>2</sup>is V, Mo, W or Si;

■ Hydrogen supplying apparatus and method of manufacturing hydrogen supplying apparatus

- 등록번호 : 7896933
- 발명자 : Sato, Akihiro(Hitachinaka, JP), Ishikawa, Takao(Hitachi, JP), Aota, Kinya(Hitachi, JP)
- 출원인 : Hitachi, Ltd.(Tokyo, JP)
- 초록 : A hydrogen supplying apparatus equipped with a hydrogen separation membrane and a catalyst plate, which is made by forming a catalyst layer on a metal plate, wherein the metal material of the membrane is different in hardness from that of the catalyst plate. A method of producing the hydrogen supplying apparatus, which comprises: bonding a catalyst plate and a hydrogen separation membrane to each other, by friction-stir welding, wherein a welding tool is pressed towards only one of the membrane and catalyst plate, forming a reaction layer between the membrane and the catalyst plate by the frictional heat, and forming ripples in the welded interface.

■ Polymer electrolyte membrane, method of preparing the same and fuel cell including the same

- 등록번호 : 7893119
- 발명자 : Lee, Jin-gyu(Seoul, KR), Mah, Sang-kook(Seoul, KR), Jung, Myung-sup(Seongnam-si, KR), Lee, Jae-jun(Suwon-si, KR), Kim, Do-yun(Seongnam-si, KR)
- 출원인 : Samsung SDI Co., Ltd.(Yongin-si, KR)
- 초록 : A polymer electrolyte membrane including a polysilsesquioxane group-containing copolymer and an ionic conductive polymer is provided. A method of preparing the polymer electrolyte membrane and a fuel cell including the polymer electrolyte membrane is also provided. The polymer electrolyte membrane has improved ion conductivity and an improved ability to suppress methanol crossover, and therefore can be used as an electrolyte membrane for a fuel cell, including a direct methanol fuel cell.

■ Features for barrier film support

- 등록번호 : 7892692
- 발명자 : Beutel, Matthew J.(Webster, NY, US)
- 출원인 : GM Global Technology Operations LLC(Detroit, MI, US)
- 초록 : A barrier film for a fuel cell is provided, including a polymeric membrane having a plurality of support features. The support features are adapted to militate against a deflection of the membrane under a pressure differential across the membrane. A fuel cell employing the barrier film has a first plate with a port formed therein, and a second plate disposed adjacent the first plate. The barrier film is disposed between the first plate and the second plate. The support features of the barrier film militate against an intrusion of the membrane into the port. A fuel cell stack formed from a plurality of the fuel cells is also provided.

■ Polyolefin microporous membrane base for non-aqueous secondary battery separator, method for producing the same, nonaqueous secondary battery separator and nonaqueous secondary battery

- 등록번호 : 7892672
- 발명자 : Nishikawa, Satoshi(Iwakuni, JP)
- 출원인 : Teijin Limited(Osaka, JP)
- 초록 : A nonaqueous secondary battery separator is provided that is excellent in heat resistance, shutdown characteristics, membrane resistance and handling property. The present invention is a polyolefin microporous membrane used for a nonaqueous secondary battery separator containing the polyolefin microporous membrane at least one surface of which is coated and integrated with a heat resistant porous layer, characterized in that the membrane has (A) a thickness of 5 to 20  $\mu\text{m}$ , (B) a porosity of 35 to 50%, (C) an air permeability per unit thickness (JIS P8117) of 10 to 30  $\text{sec}/100 \text{cc} \cdot \mu\text{m}$  and a total air permeability of the membrane (JIS P8117) of 400  $\text{sec}/100 \text{cc}$  or less, and (D)

Y/X of  $1 \times 10^{-3}$  to  $1 \times 10^{-2}$  ohm · cm<sup>2</sup>/(sec/100 cc), wherein the air permeability (JIS P8117) is represented by X sec/100 cc, and the membrane resistance upon impregnating the polyolefin microporous membrane with an electrolytic solution is represented by Y ohm · cm<sup>2</sup>.

#### ■ Process of forming multilayered structures

- 등록번호 : 7891500
- 발명자 : Kools, Willem(Winchester, MA, US)
- 출원인 : Millipore Corporation(Bedford, MA, US)
- 초록 : 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.

#### ■ Concept for slurry separation and biogas production

- 등록번호 : 7883884
- 발명자 : Bonde, Torben(Egaa, DK), Pedersen, Lars Jorgen(Hadsten, DK)
- 출원인 : GFE Patent A/S(Loejstrup, DK)
- 초록 : The present invention concerns an anaerobic digestion of animal manures, energy crops and similar organic substrates. The process is capable of refining nutrients comprised in the digested biomass to fertilizers of commercial quality. The invention also provides a method for processing animal car-

asses or fractions thereof including meat and bone meal etc., with the objective of providing an alternative means for processing the organic waste material of animal origin while at the same time facilitating the production of fertilizers. The risk of spreading BSE prions or any other prions to animals or humans is thus substantially reduced if not eliminated. The biogas and slurry separation system according to the present invention is preferably integrated with the operations of animal husbandries into a total concept in which the internal and external performances of animal husbandries are optimised. The internal performances concern quality aspects related to the management of the animal houses and include industrial hygiene, animal welfare, gaseous and dust emissions and food safety. The external performances concern mainly energy production and emissions to the environment of nutrients and greenhouse gases and the sale of high quality food product.

#### ■ Ion conductive composite membrane using inorganic conductor and method of manufacturing the same

- 등록번호 : 7883820
- 발명자 : Chang, Hyuk(Seongnam-si, KR), Kim, Hae-kyoung(Seoul, KR), Kim, Hasuck(Seoul, KR), Lee, Jin-Kyu(Seoul, KR), Park, Sangook (Seoul, KR), Ha, Shin Woo(Seoul, KR)
- 출원인 : Samsung SDI Co., Ltd.(Suwon-si, Gyeonggi-do, KR)
- 초록 : An ion-conductive composite membrane and a method of manufacturing the same, the membrane including phosphate platelets, a silicon compound, and a Keggin-type oxometalate and/or Keggin-type heteropoly acid, wherein the phosphate platelets are three-dimensionally connected to each other via the silicon compound. An electrolyte membrane having an ion-conductive inor-

ganic membrane or an ion-conductive organic/inorganic composite membrane effectively prevents crossover of liquid fuel without the reduction of ion conductivity in a liquid fuel cell, thereby allowing for the production of fuel cells having excellent performance.

■ **Process for producing proton-conducting polymer membranes, improved polymer membranes and the use thereof in fuel cells**

• 등록번호 : 7883818

• 발명자 : Kiefer, Joachim(Losheim am See, DE), Uensal, Oemer(Mainz, DE), Calundann, Gordon(North Plainfield, NJ, US), Leister, Ursula(Hattersheim, DE), Brehl, Kilian (Weilmünster, DE), Thiemer, Edmund (Flacht, DE), Schlegel, Melanie (Stockstadt, DE)

• 출원인 : BASF Fuel Cell GmbH(Frankfurt, DE)

• 초록 : The present invention relates to a proton-conducting polymer membrane comprising polyazoles which is obtainable by a process comprising the steps

- A) preparation of a mixture comprising
  - o polyphosphoric acid,
  - o at least one polyazole and/or one or more compounds suitable for forming polyazoles under the action of heat in step B),
- B) heating of the mixture obtainable according to step A) to temperatures up to 400°C. under inert gas,
- C) application of a layer to a support using the mixture from step A) and/or B),
- D) treatment of the membrane formed in step C) until it is self-supporting, wherein the treatment of the membrane is carried out using a hydrolysis liquid comprising oxo acids of phosphorus and/or oxo acids of sulfur.

■ **Organic/inorganic composite porous membrane**

**and electrochemical device using the same**

• 등록번호 : 7883799

• 발명자 : Seo, Dae Jong(Daejeon, KR), Kim, Seok Koo(Daejeon, KR), Hong, Jang Hyuk (Daejeon, KR), Sohn, Joon Yong(Busan, KR), Lee, Sang Young (Daejeon, KR), Ahn, Soon Ho(Daejeon, KR)

• 출원인 : LG Chem, Ltd.(KR)

• 초록 : The present invention provides an organic/inorganic composite porous separator, which comprises: (a) a porous substrate having pores; and (b) an organic/inorganic composite layer formed by coating at least one region selected from the group consisting of a surface of the substrate and a part of pores present in the substrate with a mixture of inorganic porous particles and a binder polymer, wherein the inorganic porous particles have a plurality of macropores with a diameter of 50 nm or greater in the particle itself thereby form a pore structure, a manufacturing method thereof, and an electrochemical device using the same. As an additional pathway for lithium ions is created due to a number of pores existing in the inorganic porous particle itself, degradation in the battery performance can be minimized, and energy density per unit weight can be increased by the weight loss effect.

■ **Multiblock copolymer, method of preparing the same, polymer electrolyte membrane prepared from the multiblock copolymer, method of preparing the polymer electrolyte membrane, and fuel cell employing the polymer electrolyte membrane**

• 등록번호 : 7879971

• 발명자 : Kim, Hae-kyoung(Yongin-si, KR), Lee, Won-mok(Yongin-si, KR), Chang, Hyuk (Yongin-si, KR), Jung, Jin Chul (Yongin-si, KR), Park, Sam Dae(Yongin-si, KR), Chang, Yun Ju(Yongin-si, KR)

• 출원인 : Samsung SDI, Co., Ltd.(Gyeonggi-do, KR)



- 초록 : A multiblock copolymer includes a polysulfone repeating unit, a sulfonated polysulfone repeating unit, a polydialkylsiloxane repeating unit and an ethylenic unsaturated group at a terminal of the multiblock copolymer. Also provided are a method of preparing the multiblock copolymer, a polymer electrolyte membrane prepared from the multiblock copolymer, a method of preparing the polymer electrolyte membrane, and a fuel cell including the polymer electrolyte membrane. The polymer electrolyte membrane that has a high ionic conductivity and good mechanical properties and minimizes crossover of methanol can be manufactured at low cost. In addition, the structure of the multiblock copolymer can be varied to increase selectivity to a solvent used in a polymer electrolyte membrane.

#### ■ Barrier-permeable proxy reporter analysis

- 등록번호 : 7879622
- 발명자 : Fries, David(St. Petersburg, FL, US), Gregson, Brian(St. Petersburg, FL, US)
- 출원인 : University of South Florida(Tampa, FL, US)
- 초록 : Analysis of complex media (e.g. -blood and seawater) is difficult because the media are composed of particles of different sizes and chemical profiles. Disclosed is a method for the detection of a constituent in a medium that enhances the molecular selectivity of a detector by separating the detector from the medium by a membrane of specified permeability. Proxy reporters are employed to enhance particle specificity. The novel combination of the invention has application to chemical detection in a broad range of fields.

#### ■ Separator for low-temperature type fuel cell and production method therefor

- 등록번호 : 7879508
- 발명자 : Miyano, Tsutomu(Osaka, JP), Shimizu,

Takeshi(Osaka, JP), Izumi, Keiji(Osaka, JP), Morita, Yoshikazu(Osaka, JP), Kamoshida, Shinichi(Osaka, JP), Kingetsu, Toshiki(Osaka, JP)

- 출원인 : Nisshin Steel Co., Ltd.(Tokyo, JP)
- 초록 : A stainless steel sheet useful as a separator for a low-temperature fuel cell has the surface state that a lot of fine projections (p) stand close together around many fine pits (d) formed over a whole surface. The surface state is realized by alternating electrolytic etching in a ferric chloride solution. When the stainless steel separator is built in a fuel cell, contact resistance between the separator and a graphite electrode is kept at a lower level even in a corrosive atmosphere. Consequently, the fuel cell can be driven with high power-generating efficiency over a long term even under severely corrosive conditions without generation of massive Joule heat.

#### ■ Solid polymer electrolyte membrane, method for manufacturing the same, and fuel cell using the solid polymer electrolyte membrane

- 등록번호 : 7879506
- 발명자 : Fujibayashi, Fusaki(Kanagawa, JP)
- 출원인 : Samsung SDI Co., Ltd.(Suwon, KR)
- 초록 : A solid polymer electrolyte membrane that exhibits stable energy generation performance for a long period of time at an operation temperature of about 100°C. to about 300°C. in an unhumidified condition or a relative humidity of about 50%. A method for manufacturing the solid polymer electrolyte membrane and a fuel cell that uses the solid polymer electrolyte membrane are provided. The solid polymer electrolyte membrane comprises a polymer compound that has a side chain that includes a unit represented by Formula (a) that is formed at a heterocyclic nitrogen atom of a polybenzimidazole.

■ Conversion system for reducing NO

- 등록번호 : 7879295
- 발명자 : Liu, Ke(Rancho Santa Margarita, CA, US), Frydman, Arnaldo(Santa Ana, CA, US), Zamansky, Vladimir (Oceanside, CA, US), Rocha, Teresa Grocela(Clifton Park, NY, US), Male, Jonathan Lloyd (Schoharie, NY, US), Acharya, Harish Radhakrishna (Clifton Park, NY, US), Primus, Roy James(Niskayuna, NY, US)
- 출원인 : General Electric Company(Niskayuna, NY, US)
- 초록 : Disclosed herein is a system for reducing NO<sub>x</sub> emissions comprising a fuel tank in fluid communication with a fuel converter, wherein the fuel converter is located down stream of the fuel tank and wherein the fuel converter comprises a catalyst composition that is operative to continuously convert heavy hydrocarbon molecules having 9 or more carbon atoms per molecule into light hydrocarbon molecules having 8 or less carbon atoms per molecule; a selective catalytic reduction catalyst reactor in fluid communication with the fuel converter and located downstream of the fuel converter; and an engine in fluid communication with the fuel tank and the selective catalytic reduction catalyst reactor, wherein the engine is located downstream of the fuel tank and upstream of the selective catalytic reduction catalyst reactor.

■ Solvent removal process

- 등록번호 : 7879243
- 발명자 : Al-Mayahi, Abdulsalam(Surrey, GB), Sharif, Adel(Guildford, GB)
- 출원인 : Surrey Aquatechnology Limited (Surrey, GB)
- 초록 : A process for removing a solvent from a first solution, said process comprising positioning a selective membrane between the first solution and a second solution having a higher osmotic potential than the first solution, such that solvent from the first solution passes

across the membrane to dilute the second solution, and extracting solvent from the second solution, wherein the membrane has an average pore size of at least 10 Angstroms, and wherein the second solution contains solute species that are too large to pass through the pores of the membrane.

■ Polymer electrolyte membrane having high durability and method for producing the same

- 등록번호 : 7875392
- 발명자 : Miyake, Naoto(Kamakura, JP), Wakizoe, Masanobu(Tokyo, JP), Honda, Eiji (Yokohama, JP)
- 출원인 : Asahi Kasei Chemicals Corporation (Tokyo, JP)
- 초록 : A polymer electrolyte membrane comprising: (a) a fluorinated polymer electrolyte having an ion exchange group, and (b) a basic polymer, wherein, optionally, at least a part of component (a) and at least a part of component (b) are chemically bonded to each other. A method for producing the above-mentioned polymer electrolyte membrane. A membrane/electrode assembly comprising the above-mentioned polymer electrolyte membrane which is securely sandwiched between an anode and a cathode. A polymer electrolyte fuel cell comprising the membrane/electrode assembly.

■ Side stream type membrane bioreactor process

- 등록번호 : 7875179
- 발명자 : Suzuki, Shigehiro(Tokyo, JP), Noguchi, Motoharu(Tokyo, JP), Kando, Koichiro (Tokyo, JP)
- 출원인 : Metawater Co., Ltd.(Tokyo, JP)
- 초록 : The invention provides a side stream type membrane bioreactor process which does not cause an excessive fall in the MLSS concentration in a bioreactor, does not require any additional effluent treatment facility for discharging backwash effluent, and can further ensure the

stability of the membrane filtration performance of a separation membrane. According to the invention, in a side stream type membrane bioreactor process, a backwash effluent containing foulants that are generated by backwashing a separation membrane is collected in a backwash effluent tank, and subjected to ozone treatment, and the resultant is returned to a bioreactor. By this ozone treatment, the foulants close to the membrane pore size of the separation membrane are made fine or are made into a state be easily taken into activated sludge flocs. Therefore, even when the treated effluent is returned to the bioreactor, the membrane filtration performance of the separation membrane is not deteriorated.

■ Membrane module for fluid filtration

- 등록번호 : 7875176
- 발명자 : Rolchigo, Philip M.(Eden Prairie, MN,

US), Burban, John H.(Lake Elmo, MN, US), Shanahan, John(White Bear Lake, MN, US), Crowder, Robert O.(Lino Lakes, MN, US)

- 출원인 : Porous Media Corporation(St. Paul, MN, US)
- 초록 : Embodiments of the invention provide a membrane module including a first plurality of fibers capable of filtering fluids that are helically wound in layers creating a mono helix. Fluids to be treated can flow radially with respect to a longitudinal axis of the mono helix or parallel to the longitudinal axis of the mono helix. The membrane module can further include a second plurality of fibers that are helically wound with the first plurality of fibers to create a dual helix. The second plurality of fibers can have different properties than the first plurality of fibers in order to achieve different filtering functionalities.