

최신 미국특허 등록 목록

■ Membrane structure and method of making

- 등록번호 : 7717271
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- 출원인 : General Electric Company(Niskayuna, NY, US)
- 초록 : A membrane structure is provided. The membrane structure includes a first layer having a plurality of interconnected pores; and a second layer disposed on the first layer. The second layer has a plurality of unconnected pores. Each of the unconnected pores is in fluid communication with at least one of the interconnected pores of the first layer. A method of making a membrane structure is provided. The method includes the steps of providing a first layer having a plurality of interconnected pores; and disposing a second layer on the first layer. Disposing a second layer includes depositing a conducting layer on the first layer; and anodizing the conducting layer to convert the conducting layer into a porous layer.

■ Method for wastewater treatment with resource recovery and reduced residual solids generation

- 등록번호 : 7713417
- 발명자 : Sutton, Paul M.(Enfield, NH, US)
- 출원인 : Envirogen Technologies, Inc.(Ewing, NJ, US)

- 초록 : A wastewater treatment system is provided including an aerobic membrane bioreactor and an anaerobic digester system connected to receive wasted solids continuously from the aerobic membrane bioreactor and also connected to return effluent from the anaerobic digester system continuously to the aerobic membrane bioreactor. Further, a process is provided for treating wastewater including the step of wasting a volume fraction of organic cell mass from an aerobic membrane bioreactor to an anaerobic digester system and maintaining a solids retention time (SRT) in the bioreactor that is (1) greater than a time needed to achieve growth of organisms suitable for converting carbonaceous biochemical oxygen demand (CBOD) into cell mass and (2) less than a time at which substantial decay of the organisms occurs. The system and process may further include optional pretreatment and/or phosphorus and/or nitrogen removal downstream of the membrane bioreactor system.

■ Carbon dioxide separation system for fuel cell system

- 등록번호 : 7713332
- 발명자 : Bronold, Matthias(Berlin, DE)
- 출원인 : Samsung SDI Co., Ltd.(Maetun-dong, Yeongtong-gu, Suwon-si, Gyeonggi-do, KR), Samsung SDI Germany GmbH (Berlin, DE)
- 초록 : A carbon dioxide separation system for a fuel cell system having a small volume and weight of a separation device and of a membrane, at simultaneous increase of the separated volume of carbon dioxide, comprises a separation device for containing a fluid phase, a

carbon dioxide phase, and a two phase fluid including fluid and carbon dioxide. The separation device comprises a two phase fluid inlet, a fluid outlet, a carbon dioxide outlet, a carbon dioxide separation membrane, and a flow restrictor creating a backpressure which presses separated carbon dioxide through the carbon dioxide separation membrane. The flow restrictor comprises at least one narrow aperture, and is mounted downstream of the separation device. The carbon dioxide separation membrane is positioned in the separation device in such a manner that at least a part of the total membrane area is arranged above a two phase fluid level and is in touch with carbon dioxide contained in the separation device above the two phase fluid level.

■ Water treating apparatus

- 등록번호 : 7708882
- 발명자 : Kobayashi, Masato(Tokyo, JP)
- 출원인 : Eco Creative Japan Co.,Ltd.
(Kanagawa-Ken, JP)
- 초록 : A vertical membrane module unit is allowed to be installed even at a place with a low ceiling. A housing containing a vertical membrane module unit is held by a housing holder. The housing holder holds the housing tiltably such that the housing can be positioned with the longitudinal direction of the membrane module unit being substantially vertical when treated water is extracted, and the housing can be positioned with the longitudinal direction of the membrane module unit being substantially horizontal when the membrane module unit is removed from the housing.

■ Hydrogen permeable membrane

- 등록번호 : 7708809
- 발명자 : Kita, Koichi(Saitama, JP), Hara, Shigeki(Tsukuba, JP), Itoh, Naotsugu(Tsukuba, JP)
- 출원인 : Mitsubishi Materials Corporation
(Tokyo, JP)

- 초록 : A hydrogen permeable membrane which has an excellent high-temperature amorphous stability and a long lifetime under high-temperature heating operation and which can be miniaturized for use in a high-performance hydrogen purifier. The hydrogen permeable membrane is made of a non-crystalline nickel-zirconium alloy or zirconium-nickel alloy composed of 44 to 75 atom % of nickel or zirconium; and 0.2 to 16 atom % of aluminum, 0.2 to 12 atom % of vanadium and/or niobium, or 0.2 to 12 atom % of niobium and 0.1 to 10 atom % of phosphorus (provided that the combined amount of niobium and phosphorus is not more than 18 atom %); with the balance being zirconium or nickel and unavoidable impurities.

■ Ion conducting organic/inorganic hybrid polymers

- 등록번호 : 7704622
- 발명자 : Meador, Maryann B.(Strongsville, OH, US), Kinder, James D.(Canfield, OH, US)
- 출원인 : The United States of America as represented by the Administrator of the National Aeronautics and Space Administration(Washington, DC, US)
- 초록 : This invention relates to a series of organic/inorganic hybrid polymers that are easy to fabricate into dimensionally stable films with good ion-conductivity over a wide range of temperatures for use in a variety of applications. The polymers are prepared by the reaction of amines, preferably diamines and mixtures thereof with monoamines with epoxy-functionalized alkoxysilanes. The products of the reaction are polymerized by hydrolysis of the alkoxysilane groups to produce an organic-containing silica network. Suitable functionality introduced into the amine and alkoxysilane groups produce solid polymeric membranes which conduct ions for use in fuel cells, high-performance solid

state batteries, chemical sensors, electrochemical capacitors, electro-chromic windows or displays, analog memory devices and the like.

■ Hollow fiber membrane module and method for making thereof

- 등록번호 : 7704393
- 발명자 : Noh, Soo-Hong(Wonju, KR), Kwon, Oh-Sung(Seoul, KR), Chang, Jin-Ho(Seoul, KR), Kim, Sang-Hoon(Suwon, KR)
- 출원인 : Industry-Academic Cooperation Foundation(Seoul, KR)
- 초록 : It is an object of the present invention to provide a hollow fiber membrane module which maximizes the efficiency of removing scale-like contaminants generated at the water treatment using hollow fiber membranes, and a method of manufacturing the same. The hollow fiber membrane module includes hollow fiber membranes for making water treatment due to the pressure difference, and a collector fixing the hollow fiber membranes in bundle. A treated-water tube is extended to the inside of the collector, and communicated with the inner passage of the hollow fiber membranes to deliver the water treated through the hollow fiber membranes. A diffuser is installed at the collector to diffuse bubbles to the hollow fiber membranes. An air tube is extended to the collector, and connected to the diffuser to feed air. Dividers are installed over the collector to partition the hollow fiber membranes into a plurality of bundles.

■ Liquid-gas separator for direct liquid feed fuel cell

- 등록번호 : 7700213
- 발명자 : Luo, Xiaobing(Yongin-si, KR), Kang, Sang-kyun(Seoul, KR), Seung, Do-young(Seoul, KR)
- 출원인 : Samsung SDI Co., Ltd.(Suwon-si, KR)
- 초록 : Provided is a liquid-gas separator of a

direct liquid feed fuel cell. The liquid-gas separator includes an empty ball shaped main body; a gas extraction membrane which is attached to an opening formed in the main body, and selectively extracts gas from the main body; an inlet which is formed in the main body and guides the liquid and gas into the main body; an outlet which is formed on the main body and guides the liquid to the outside of the main body; and a flexible tube having a hollow structure, one end of which is connected to the outlet and the other end of which is immersed in the liquid fuel.

■ Process for providing oxygen to a liquid

- 등록번호 : 7699985
- 발명자 : Cote, Pierre Lucien(Dundas, CA), Husain, Hidayat(Oakville, CA), Behmann, Henry(Puslinch, CA)
- 출원인 : ZenonTechnology Partnership(Wilmington, DE, US)
- 초록 : A membrane supported biofilm reactor uses modules having fine, hollow fibers, for example, made from melt spun thermoplastic polymers treated after spinning to increase their permeability to oxygen, used, for example, in tows or formed into a fabric. In one module, one or more sheets of the fabric are potted into a module to enable oxygen containing gas to be supplied to the lumens of the hollow fibers. Various reactors and processes, for example to treat wastewater, using such modules are described. In one process, oxygen travels through fibers, optionally through an attached biofilm, to oxygenate surrounding water. Mechanical, chemical and biological methods, for example endogenous respiration, are used to control the thickness of the biofilm.

■ Water purifying system

- 등록번호 : 7699968
- 발명자 : Osawa, Masanobu(Tokyo, JP), Yamada, Satoshi(Tokyo, JP)
- 출원인 : Kurita Water Industries Ltd.(Tokyo, JP)

- **초록** : The present invention provides a water purifying system capable of efficiently producing treated water containing boron at a low concentration. Water to be treated is first fed to the RO membrane apparatus1 and the passed water is fed through the boron absorptive apparatus2. Water which was passed through the boron absorptive apparatus2 and of which boron was thus removed is fed through the electrodeionization apparatus3. In this manner, water treated by electrodeionization is taken out as treated water. The condensed water of the electrodeionization apparatus3 may be discharged or returned to the upstream side of the RO membrane apparatus1 through a return pipe4 so that the condensed water is added to water to be treated. Suitably used as the absorptive agent accommodated in the boron absorptive apparatus2 is a boron selective absorptive agent capable of selectively absorbing boron.
- **Membrane suitable for use in an analyte sensor, analyte sensor, and associated method**

 - 등록번호 : 7699964
 - 발명자 : Feldman, Benjamin(Oakland, CA, US), Liu, Zenghe(Alameda, CA, US), Mao, Fei(Fremont, CA, US), Heller, Adam(Austin, TX, US)
 - 출원인 : Abbott Diabetes Care Inc.(Alameda, CA, US)
 - 초록 : A multifunctional membrane is provided. The multifunctional membrane is suitable for use in an analyte sensor. In a particular application, the multifunctional membrane may be used in connection with an amperometric biosensor, such as a transcutaneous amperometric biosensor. Some functions of the membrane are associated with properties of membrane itself, which is comprised of crosslinked polymers containing heterocyclic nitrogen groups. For example, the membrane, by virtue of its polymeric composition, may regulate the flux of an analyte to a sensor.
- Such regulation generally improves the kinetic performance of the sensor over a broad range of analyte concentration. Other functions of the membrane are associated with functional components, such as a superoxide-dismutating/catalase catalyst, either in the form of an enzyme or an enzyme mimic, that can be bound to the scaffold provided by the membrane. The effect of any such enzyme or enzyme mimic is to lower the concentration of a metabolite, such as superoxide and/or hydrogen peroxide, in the immediate vicinity of the sensing layer of the biosensor. Lowering the concentrations of such metabolites, which are generally deleterious to the function of the sensor, generally protects or enhances biosensor integrity and performance. The membrane is thus an important tool for use in connection with analyte sensors, amperometric sensors, biosensors, and particularly, transcutaneous biosensors. A membrane-covered sensor and a method for making same are also provided.
- **Apparatus for concentrating water-soluble organic material**

 - 등록번호 : 7713417
 - 발명자 : Ikeda, Shiro(Kanagawa-ken, JP), Nakane, Takashi(Ibaraki-ken, JP)
 - 출원인 : Mitsubishi Chemical Corporation (Tokyo, JP)
 - 초록 : A water-soluble organic material condensation apparatus equipped with a distillation column for distilling an aqueous solution of a water-soluble organic material, wherein a vapor generated at the top of the distillation column or a condensed liquid from the vapor is introduced to a device other than the distillation column which has the function to separate water from the water-soluble organic material to thereby condense the water-soluble organic material through separating water and then the condensed water-soluble organic material is recycled to the distillation

column. The device other than the distillation column is desirably a separating film such as a zeolite film. The apparatus is improved in the operation of the upper portion of the condensation section of the distillation column and allows energy savings during distillation.

■ Method for testing separation modules

- 등록번호 : 7698928
- 발명자 : Jons, Steven Douglas(Eden Prairie, MN, US), Johnson, Jon E.(Plymouth, MN, US), Fialkowski, Michael A.(Eau Claire, WI, US)
- 출원인 : Dow Global Technologies, Inc.(Midland, MI, US)
- 초록 : New methods and apparatus are described for assessing the integrity of a separation module or filtration system. A principle embodiment concerns use of a transient pulse of challenge species to probe a spiral wound module. The resulting time-dependent concentration of challenge species in the permeate is detected, recorded, and compared to a reference. An apparatus is further claimed for detecting permeate conductivity at multiple points within the permeate collection tube of a spiral wound module. Also disclosed is a process whereby the permeate stream from a filtration system is concentrated by a high recovery membrane apparatus prior to measurement of challenge species concentration.

■ Polyarylether membranes

- 등록번호 : 7695628
- 발명자 : Steiger, Daniel(Clifton Park, NY, US), Zhang, Yanshi(Schenectady, NY, US), Yeager, Gary William(Rexford, NY, US)
- 출원인 : General Electric Company(Niskayuna, NY, US)
- 초록 : Membranes for use in methods and apparatuses for hemodialysis and hemofiltration are composed of at least one polyarylethernitrile

block copolymer having structural units of formula I

wherein

Z is a direct bond, O, S, CH₂, SO, SO₂, CO, RPO, CH₂, alkenyl, alkynyl, a C₁-C₁₂aliphatic radical, a C₃-C₁₂cycloaliphatic radical, a C₃-C₁₂aromatic radical or a combination thereof;

R is a C₆-₁₂aromatic radical or a C₁-₁₂aliphatic radical;

R₁ and R₂ are independently H, halo, nitro, a C₁-C₁₂aliphatic radical, a C₃-C₁₂cycloaliphatic radical, a C₃-C₁₂aromatic radical, or a combination thereof;

a is 0, 1, 2 or 3;

b is 0, 1, 2, 3 or 4; and

m and n are independently 0 or 1.

■ Structured membrane with controllable permeability

- 등록번호 : 7695550
- 발명자 : Krupenkin, Thomas Nikita(Warren, NJ, US), Lifton, Victor Alexander(Bridgewater, NJ, US), Taylor, Joseph Ashley(Springfield, NJ, US), Vyas, Brijesh(Warren, NJ, US)
- 출원인 : Alcatel-Lucent USA Inc.(Murray Hill, NJ, US)
- 초록 : An apparatus that comprises a membrane having a plurality of fluid-support-structures and openings located between the fluid-support-structures. The fluid-support-structures have at least one dimension that that is about 1 millimeter or less. The apparatus also comprises a wicking material positioned adjacent to a surface of the membrane. When a fluid locatable on a surface of the fluid-support-structures penetrates the fluid-support-structures, at least a portion of the fluid passes through the openings and into the wicking material.

■ Semipermeable membrane system for magnetic particle fractions

- 등록번호 : 7691264

- 발명자 : Franzreb, Matthias(Karlsruhe, DE), Rogge, Tilmann(Heidelberg, DE)
- 출원인 : Forschungszentrum Karlsruhe GmbH (Karlsruhe, DE)
- 초록 : In a semi-permeable membrane system for transferring magnetic particle fractions contained in a first fluid to a second fluid, comprising a membrane through which passages extend and which separates the first fluid from the second fluid being a pressure generation arrangement is provided for generating a reversible pressure differential between the two fluids across the membrane for alternately causing fluid movement in the membrane in opposite directions and a magnetic field generator is provided for alternately generating a magnetic field in the membrane wherein, during the fluid movement in one direction, the magnetic field is switched on to hold the magnetic particles in place in the membrane and, during fluid flow in the opposite flow direction, the magnetic field is switched off to permit the magnetic particles to be moved through the membrane in the other direction.

■ Membrane-mediated electropolishing with topographically patterned membranes

- 등록번호 : 7691250
- 발명자 : Mazur, Stephen(Wilmington, DE, US), Jackson, Charles E.(Middletown, DE, US), Foggin, Gary W.(Wilmington, DE, US)
- 출원인 : E.I. Du Pont de Nemours and Company(Wilmington, DE, US)
- 초록 : This invention provides membrane-mediated electropolishing (MMEP) processes for polishing and/or planarizing metal work pieces using topographically patterned membranes. The processes can be used for both pure metals and alloys, and provide advantages over conventional electropolishing processes and known MMEP processes using smooth membranes. This invention also provides a cathode

half-cell and an apparatus useful in membrane-mediated electropolishing processes. The invention also provides processes for electroengraving and electromachining topographic patterns, holes and/or grooves into the surface of a metal work piece.

■ Polymer electrolyte fuel cell

- 등록번호 : 7687187
- 발명자 : Fukuda, Kaoru(Wako, JP), Eguchi, Taku(Wako, JP), Tsuji, Makoto(Wako, JP)
- 출원인 : Honda Motor Co., Ltd.(Tokyo, JP)
- 초록 : A polymer electrolyte fuel cell consists of plural units, and the unit has an anode side separator, an anode diffusion layer, an anode catalytic layer, polymer electrolyte membrane, a cathode catalytic layer, a cathode diffusion layer, and a cathode side separator. The cathode catalytic layer further includes a catalyst in which platinum or platinum alloy is supported on a carbon supporting body having an average lattice space d_{002} of [002] surface of 0.338 to 0.355 nm and specific surface area of the supporting body of 80 to 250 m^2/g , electrolyte containing ion exchange resin, and vapor grown carbon fiber. Furthermore, a water holding layer containing ion exchange resin, carbon particles, and vapor grown carbon fiber is arranged at an interface of the cathode diffusion layer and the cathode catalytic layer.

■ Membrane electrode assembly with a fibrous substrate, method for producing the same and polymer electrolyte fuel cell

- 등록번호 : 7687184
- 발명자 : Yamauchi, Masaki(Osaka, JP), Hori, Yoshihiro(Nara, JP), Yoshida, Akihiko(Osaka, JP), Yoshimura, Mikiko(Tokyo, JP), Uchida, Makoto(Osaka, JP)
- 출원인 : Panasonic Corporation(Osaka, JP)

• 초록 : In a conventional polymer membrane electrode assembly, particularly when operated for a long period of time, a portion of the polymer electrolyte membrane to be in contact with the gas diffusion layer has suffered significant degradation. In order to address this, in a membrane electrode assembly including a hydrogen ion conductive polymer electrolyte membrane, a pair of catalyst layers arranged on both surfaces of the polymer electrolyte membrane, and a pair of gas diffusion layers, each including a fibrous substrate, arranged on the outer surfaces of the catalyst layers, a thickness T_A of a center portion that faces the catalyst layer and a thickness T_B of a peripheral portion surrounding the center portion are set to satisfy a expression (1): $T_B / T_A \leq 0.9$.

■ Submerged hollow fiber membrane module

- 등록번호 : 7686955
- 발명자 : Lee, Moo Seok(Seoul, KR), Lee, Kwang Jin(Suwon-si, KR), Shin, Yong Cheol (Seoul, KR), Choi, Seong Hak(Suwon-si, KR), Woo, Youn Tai(Seoul, KR)
- 출원인 : Kolon Industries, Inc.(Kwacheon-Si, KR)
- 초록 : The present invention discloses a submerged hollow fiber membrane module which is of such a structure that it is easy to expand a module processing capability according to a treatment capacity, provides convenient module coupling properties and module manufacturing properties, maintains a stable flux under an efficient air diffusion condition and prevents the damage of membranes and water leakage caused by the loosening of module connecting regions. The submerged hollow fiber membrane module comprises [I] two module headers (2 and 2') having a filtrate water collecting portion (3) for col-

lecting filtrate water filtered through hollow fiber membranes and a filtrate water outlet (7), [II] an air diffusion unit 8 consisting of support tubes (9 and 9') fixing the two module headers (2 and 2') while keeping them spaced a predetermined distance and air diffusion tubes (11 and 11') having air diffusion holes (13), and [III] a bundle of hollow fiber membranes (1) having both opposite ends fixed to the insides of the module headers (2 and 2') by an adhesive (6) so as to form a water collecting space within the module headers (2 and 2'), the ends (5) of the hollow portions of the hollow fiber (20) membranes being opened and disposed in parallel to a filtrate water discharge surface (4).

■ Water purification system and method, and module for the system

- 등록번호 : 7686950
- 발명자 : Gagnet, Yves(Montigny le Bretonneux, FR)
- 출원인 : Millipore Corporation(Billerica, MA, US)
- 초록 : The invention relates to a method and a system for purifying water whereby: the water to be purified is pressurized; a pressurized flow of said water is directed onto at least one selective permeability membrane to divide (11) the flow of pressurized water into a permeate flow and a retentate flow; the permeate flow is electrodeionized (12) to produce a flow of purified water consisting of the electrodeionized permeate flow; the flowrate of the retentate flow (19) is reduced; a substantially constant predetermined pressure (21) is maintained on the selective permeability membrane(s); and a substantially constant predetermined permeate flowrate is maintained and also relates to a suitable tangential filtration module system.