

## 최신 미국특허 등록 목록

- Nanothin polymer films with selective pores and method of use thereof

  - 등록번호 : 7678838
  - 발명자 : Pinkhassik, Evgueni(Memphis, TN, US), Danila, Delia Cesara(Houston, TX, US), Banner, Larry Todd(Cordova, TN, US)
  - 출원인 : University of Memphis Research Foundation(Memphis, TN, US)
  - 초록 : A method of preparing nanothin polymer films having uniform and selectively sized pores utilizing pore forming templates. Lipids and pore forming templates are dissolved into a first solution. The solvent is removed thereby creating a lipid bilayer with pore forming templates dispersed throughout. The bilayer is hydrated and monomers and crosslinkers are added to create a second solution. A nanothin film with pore forming templates is created through polymerization of said second solution. The pore forming templates are dissolved into a third solution by addition of a chemical in which the pore forming template is soluble, but the lipid bilayer is insoluble. This third solution is separated from the mixture leaving a nanothin polymer film with pores of a uniform thickness and surface area. In summary, the guided assembly method presented here suggests a new general strategy for the fabrication of nanothin materials with controlled permeability, which provides improvements over the currently existing technology.
- Hydrogen permeable membrane, fuel cell and hydrogen extracting apparatus equipped with the hydrogen permeable membrane, and method of manufacturing the hydrogen permeable membrane

  - 등록번호 : 7678181
  - 발명자 : Aoyama, Satoshi(Susono, JP), Sato, Hiro-michi(Atsugi, JP), Uemura, Takashi(Takasaki, JP), Mizuno, Osamu(Ikeda, JP), Yoshida, Kentaro(Takarazuka, JP), Ihara, Tomohiko(Kawanishi, JP)
  - 출원인 : Toyota Jidosha Kabushiki Kaisha(Toyota, JP), Sumitomo Electric Industries, Ltd(Osaka, JP)
  - 초록 : A hydrogen permeable membrane (10) for selectively allowing hydrogen to permeate therethrough includes a metal base layer (12) containing vanadium (V), a metal coating layer (16) containing palladium (Pd), and an intermediate layer (14) that is formed between the metal base layer (12) and the metal coating layer (16) and made of a metal having a higher melting point than the metal base layer (12) and the metal coating layer (16) and possessing hydrogen permeability.
- Separation membrane and manufacturing process thereof

  - 등록번호 : 7677399
  - 발명자 : Takeno, Shogo(Nagoya, JP), Ichikawa, Akimasa(Nagoya, JP)
  - 출원인 : NGK Insulators, Ltd.(Nagoya, JP)
  - 초록 : A process for manufacturing a separation membrane with excellent productivity, which can uniformly dry and imidize a separation membrane precursor solution formed on an inner surface of through-holes of a monolith substrate and which does not require complicated operations such as placement of a monolith substrate in a dryer, and the separation mem-

brane manufactured by the process are provided. The separation membrane is manufactured comprising: causing a separation membrane precursor solution to pass through through-holes in a porous monolith substrate, to form a membrane of the precursor solution on the surface of the through-holes, and drying the membrane by causing hot wind to pass through the through-holes.

#### ■ Process for improving membranes

- 등록번호 : 7677398
- 발명자 : Belfer, Sophia(Beer Sheva, IL), Fainstein, Rosalia(Beer Sheva, IL), Kesselman, Luba(Beer Sheva, IL), Linder, Charles(Rehovot, IL)
- 출원인 : Ben Gurion University of the Negev Research and Development Authority (Beer Sheva, IL)
- 초록 : The invention provides a process for improving the antifouling properties and for increasing the selectivity of commercial composite polyamide nanofiltration (NF) and reverse osmosis (RO) membranes comprising circulating a low concentration of water soluble monomers and an initiating redox couple in an aqueous solvent, without transverse pressure over the surface of the membrane thereby effecting a free-radical graft polymerization on the surface of the membrane.

#### ■ Composites and composite membranes

- 등록번호 : 7674505
- 발명자 : Kerres, Jochen(Ostfildern, DE), Häring, Thomas(Stuttgart, DE), Häring, Rima(Stuttgart, DE)
- 출원인 : Thomas Haring and RimaHaring(Stuttgart, DE)

- 초록 : The invention relates to a composite or a composite membrane consisting of an ionomer and of an inorganic optionally functionalized phyllosilicate. The isomer can be: (a) a cation exchange polymer; (b) an anion exchange polymer; (c) a polymer containing both anion exchanger groupings as well as cation exchanger groupings on the polymer chain; or (d) a blend consisting of (a) and (b), whereby the mixture ratio can range from 100% (a) to 100% (b). The blend can be ionically and even covalently cross-linked. The inorganic constituents can be selected from the group consisting of phyllosilicates or teosilicates.

#### ■ Hollow porous-wall glass microspheres for hydrogen storage

- 등록번호 : 7666807
- 발명자 : Heung, Leung K.(Aiken, SC, US), Schumacher, Ray F.(Aiken, SC, US), Wicks, George G.(Aiken, SC, US)
- 출원인 : Savannah River Nuclear Solutions, LLC(Aiken, SC, US)
- 초록 : A porous wall hollow glass microsphere is provided having a diameter range of between 1 to 200 microns, a density of between 1.0 to 2.0 gm/cc, a porous-wall structure having wall openings defining an average pore size of between 10 to 1000 angstroms, and which contains therein a hydrogen storage material. The porous-wall structure facilitates the introduction of a hydrogen storage material into the interior of the porous wall hollow glass microsphere. In this manner, the resulting hollow glass microsphere can provide a membrane for the selective transport of hydrogen through the porous walls of the microsphere, the small pore size preventing gaseous or liquid contaminants from entering the interior of the

hollow glass microsphere.

#### ■ Membrane electrochemical generator

- 등록번호 : 7666536
- 발명자 : Trifoni, Eduardo(Napoli, IT), Facchi, Daniele(Rovato, IT), Fleba, Gian Piero (Milan, IT), Lenardon, Matteo(Lomazzo, IT), Liotta, Marcello(Rozzano, IT), Merlo, Luca(Montorfano, IT), Jacobo, Ruben Ornelas(San Giuliano Milanese, IT), Toro, Antonino(Milan, IT), Traini, Fabio(Milan, IT)
- 출원인 : Nuvera Fuel Cells Europe S.R.L.(Milan, IT)
- 초록 : The present invention relates to a membrane electrochemical generator formed by a multiplicity of reaction cells mutually connected in electrical series and assembled according to a bipolar configuration. In accordance with the present invention, the thermal management of the membrane electrochemical generator and the hydration of the membrane are ensured by the injection of a cooling fluid, preferably liquid water, in the gaseous reactant feed. Such an injection takes place through a multiplicity of calibrated fluid injection holes obtained in conductive bipolar plates delimiting the reaction files. The cooling fluid can be preheated by passing through a collector/distributor structure located in an additional cell.

#### ■ Ion transport membrane module and vessel system with directed internal gas flow

- 등록번호 : 7658788
- 발명자 : Holmes, Michael Jerome(Thompson, ND, US), Ohrn, Theodore R.(Alliance, OH, US), Chen, Christopher MingPoh(Allentown, PA, US)
- 출원인 : Air Products and Chemicals, Inc.(Allentown, PA, US), SOFCO-EFS Holdings LLC (Alliance, OH, US)

- 초록 : An ion transport membrane system comprising (a) a pressure vessel having an interior, an inlet adapted to introduce gas into the interior of the vessel, an outlet adapted to withdraw gas from the interior of the vessel, and an axis; (b) a plurality of planar ion transport membrane modules disposed in the interior of the pressure vessel and arranged in series, each membrane module comprising mixed metal oxide ceramic material and having an interior region and an exterior region; and (c) one or more gas flow control partitions disposed in the interior of the pressure vessel and adapted to change a direction of gas flow within the vessel.

#### ■ RO membrane cleaning method

- 등록번호 : 7658852
- 발명자 : Liberman, Igal(Tel Aviv, IL)
- 출원인 : Membrane Recovery Ltd(Tel Aviv, IL)
- 초록 : Direct-osmosis (DO) method for cleaning a semi-permeable membrane in a RO separation module, the membrane having a feed side with foulant located thereon, and an opposite permeate side. A normal RO separation process in the same module includes: feeding, under gauge pressure PGr, raw saline solution having osmotic pressure POr to the membrane feed side; collecting permeate (solvent) having osmotic pressure POP from the permeate side, under gauge pressure PGp; and removing residual brine from the membrane feed side. The method comprises feeding to the feed side of the membrane, for a predetermined injection time, super saline solution having osmotic pressure POs > POr, such that backward flow of permeate towards the feed side of the membrane is provided so as to lift the foulant from the feed side.

#### ■ Lithium rechargeable battery including a porous membrane separator formed of ceramic secondary

**particles and a binder**

- 등록번호 : 7659036
- 발명자 : Kim, Jinhee(Yongin-si, KR), Han, Wonchull(Yongin-si, KR), Min, Jaevun (Yongin-si, KR)
- 출원인 : Samsung SDI Co., Ltd.(Suwon-si, KR)
- 초록 : A lithium rechargeable battery includes a separator that shows excellent safety characteristics such as short circuit resistance and heat resistance. The lithium rechargeable battery includes a cathode, an anode, a separator that separates the cathode and the anode from each other, and a non-aqueous electrolyte, wherein the separator includes a porous membrane formed of a ceramic material and a binder, and wherein the binder includes at least one crystalline resin having a crystal melting temperature of 250°C. or higher or at least one non-crystalline resin having an initial decomposition temperature of 250°C. or higher.

■ **Polymer membrane for fuel cell, method of preparing the same, membrane-electrode assembly including the same, and fuel cell system including the same**

- 등록번호 : 7659318
- 발명자 : Han, Sang-Il(Suwon-si, KR), Son, In-Hyuk(Suwon-si, KR), Shin, Chan-Gyun(Suwon-si, KR), Lee, Chang-Bong(Suwon-si, KR)
- 출원인 : Samsung SDI Co., Ltd.(Suwon-si, Gyeonggi-do, KR)
- 초록 : The present invention relates to a polymer electrolyte membrane for a fuel cell, a method for manufacturing the polymer electrolyte membrane, a membrane-electrode assembly for a fuel cell including the polymer electrolyte membrane, and a fuel cell system including the membrane-electrode assembly. The polymer electrolyte membrane includes a

proton-conductive polymer membrane including a polymer micelle inside a hydrophilic channel. Herein, the micelle includes a vinyl-based polymer obtained from polymerization of a vinyl-based monomer and an anionic surfactant surrounding the vinyl-based polymer.

■ **Sulfonated poly(phenylene sulfide) films as polyelectrolyte membranes**

- 등록번호 : 7659319
- 발명자 : Fuller, Timothy J.(Pittsford, NY, US), Dobulis, Beba T.(Fairport, NY, US)
- 출원인 : GM Global Technology Operations, Inc.(Detroit, MI, US)
- 초록 : Proton conducting membranes are made of sulfonated films comprising poly(arylene sulfide), an olefinic polymer, and an elastomer. They are used in PEM fuel cells operating at temperatures above 95°C., or at low relative humidity. According to methods of the invention, sulfonated poly(phenylene sulfide) (SPPS) films are provided with a wide range of physical properties, which depend in part on the ion exchange capacity of the films. In particular, the degree or level of sulfonation can be tailored by adjusting reaction conditions such as temperature and time.

■ **Food and beverage industry membrane valve structure**

- 등록번호 : 7661437
- 발명자 : Schulz, Dieter(Bochum, DE), Baumbach, Frank(Soest, DE)
- 출원인 : APV Rosista GmbH(Unna, DE)
- 초록 : A food and beverage industry membrane valve structure with a membrane which separates a control compartment from a product compartment in a food or beverage handling or processing machine. The abstract

of the disclosure is submitted herewith as required by 37 C.F.R. §1.72(b). As stated in 37 C.F.R. §1.72(b): A brief abstract of the technical disclosure in the specification must commence on a separate sheet, preferably following the claims, under the heading "Abstract of the Disclosure." The purpose of the abstract is to enable the Patent and Trademark Office and the public generally to determine quickly from a cursory inspection the nature and gist of the technical disclosure. The abstract shall not be used for interpreting the scope of the claims. Therefore, any statements made relating to the abstract are not intended to limit the claims in any manner and should not be interpreted as limiting the claims in any manner.

■ Proton-conducting polymer membrane that contains polyazoles and is coated with a catalyst layer, and application thereof in fuel cells

- 등록번호 : 7661542
- 발명자 : Baurmeister, Jochen(Eppstein, DE), Kundler, Isabel(Königstein, DE), Padberg, Christoph(Wiesbaden, DE), Uensal, Oemer(Mainz, DE), Kiefer, Joachim(Losheim Am See, DE), Calundann, Gordon(North Plainfield, NJ, US), Benicewicz, Brian (Loudonville, NY, US), Weber, Mathias(Rüsselsheim, DE)
- 출원인 : BASF Fuel Cell GmbH(DE)
- 초록 : The present invention relates to a proton-conducting polymer membrane which comprises polyazoles and is coated with a catalyst layer and is obtainable by a process comprising the steps

A) preparation of a mixture comprising

- polyphosphoric acid,
- at least one polyazole (polymer A) and/or one or more compounds which are suitable for forming polyazoles under the action of heat according to step B),

B) heating of the mixture obtainable according to step A) under inert gas to temperatures of up to 400° C.,

C) application of a layer using the mixture obtained according to step A) and/or B) to a support,

D) treatment of the membrane formed in step C) until it is self-supporting,

E) application of at least one catalyst-containing coating to the membrane formed in step C) and/or in step D).

■ Membrane post treatment

- 등록번호 : 7662212
- 발명자 : Mulette, Daniel(New South Wales, AU), Muller, Joachim(New South Wales, AU), Patel, Neeta(New South Wales, AU)
- 출원인 : Siemens Water Technologies Corp.(Warrendale, PA, US)
- 초록 : The invention relates to polymeric ultra-filtration or microfiltration membranes of, for instance, Halar, PVDF or PP, incorporating PVME or vinyl methyl ether monomers. The PVME may be present as a coating on the membrane or dispersed throughout the membrane or both. The membranes are preferably hydrophilic with a highly asymmetric structure with a reduced pore size and/or absence of macrovoids as a result of the addition of PVME. The PVME maybe cross-linked. The invention also relates to methods of hydrophilising membranes and/or preparing hydrophilic membranes via thermal or diffusion induced phase separation processed.

■ Method of cleaning fouled or scaled membranes

- 등록번호 : 7662289
- 발명자 : Musale, Deepak A.(Aurora, IL, US), Zeiher, E. H. Kelle(Naperville, IL, US)

- 출원인 : Nalco Company(Naperville, IL, US)
- 초록 : A method of cleaning a fouled or a scaled RO or NF membrane surface with a solution containing one or more thermo-responsive polymers is disclosed. More specifically, the method comprises: treating the membrane surface in a membrane separation system with a solution containing one or more TRP, wherein said TRP is soluble in said solution and at least an effective amount of said TRP diffuses into a foulant layer on said membrane surface; making insoluble said TRP diffused into said foulant layer; optionally, rinsing the membrane.

■ Organic/inorganic composite microporous membrane and electrochemical device prepared thereby

- 등록번호 : 7662517
- 발명자 : Lee, Sang Young(Daejeon, KR), Kim, Seok Koo(Daejeon, KR), Suk, Jung Don(Daejeon, KR), Yong, Hyun Hang(Seoul, KR), Hong, Jang Hyuk(Daejeon, KR), Ahn, Soon Ho(Daejeon, KR)
- 출원인 : LG Chem, Ltd. (Seoul, KR)
- 초록 : Disclosed is an organic/inorganic composite porous separator comprising: (a) a polyolefin-based separator substrate; and (b) an active 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 particles and a binder polymer, wherein the inorganic particles in the active layer are interconnected among themselves and are fixed by the binder polymer, and interstitial volumes among the inorganic particles form a pore structure. A method for manufacturing the same separator and an electrochemical device including the same

separator are also disclosed. An electrochemical device comprising the organic/inorganic composite porous separator shows improved thermal and electrochemical safety and quality, simultaneously.

■ Membrane structure and method of making

- 등록번호 : 7669719
- 발명자 : Ramaswamy, Vidya(Niskayuna, NY, US), Taylor, Seth Thomas(Niskayuna, NY, US), Ruud, James Anthony(Delmar, N Y, US), Sander, Melissa Suzanne(Schenectady, NY, US), Ku, Anthony Yu-Chung(Rexford, NY, US), Manoharan, Mohan(Niskayuna, NY, US)
- 출원인 : General Electric Company(Niska, NY, US)
- 초록 : A membrane structure is provided. The membrane structure includes a first layer having a plurality of pores; and a second layer disposed on, the first layer. The second layer has a plurality of unconnected pores. At least a portion of the plurality of unconnected pores of the second layer is at least partially filled with a filler such that the first layer is substantially free of the filler. At least a portion of the plurality of unconnected pores of the second layer is in fluid communication with at least one of the 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; disposing a second layer on the first layer, and filling at least a portion of the unconnected pores of the second layer with a filler such that the first layer is substantially free of the filler. Disposing a second layer includes depositing a metal layer on the first layer; and anodizing the metal layer to convert the

metal layer into porous oxide layer.

■ **Biosensor membranes composed of polymers containing heterocyclic nitrogens**

- 등록번호 : 7670470
- 발명자 : Mao, Fei(Fremont, CA, US), Cho, Hyun(Berkeley, CA, US)
- 출원인 : Abbott Diabetes Care Inc.(Alameda, CA, US)
- 초록 : Novel membranes comprising various polymers containing heterocyclic nitrogen groups are described. These membranes are usefully employed in electrochemical sensors, such as amperometric biosensors. More particularly, these membranes effectively regulate a flux of analyte to a measurement electrode in an electrochemical sensor, thereby improving the functioning of the electrochemical sensor over a significant range of analyte concentrations. Electrochemical sensors equipped with such membranes are also described.

■ **Coolant mixture separator assembly for use in a polymer electrolyte membrane (PEM) fuel cell power plant**

- 등록번호 : 7670702
- 발명자 : Grasso, Albert P.(Vernon, CT, US)
- 출원인 : UTC Power Corp.(So. Windsor, CT, US)
- 초록 : A liquid-gas separator assembly is used in separating gas bubbles from a liquid coolant which liquid coolant is used in a polymer electrolyte membrane (PEM) fuel cell power plant. The assembly includes a cylindrical housing containing a central tube which is surrounded by an annular chamber. The annular chamber is defined by the outer surface of the central tube and the inner surface of the cylindrical housing. An inlet line injects a stream of the coolant from the fuel cell stack area of the power plant into the bottom of the central tube in a

tangential flow pattern so that the coolant and gas bubble mixture swirls upwardly through the central tube. The swirling flow pattern of the coolant and gas bubble mixture causes the gas bubbles to separate from the liquid coolant so that the gas in the mixture will migrate to the central portion of the swirl tube and the liquid component of the mixture will centrifugally migrate to the inner wall of the swirl tube. The gaseous component of the separated mixture is then expelled from the housing through an outlet in the upper portion of the housing, and the coolant liquid descends through the annular chamber to the bottom of the housing where the coolant liquid will be returned to the cell stack area of the power plant. The gas bubbles may include reactant from either the cathode or the anode. The separator of this invention is particularly useful in mobile applications since it is less sensitive to vehicular acceleration forces.

■ **Method of cleaning fouled and/or scaled membranes**

- 등록번호 : 7674382
- 발명자 : Musale, Deepak A.(Aurora, IL, US)
- 출원인 : Nalco Company(Naperville, IL, US)
- 초록 : A method of cleaning a fouled and/or scaled UF or MF membrane with a solution containing one or more thermo-responsive polymers is disclosed. More specifically, the method comprises: (a) treating the membrane in a membrane separation system with a solution containing one or more TRP, wherein said TRP is soluble in said solution and at least an effective amount of said TRP diffuses into a foulant layer that is present on the surface and/or in pores of said membrane; (b) making insoluble said TRP diffused into said foulant layer; (c) optionally rinsing the membrane; (d) optionally backwashing the membrane with air and/or liq-

uid between the steps (b) and (c); and (e) optionally backwashing the membrane with air and/or liquid after the membrane is rinsed in step (c).

#### ■ Process for improving membranes

- 등록번호 : 7677398
- 발명자 : Belfer, Sophia(Beer Sheva, IL), Fainstein, Rosalia(Beer Sheva, IL), Kesselman, Luba(Beer Sheva, IL), Linder, Charles(Rehovot, IL)
- 출원인 : Ben Gurion University of the Negev Research and Development Authority (Beer Sheva, IL)
- 초록 : The invention provides a process for improving the antifouling properties and for increasing the selectivity of commercial composite polyamide nanofiltration (NF) and reverse osmosis (RO) membranes comprising circulating a low concentration of water soluble monomers and an initiating redox couple in an aqueous solvent, without transverse pressure over the surface of the membrane thereby effecting a free-radical graft polymerization on the surface of the membrane.

#### ■ Separation membrane and manufacturing process thereof

- 등록번호 : 7677399
- 발명자 : Takeno, Shogo(Nagoya, JP), Ichikawa, Akimasa(Nagoya, JP)
- 출원인 : NGK Insulators, Ltd.(Nagoya, JP)
- 초록 : A process for manufacturing a separation membrane with excellent productivity, which can uniformly dry and imidize a separation membrane precursor solution formed on an inner surface of through-holes of a monolith substrate and which does not require complicated operations such as placement of a monolith substrate in a dryer, and

the separation membrane manufactured by the process are provided. The separation membrane is manufactured comprising: causing a separation membrane precursor solution to pass through through-holes in a porous monolith substrate, to form a membrane of the precursor solution on the surface of the through-holes, and drying the membrane by causing hot wind to pass through the through-holes.

#### ■ Membrane air dryer and sweep valve

- 등록번호 : 7678177
- 발명자 : Nichols, Randall W.(Westlake, OH, US)
- 출원인 : New York Air Brake Corporation(Watertown, NY, US)
- 초록 : A membrane air dryer includes a proportioning valve for providing sweep air to the dryer. The valve may be located in an easily accessible location and may be oriented so that the movable valve element extends transverse to the length of the shell. The valve may be configured to allow air to flow back from the delivery port to the fibers during a compressor unload cycle to maintain pressure on the fibers, while blocking flow of air from the delivery port to the sweep chamber.

#### ■ Membrane plate and filter element

- 등록번호 : 7678273
- 발명자 : Harms, Eberhard(Muppert, DE), Grigo, Mark(Soest, DE)
- 출원인 : Utisol Technologies AG(Zug, CH)
- 초록 : A filter unit includes membrane plates placed together parallel to one another, which at least in zones around connecting elements for the purpose of draining permeate are connected together liquid-tight. The membrane plates because of their shape and after two membrane plates have been placed one



on top of the other are provided for manufacturing a liquid-tight connection or a seal by welding. As a result unfiltered liquid flows through between the membrane plates and contamination of the permeate within a volume situated between the connecting elements is prevented. Over a number of connecting elements and zones located in between it is possible to attach a hollow profile, which is closed-off at its ends. This hollow profile in a liquid-tight manner surrounds discharge openings of the connecting elements and the zones located in between with positive material engagement. As a result, a permeate collection channel is formed, out of which and through a permeate discharge the permeate can be extracted through suction.

■ **Composition for polymer solid electrolyte, polymer solid electrolyte, polymer, polymer solid electrolyte battery, ion conductive membrane, copolymer and process for producing the copolymer**

- 등록번호 : 7678860
- 발명자 : Muramoto, Hiroo(Chiba, JP), Niitani, Takeshi(Ichihara, JP), Aoyagi, Koichiro (Chiba, JP)
- 출원인 : Nippon Soda Co., Ltd.(Tokyo, JP)
- 초록 : The present invention provides a polymer solid electrolyte excellent in thermal properties, physical properties and ion conductivity and being close to practical level; especially, a totally solid electrolyte and a composition for producing the same. A composition for polymer solid electrolyte includes a copolymer having repeating units represented by Formula (I):  $\text{R}_1$  independently represents a hydrogen atom or a C1-C10 hydrocarbon group;  $\text{R}_2$  and  $\text{R}_3$  independently represents a hydrogen atom or a methyl group;  $\text{R}_4$  represents a hydrogen atom, a

hydrocarbon group, an acyl group or a silyl group; and  $m$  is an integer of 1 to 100), and repeating units represented by Formula (II):  $\text{R}_5$  and  $\text{R}_6$  independently represents a hydrogen atom or a C1-C10 hydrocarbon group;  $\text{R}_7$  represents an organic group having at least one functional group selected from the group consisting of hydroxyl group, carboxyl group, epoxy group, acid anhydride group and amino group); and an electrolyte salt.

■ **Proton exchange membrane materials based on sulfonated poly (phthalazinones)**

- 등록번호 : 7678863
- 발명자 : Gao, Yan(Montreal, CA), Gulver, Michael D.(Ottawa, CA), Robertson, Gilles P.(Hull, CA), Jian, Xigao(Dallan, CN)
- 출원인 : National Research Council of Canada(CA)
- 초록 : A novel class of proton exchange membrane materials, sulfonated poly(phthalazinones), were prepared by modification of poly(phthalazinone). Sulfonation reactions were conducted at room temperature using mixtures of 95-98% concentrated sulfuric acid and 27-33% fuming sulfuric acid with different acid ratios in order to get SPPEK with degree of sulfonation (DS) in the range of 0.6 to 1.0. The presence of sulfonic acid groups was confirmed by FT-IR analysis, and the DS and structures were characterized by NMR. The introduction of sulfonic groups into the polymer chains led to an increase in the glass transition temperature and a decrease in the decomposition temperature. Membrane films were cast from solution in N, N-dimethylformamide or N, N-dimethylacetamide. Water uptakes and swelling ratios of the membrane films increased with DS and sulfonated polymers with  $\text{DS} > 1.2$  were water soluble at 80°C. Proton conductivity increased with DS and temperature up to 95°C, reaching 10-2S/Cm.