components for their usefulness in the creation of a biomimetic membrane formulation that meets the membrane protein requirements, i.e. specific hydrophilic and hydrophobic regions or layers. At the same time, such an assay would provide useful information about the folding state of a membrane protein.

Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the filed relevant to the present disclosure as it existed before the priority date of each claim of this application.

In a first aspect, the invention provides a liquid membrane system in the form of a bulk liquid membrane (BLM) containing a biochannel, an emulsion liquid membrane (ELM) containing a biochannel, or a supported (immobilised) liquid membrane (SLM), containing a biochannel, wherein the liquid membrane system comprises vesicles, said vesicles being formed from one or more amphiphilic compounds, said amphiphilic compounds forming a bilayer into which the biochannels have been incorporated, and wherein said liquid membrane system further comprises a stabilising oil phase in which the vesicles are formed that comprises squalene, squalane or a mixture thereof.

In a second aspect, the invention provides a method for extracting pure water from an aqueous liquid media comprising contacting one or more liquid membranes according to the first aspect, wherein the bochannel is an aquaporin water channel, with an aqueous liquid medium thereby extracting pure water by forward osmosis.

SUMMARY OF THE INVENTION

Broadly, the present invention relates to a liquid membrane system in the form of a biochannel containing bulk liquid membrane (BLM), biochannel containing emulsion liquid membrane (ELM), and biochannel containing supported (immobilised) liquid membrane (SLM), or a combination thereof, wherein the liquid membrane system is based on vesicles formed from amphiphilic compounds such as lipids forming a bilayer wherein biochannels have been incorporated and wherein said vesicles further comprise a stabilising oil phase. In a preferred embodiment the liquid membrane system is an aquaporin containing liquid membrane system, such as an aquaporin containing bulk liquid membrane (BLM), an aquaporin containing emulsion liquid membrane (ELM), and aquaporin containing supported (immobilised) liquid membrane (SLM), and/or combinations thereof, wherein said liquid membrane system comprises biochannels, such as aquaporin water channels, in a dispersion of amphiphilic molecules. The liquid membrane system may be used in a range of applications, including water extraction from liquid aqueous media by forward osmosis, e.g. for desalination of salt water.

Disclosed herein is ~~Accordingly, in a first aspect, the present invention provides~~ a liquid membrane system in the form of a biochannel containing bulk liquid membrane (BLM), biochannel containing emulsion liquid membrane (ELM), and biochannel containing supported (immobilised) liquid membrane (SLM), or a combination thereof, wherein the liquid membrane system comprises vesicles formed from one or more amphiphilic compounds forming a bilayer into which the biochannels have been incorporated and wherein the vesicles further comprise a stabilising oil phase.

Disclosed herein is ~~In a further aspect, the present invention provides~~ a method of extracting water from an aqueous liquid comprising the following steps:

a) mixing an amount of the liquid membrane system of any one of the preceding claims into a first aqueous liquid having an osmotic pressure which is less than that of the vesicles to form a suspension,

b) allowing the vesicles in said suspension to absorb pure water from said first liquid and expand as long as an osmotic pressure gradient exists,

c) separating the expanded vesicles the from the first liquid, and

d) resuspending said vesicles from step c) in a second aqueous liquid having an osmotic pressure that exceeds the pressure of the expanded vesicles to allow for the extracted water in the vesicles to flow into and dilute said second liquid as long as an osmotic gradient is present leaving the vesicles in a non-expanded state.

Disclosed herein is ~~In a further aspect, the present invention provides~~ an apparatus for pure water extraction from an aqueous liquid media which comprises one or more liquid membranes as described herein.

Disclosed herein is a ~~In a further aspect, the present invention provides solventless~~ giant protein vesicle consisting essentially of an amphiphilic lipid, transmembrane protein channels, and an oil in an aqueous dispersion, wherein the lipid to protein molar ratio is in the range of from about 1:50 to about 1:400.

Disclosed herein are ~~In a further aspect, the present invention provides~~ compositions comprising the giant protein vesicles as described herein.

Disclosed herein are ~~In a further aspect, the present invention provides~~ methods of preparing the giant protein vesicles consisting essentially of an amphiphilic lipid, transmembrane protein channels, and an oil in an aqueous dispersion, and wherein the lipid to protein molar ratio is in the range of from about 1:50 to about 1:400, the method comprising the steps of:

a) preparing liposomes from a dried lipid solution that has been rehydrated in a detergent containing buffer and extruded through a filter of about 100 nm to about 500 nm pore size,

b) mixing the liposomes from a) with a transmembrane protein solution, wherein the protein is optionally linked to a fluorescent label,

c) dialysing the mixture from b) overnight using a molecular weight cut off of about 10kDa,

d) separating the proteoliposome vesicles formed in step c), e.g. by centrifugation,

e) optionally obtaining an absorbance spectrum of the GPVs formed which is compatible with the fluorescent label used in order to verify correct insertion of the transmembrane protein in the vesicle membranes, and

f) mixing the proteoliposomes obtained in step d) with a lipid in an oil phase solution containing the same lipid as in step a), e.g. in a molar ratio ranging from about 1:3 v/v to about 1:12 v/v,

thereby resulting in the formation of GPVs from the proteoliposomes.

In any particular case, within the general framework of the methods disclosed herein, the skilled person will be able to select appropriate specific conditions according to the size of the sample of giant protein vesicles being prepared and the properties of the reagents used.

By way of example, the conditions used in step c) employs a dialysate flow of from about 1 to about 10 mL/min, more preferably from about 1 to about 5 mL/min and most preferably about 3 mL/min.

By way of example, the separation in step d) uses centrifugation, for example between about 10,000-20,000 rpm (e.g. 14,200 rpm) for between about 1-5 minutes (e.g. about 90 sec).

By way of example, the mixing in step f) use end-over-end rotation overnight at about 4°C.

Disclosed herein are ~~In a further aspect, the present invention provides~~ methods of preparing giant protein vesicles consisting essentially of an amphiphilic lipid, transmembrane protein channels, and an oil in an aqueous dispersion, and wherein the lipid to protein molar ratio is in the range of from about 1:50 to about 1:400, the method comprising self assembling the vesicles from an aqueous mixture of said amphiphilic lipid, transmembrane protein channels, and oil following end-over-end mixing.

Disclosed herein is ~~In a further aspect, the present invention provides~~ the use of the giant protein vesicles prepared according to a method as described herein for extraction of water through forward osmosis.

Disclosed herein is ~~In a further aspect, the present invention provides~~ the use of the giant protein vesicles prepared according to a method as described herein for re-extraction of pure water from a patient's plasma lost through haemodialysis.

Disclosed herein are ~~In a further aspect, the present invention provides~~ supported liquid membranes having an open or closed sandwich construction, wherein a substantially flat porous filter material provides support on one or both sides of a layer of proteoliposomes, thereby immobilizing the layer.

Disclosed herein is ~~In a further aspect, the present invention provides~~ a composite filter membrane or disk created by sandwiching a layer of aquaporin containing proteoliposomes or giant protein vesicles in between filter materials selected from ultrafiltration membranes, nanofiltration membranes and microfiltration membranes.

Disclosed herein is ~~In a further aspect, the present invention provides~~ a liquid membrane system in the form of a microemulsion comprising lipid vesicles having membrane bound or incorporated biochannels or protein channels, such as aquaporin water channels in an oil phase, and which is suitable for water extraction from liquid aqueous media.

Disclosed herein is ~~In a further aspect, the present invention provides~~ a method of preparing said microemulsion. Said liquid membrane system may further be contained or immobilised in a contactor module or in an essentially planar porous sandwich construction.

Disclosed herein is ~~In a further aspect, the present invention provides~~ an assay for measuring the hydrophilicity of the membrane protein environment, where said assay is based on a fluorescently labelled membrane protein using an environmental sensitive probe the fluorescence of which can be measured when the protein to which it is attached is reconstituted in a biomimetic membrane, such as a lipid bilayer membrane or corresponding amphiphilic membrane.

Disclosed herein is ~~In a further aspect, the present invention provides~~ a method for determining whether a specific combination of membrane-forming lipid and a membrane protein is capable of forming a biomimetic membrane in which the membrane protein is correctly folded, the method comprising:

(a) introducing a membrane protein labelled with a fluorescent label into a membrane forming lipid mixture, wherein a fluorescent property of the fluorescent label is dependent on the environment of the membrane protein in the biomimetic membrane formed by the combination of protein and lipid;

(b) detecting a fluorescent signal from the membrane protein labelled with a fluorescent label; and

(c) determining from the fluorescent signal whether the membrane the combination of lipid and membrane protein is capable of forming a biomimetic membrane in which the protein is correctly folded

Disclosed herein is ~~In a further aspect, the present invention provides~~ a method for determining whether a membrane protein is capable of folding correctly in a biomimetic membrane, the method comprising:

(a) introducing a membrane protein labelled with a fluorescent label into a system for determining whether the membrane protein is capable of folding correctly in a biomimetic membrane, wherein a fluorescent property of the fluorescent label is dependent on the environment of the membrane protein in the biomimetic membrane;

(b) detecting a fluorescent signal from a membrane protein labelled with a fluorescent label; and

(c) determining from the fluorescent signal whether the membrane protein is correctly folded in the biomimetic membrane.

Disclosed herein is ~~In a further aspect, the present invention provides~~ a biomimetic membrane for measuring the activity and/or function of membrane protein forming the biomimetic membrane, wherein the membrane protein comprises a fluorescent label having a fluorescent property of the fluorescent label is dependent on the environment of the membrane protein in the biomimetic membrane, wherein the activity or function of the membrane protein is measurable by detecting a fluorescent signal from the fluorescent label.

Disclosed herein is ~~In a further aspect, the present invention provides~~ a sensor comprising a biomimetic membrane as described herein.

Embodiments of the present invention will now be described by way of example and not limitation with reference to the accompanying figures and examples.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows the general principles of three types of liquid membranes: Bulk liquid membrane (BLM), Emulsion liquid membrane (ELM), Supported liquid membrane (SLM).

Fig. 2 shows hollow fibers and spiral wound separation modules in liquid membrane modules.

Fig. 3 shows a principle sketch of a two Module Hollow Fiber Supported Liquid Membrane.

Fig. 4 shows a principle sketch of an apparatus and a method for concentration of aqueous solutions using the vesicles of the invention.

Fig. 5 shows a principle sketch of a method of providing a nutrient drink comprising pure drinking water through forward osmosis.

Fig. 6 shows a principle sketch of the use of the vesicles of the invention in forward osmosis – following ultrafiltration of a uniform electrolyte. This is an example of a complete application of water extraction from any aqueous solution or liquid.

Fig. 7 shows a principle sketch for the use of vesicles of the invention in pressure retarded osmosis for osmotic power production.

Fig. 8 shows the relation between liquid membrane formulation and concentration of the proteoliposome microemulsion (liquid membrane).

Fig. 9 is a drawing illustrating the basic parameters for calculating .

Fig. 10 is a schematic drawing of a forward osmosis batch cell unit.

Fig. 11 is a drawing of a filter cup for forward osmosis

Fig. 12 is a graph showing difference of osmolarity over time between draw and feed solutions.

S., Biophys. J., vol. 23, 1978]. It is preferred in this invention to reduce the content of organic solvents that are normally employed in lipid vesicle emulsions to obtain a solvent less or even solvent free vesicle composition.

Disclosed herein is ~~In a further aspect, the present invention also relates to~~ a fluorescence assay, e.g. using a naphthalene derivative fluorescent molecule, e.g. the fluorophore 6-bromoacetyl-2-dimethylaminonaphthalene (badan™) as a probe which can be covalently attached to Cys residues of a protein. The probe is sensitive to the hydrophilicity of the molecular environment to which it is exposed giving a maximum fluorescence emission range of 450 nm to 550 nm. When the badan probe is hydrophobic exposed it has its highest fluorescence emission yield and this is at 450 nm. In contrast, when the badan probe is hydrophilic exposed (e.g. water) it has low fluorescence emission yield and emission maximum at around 550 nm. Intermediate hydrophilic/hydrophobic conditions to those explained above give rise to emission maximum and fluorescence yield in between the above described features of badan fluorescence properties. Table 1 below is a list of useful fluorescent probes.

Table 1

Abbreviation:	**Chemical name:**
Badan	6-Bromoacetyl-2-dimethylaminonaphthalene
Acrylodan	6-acrylolyl-2-dimethylamino-naphthalene
Laurdan	6-Dodecanoyl-2-dimethylaminonaphthalene
Prodan	6 – Propionyl-2-dimethylaminonaphthalene
1,5-IAEDANS	5-((((2-iodoacetyl)amino)ethyl)amino)naphthalene-1-sulfonic acid
IAANS	2-(4'-(iodoacetamido)anilino)naphthalene-6-sulfonic acid
MIANS	2-(4'-maleimidylanilino)naphthalene-6-sulfonic acid, sodium salt

This assay provides information useful for measuring and/or imaging of the partitioning of a membrane protein in amphiphilic biomimetic membranes and, thus, the folding state of a membrane protein. The type of information obtained through the assay depends on the type of membrane association specific to the membrane protein in question and the position of the fluorescent probe on the protein. An exemplary embodiment of the invention is the fluorescence labelling using badan™ on an aquaporin molecule, where the degree of successful protein reconstitution into biomimetic membrane is measured by either spectroscopy or imaged by microscopy.

This assay is specifically useful in optimisation of the reconstitution processes of the protein, and/or in the selection of the biomimetic membrane formulation (phospholipids and other bulk membrane constituents such as cholesterol and the like) in order to fit the specific requirements of individual membrane proteins, such as aquaporins.

In addition the method is useful in creating membrane protein sensors based on fluorescence labelling and to create an assay of measuring hydrophilic/hydrophobic exposure of membrane proteins. The present invention also provides a novel methodology of creating fluorescence based membrane protein sensors for measuring membrane protein activity.

Table 5. List of filters with indication of type, producer and pore selectivities

List of abbreviations:

MF: microfiltration, NF: nanofiltration, UF: ultrafiltration, RO: Reverse Osmosis, RC: regenerated cellulose, -as: asymmetric, -s: symmetric

membrane type	producer	brand name	pore specs. size/cut-off Da
RO-as	AlfaLaval	RO98pHt	≥97% NaCl rejection at 15.5 bar. 0.1-2 nm
NF-as	AlfaLaval	NF-99	min. 0.3 kDa ≥96% MgSO4 rejection at 9 bar appr.1–10 nm
(MF) –s, unlaminated	Sterlitech	PTFE	0.200 µm
(MF)-as	Sterlitech	PTFE	0.200 µm
NF-s	Sterlitech	PTFE	0.450µm
NF-as	Dow Chemical	FilmTec NF270	appr. 1–10 nm
UF-as	AlfaLaval	ETNA 1 kDa	1 kDa / 2nm
UF-as	AlfaLaval	ETNA 10 kDa	10 kDa/ 6nm
MF-s	Millipore	Durapor	0.450 µm
RC-as	AlfaLaval RC	RC70PP	10 kDa/ 6nm

In addition to the specific embodiments of the present invention as illustrated by the figures herein the liquid membrane system of the invention is useful in a biosensor application for detection of compounds having a biochannel modulating effect, such as inhibition and activation, and for drug screening. An example would be incorporation of a functional potassium channel in an immobilised proteoliposome preparation, and screening compound libraries for inhibition or blocking of the channel. Judge SI and

Bever CT have shown this principle for the identification of drugs that are useful in the treatment of multiple sclerosis, cf. references section.

Throughout this specification the word "comprises", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

~~Claims:~~

1. A liquid membrane system in the form of a bulk liquid membrane (BLM), an emulsion liquid membrane (ELM) or a supported (immobilised) liquid membrane (SLM), or a combination thereof, wherein:

the liquid membrane system comprises vesicles formed from one or more amphiphilic lipids forming a bilayer into which functional protein channels are incorporated, wherein the vesicles are formed in a stabilizing oil phase.

2. The liquid membrane system according to claim 1, wherein the vesicles in the stabilizing oil phase are solvent less.

3. The liquid membrane system according to claim 1 or claim 2, wherein the vesicles in the stabilizing oil phase are solvent free.

4. The liquid membrane system according to claim 1, wherein the functional protein channel is an aquaporin water channel.

5. The liquid membrane system according to claim 1, wherein the functional protein channel is an amphiphilic pore forming molecule or a transmembrane channel molecule.

6. The liquid membrane system according to claim 5, wherein the amphiphilic pore forming molecule or the transmembrane channel molecule is alpha-hemolysin, OmpG, FomA, VDAC, alamethicin, valinomycin, gramicidin A or a derivative thereof, a synthetic peptide, an ion channel or an ion-selective ionophore.

7. The liquid membrane system according to any one of the preceding claims, wherein the one or more amphiphilic lipids are phospholipids, phosphoglycerides, sphingolipids and/or cardiolipin, or mixtures thereof.

8. The liquid membrane system according to claim 5, wherein one or more amphiphilic lipids comprises asolectin, DOPC (1,2-5 dioleoylphosphatidylcholine, or 1,2-dipalmitoyl-sn-phosphatidylcholine (DPPC).

9. The liquid membrane system according to any one of the preceding claims, wherein the oil phase comprises components selected from the group consisting of a sterol, squalene, squalane, alpha-tocopherol, hopanoids, isoprenes including esterified dolichol, ubiquinone (Q10), jojoba oil, light mineral oils, linseed oil, soybean oil, ground nut oil, phospholipid stabilized squalene or an emulsion of soy bean oil, phospholipids and glycerin, and alkanes, such as ~~decane, undedane, dodecane; and mixtures thereof.~~

10. The liquid membrane system according to claim 9, wherein the oil phase comprises squalene.

11. The liquid membrane system according to any one of the preceding claims, wherein the biochannels are present in a ratio of 1% to 70% relative to the vesicle surface area.

12. The liquid membrane system according to any one of the preceding claims, wherein the vesicles have an approximate maximal diameter of up to 1000 µm.

13. The liquid membrane system according to any one of the preceding claims, wherein the vesicles have a diameter between 100 and 250 µm.

14. The liquid membrane system according to any one of claims 2 to 13, wherein the vesicles are solventless giant protein vesicles consisting essentially of an amphiphilic lipid, transmembrane protein channels, and an oil in an aqueous dispersion, wherein the lipid to protein molar ratio is in the range of from 1:50 to 1:400.

15. A method of extracting water from an aqueous liquid comprising the following steps:

a) mixing an amount of the liquid membrane system of any one of the preceding claims into a first aqueous liquid having an osmotic pressure which is less than that of the vesicles to form a suspension,

b) allowing the vesicles in said suspension to absorb pure water from said first liquid and expand as long as an osmotic pressure gradient exists,

c) separating the expanded vesicles the from the first liquid, and

d) resuspending said vesicles from step c) in a second aqueous liquid having an osmotic pressure that exceeds the pressure of the expanded vesicles to allow for the extracted water in the vesicles to flow into and dilute said second liquid as long as an osmotic gradient is present leaving the vesicles in a non-expanded state.

16. The method according to claim 15, wherein said first aqueous liquid is selected from the group consisting of a natural water source, such as sea water, river water, lake water, brackish water, rain water; waste water which is not toxic to the aquaporin water channels; or biological fluids including wine, fruit and vegetable juice, milk, whole blood, plasma, urine, saliva, sweat or homogenized tissue.

17. The method according to claim 15 or claim 16, wherein the step of separating the expanded vesicles the from the first liquid is carried out by centrifugation or filtration.

18. The method according to any one of claims 15 to 17, wherein the method is used for desalination of seawater, wherein salt water is the feed or first aqueous liquid and a CO_2/NH_3

containing aqueous solution is the draw solution or second aqueous liquid.

19. An apparatus for pure water extraction from an aqueous liquid media which comprises one or more liquid membranes according to any one of claims 1 to 14.

20. The apparatus according to claim 19, wherein the apparatus is a two module hollow fiber supported liquid membrane contactor module or a liquid cell extra-flow membrane contactor.

21. A method of preparing the giant protein vesicles according to claim 14, the method comprising the steps of:

a) preparing liposomes from a dried lipid solution that has been rehydrated in a detergent containing buffer and extruded through a filter of 100 nm to 500 nm pore size,

b) mixing the liposomes from a) with a transmembrane protein solution, wherein the protein is optionally linked to a fluorescent label,

c) dialysing the mixture from b) overnight using a molecular weight cut off of 10kDa,

d) separating the proteoliposome vesicles formed in step c), e.g. by centrifugation,

e) optionally obtaining an absorbance spectrum of the GPVs formed which is compatible with the fluorescent label used in order to verify correct insertion of the transmembrane protein in the vesicle membranes, and

f) mixing the proteoliposomes obtained in step d) with a lipid in an oil phase solution containing the same lipid as in step a) in a molar ratio ranging from 1:3 v/v to 1:12 v/v,

thereby resulting in the formation of GPVs from the proteoliposomes.

22. A method of preparing giant protein vesicles according to claim 14, the method comprising self assembling the vesicles from an aqueous mixture of said amphiphilic lipid, transmembrane protein channels, and oil following end-over-end mixing.

23. The method according to claim 21 or claim 22, wherein the lipid is asolectin.

23. The method according to claim 21 or claim 22, wherein the lipid is DOPC or DPhPC or DOPS or natural lipid extracts, such as *E. coli* total lipid extract, or soybean mixed phospholipids., or combination mixtures thereof.

24. The method according to any one of claims 21 to 23, wherein said oil phase include squalene, squalane, alpha-tocopherol, hopanoids, isoprenes (e.g. esterified dolichol), ubiquinone (Q10), jojoba oil, light mineral oils, linseed oil, soybean oil, phospholipid stabilized squalene or soybean oil (or an emulsion of soy bean oil, phospholipids and glycerin, intralipid™) and the like.

25. The method according to any one of claims 21 to 25, wherein said transmembrane protein is selected from aquaporins, such as SoPIP2;1 and AqpZ; and transmembrane proteins,

~~such as FomA.~~

26. The method according to any one of claims 21 to 25, wherein the transmembrane protein is linked to a fluorescent label.

27. The method according to claim 26, wherein the fluorescent label is a naphthalene derivative such as those listed in table 1 herein or a fluorescently functional derivative thereof.

28. The method according to claim 27, wherein the naphthalene derivative is 6-bromoacetyl-2-dimethylaminonaphthalene.

29. Use of the giant protein vesicles prepared according to the method of any one of claims 21 to 28 for extraction of water through forward osmosis.

30. Use of the giant protein vesicles prepared according to the method of any one of claims ~~21 to 28 for re-extraction of pure water from a patients plasma lost through haemodialysis.~~

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A liquid membrane system in the form of a bulk liquid membrane (BLM) containing a biochannel, an emulsion liquid membrane (ELM) containing a biochannel, or a supported (immobilised) liquid membrane (SLM), containing a biochannel,

wherein the liquid membrane system comprises vesicles, said vesicles being formed from one or more amphiphilic compounds, said amphiphilic compounds forming a bilayer into which the biochannels have been incorporated,

and wherein said liquid membrane system further comprises a stabilising oil phase in which the vesicles are formed that comprises squalene, squalane or a mixture thereof.

2. The liquid membrane system according to claim 1, wherein said biochannel is an aquaporin water channel.

3. The liquid membrane system according to claim 1, wherein the biochannel is selected from the group consisting of boron nitride nanotubes, carbon nanotubes, amphiphilic pore forming molecules including the transmembrane channel molecules beta-barrel pores such as alpha-hemolysin and OmpG, FomA, and VDAC; the transmembrane peptide pores alamethicin, valinomycin, and gramicidin A including derivatives thereof and synthetic peptides; ion channels, and ion-selective ionophores.

4. The liquid membrane system according to any one of claims 1 to 3, wherein the amphiphilic compounds are lipids.

5. The liquid membrane system according any one of the preceding claims, wherein the biochannels are present in a ratio of 1% to about 70% relative to the vesicle surface area.

6. The liquid membrane system according to any one of the preceding claims which is contained or immobilised in a contactor module.

7. The liquid membrane system of claim 6, wherein the contactor module is selected from the group consisting of a flat sheet module, a hollow fibers separation module and a spiral wound separation module.

8. The liquid membrane system of claim 6, wherein the contactor module is a two module hollow fiber supported liquid membrane contactor module or a liquid cell extra-flow membrane contactor module.

9. The liquid membrane system according to any one of the preceding claims which is contained or immobilised in a porous support layer.

10. The liquid membrane system according to claim 2 which is adapted to extract water from liquid aqueous media by forward osmosis.

11. The liquid membrane system according to claim 10, wherein the liquid medium is salt water and the membrane system is adapted to desalinate salt water.

12. The liquid membrane system according to claim 10, wherein said forward osmosis process utilizes salt water as the feed solution and a CO_2/NH_3 aqueous solution as the draw solution, and where elimination of the dissolved CO_2 and NH_3 gases is effected through heating to about 58 °C.

13. The liquid membrane system according to claim 10, wherein the water is pure water.

14. The liquid membrane system according to claim 2, wherein the liquid medium is a dialysate resulting from haemodialysis and the membrane system is adapted to re-extract water from the dialysate resulting from haemodialysis.

15. A method for extracting pure water from an aqueous liquid media comprising contacting one or more liquid membranes according to claim 2 with an aqueous liquid medium thereby extracting pure water by forward osmosis.

16. The method of claim 15, wherein the aqueous liquid medium is salt water and the membrane system is used for desalination.

17. The method of claim 15 or claim 16, wherein said forward osmosis process utilizes salt water as the feed solution and a CO_2/NH_3 aqueous solution as the draw solution, and where elimination of the dissolved CO_2 and NH_3 gases is effected through heating to about 58 °C.

18. The method of claim 15, wherein the liquid medium is a dialysate resulting from haemodialysis and the membrane system is used in re-extracting water from the dialysate resulting from haemodialysis.