Claims:

1. A liquid membrane matrix comprising a cellular structure having an internal water phase, an external oil phase, and a boundary layer between cells comprising a non-ionic detergent into which transmembrane protein channels have been incorporated, wherein said protein channels are aquaporin or aquaglyceroporin water channels.

2. The liquid membrane matrix according to claim 1, wherein said oil phase comprises components selected from the group consisting of a sterol, squalene, squalane, alpha-tocopherol, hopanoids, isoprenes including esterified dolichol, glycerol, ubiquinone, jojoba oil, light mineral oils, linseed oil, soybean oil, ground nut oil, phospholipid stabilized squalene, or an emulsion of soy bean oil, phospholipids and glycerol, and alkanes, such as decane, undedane, dodecane; and mixtures thereof.

3. The liquid membrane matrix according to claim 1 or claim 2, wherein said oil phase comprises non-polar hydrocarbon solvents, e.g. having unbranched or branched carbon chains of 6 to 12 carbon atoms.

4. The liquid membrane matrix according to ~~claim 1 or 2~~ any one of claims 1 to 3, wherein said non-ionic detergent is selected from ~~nonionic detergents, such as a~~ hydrophile-hydrophobe-hydrophile (A-B-A) type poloxamers.

5. The liquid membrane matrix according to any one of claims 1 to 3, wherein said non-ionic detergent is an amphiphilic block copolymer.

6. The liquid membrane matrix according to any one of claims 1 to 5, further comprising an amphiphilic lipid component.

~~7. The liquid membrane matrix according to any one of claims 1 to 6, wherein said protein channel is an aquaporin or aquaglyceroporin water channel.~~

7.~~8.~~ The liquid membrane matrix according to ~~claim 7~~ any one of the preceding claims, wherein the aquaporin or aquaglyceroporin water channel is selected from the group consisting of Aqp 4, Aqp 1, Aqp Z, SoPIP2;1 and monomeric, dimeric, tetrameric and higher oligomers as well as functional variants thereof including mutated, conjugated and truncated versions of the primary sequence.

~~9. The liquid membrane matrix according to any one of claims 1-6, wherein said protein channel is a functional potassium channel.~~

~~10. The liquid membrane matrix according to any one of claims 1 to 8 6, wherein said transmembrane protein is selected from the group consisting of beta-barrel pores, such as alpha-hemolysin and OmpG, FomA, and VDAC; rhodopsins, such as bacteriorhodopsin, or transmembrane peptide pores, such as alamethicin, valinomycin, and gramicidin A including derivatives thereof and synthetic transmembrane peptides; ion channels, or ion-selective ionophores.~~

8.~~11.~~ The liquid membrane matrix according to any one of claims 1 to ~~10~~ 7 having cells with an approximate maximal diameter of up to 1000 µm and the majority of cells lie preferably in the range of about 20 to about 50 µm.

9.~~12.~~ A method of extracting water from an aqueous liquid comprising the following steps:

a) placing an amount of the liquid membrane matrix according to any one of claims ~~7, 8 or 11~~ 1 to 8 into a filter chamber which is in controlled connection with a first aqueous liquid (feed solution) having an osmotic pressure which is lower than or equal to that of the liquid membrane matrix, and which is further in controlled connection with a second aqueous liquid (draw solution) having an osmotic pressure which is higher than that of the matrix to create an osmotic pressure potential between said first and said second liquid,

b) allowing the matrix to absorb pure water from said first liquid and to mediate a pure water flux into said second liquid as long as an osmotic pressure gradient exists,

c) optionally separating the extracted pure water from said second liquid.

10~~13~~. The method according to claim ~~12~~ 9, wherein said first aqueous liquid is selected from the group consisting of any type of 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, biological fluids including wine, fruit and vegetable juice, milk, whole blood, plasma, urine, saliva, sweat, homogenized tissue etc.

11~~14~~. An apparatus for pure water extraction from an aqueous liquid media which comprises one or more liquid membrane matrices according to any one of claims 1 to 8 ~~and 11~~.

12~~15~~. An apparatus for pure water extraction from an aqueous liquid media said apparatus having a filter house comprising one or more aquaporin containing liquid membrane matrices according to any one of claims 1 to 8 ~~and 11~~.

13~~16~~. The apparatus according to claim 12 ~~14~~, wherein the apparatus is a hollow fiber module.

14~~17~~. The apparatus according to claim 12 ~~14~~, wherein the apparatus is a two module hollow fiber liquid - liquid membrane contactor module or a liquid cell extra-flow membrane contactor.

15~~18~~. A method of preparing a liquid membrane matrix suitable for extraction of water from a liquid medium using forward osmosis the method comprising combining an aqueous solution of a non-ionic detergent with a buffered aqueous aquaporin protein preparation and an oil followed by end-over-end mixing and allowing the resulting emulsion to separate and extract the generated extended oil/water interphase which constitutes said liquid membrane matrix.

16~~19~~. Use of the liquid membrane matrix prepared according to any one of claims 1 to 8 ~~and 11~~ for extraction of pure water through forward osmosis.

17~~20~~. Use of the liquid membrane matrix prepared according to any one of claims 1 to 8 ~~and 11~~ for re-extraction of pure water from a patient's plasma lost through hemodialysis.

18~~21~~. A supported liquid membrane matrix having a closed sandwich construction, wherein a substantially flat porous filter material provides support on both sides of a layer of a liquid membrane matrix according to any one of claims 1 to ~~11~~ 8 thereby immobilising the layer.

19~~22~~. A supported liquid membrane matrix having an open sandwich construction, wherein a substantially flat porous filter material provides support on one side of a layer of a liquid membrane matrix according to any one of claims 1 to ~~11~~ 8 thereby immobilising the layer.