Claims:

1. A liquid membrane matrix ~~comprising~~ consisting of a cellular structure having an internal water phase, an external oil phase and a boundary layer between cells comprising an amphiphilic non-ionic detergent and optionally one or more amphiphilic lipid components, wherein aquaporin or aquaglyceroporin water channels proteins have been incorporated in the boundary layer between the cells of the liquid membrane matrix and wherein the molar ratio of protein to amphiphilic non-ionic detergent in the boundary layer is between 1: 50 and 1:400.

2. The liquid membrane matrix according to claim 1, wherein said amphiphilic non-ionic detergent is an amphiphilic block copolymer.

3. The liquid membrane matrix according to claim 2, wherein the amphiphilic block copolymer is a poloxamer.

4. The liquid membrane matrix according to claim 3, wherein the poloxamer is a hydrophile-hydrophobe-hydrophile A-B-A type poloxamers.

5. The liquid membrane matrix according to any one of the preceding claims, 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.

6. The liquid membrane matrix according to any one of the preceding claims, wherein said oil phase comprises a non-polar hydrocarbon solvent.

7. The liquid membrane matrix according to any one of the preceding claims, wherein the one or more amphiphilic lipid components are selected from the group consisting of phospholipids, phosphoglycerides, sphingolipids, cardiolipin, natural lipid extracts, *E. coli* total lipid extract, soybean mixed phospholipids and mixtures thereof.

~~amphiphilic lipic component.~~

8. The liquid membrane matrix according to claim 7, wherein the phospholipids are 1,2-dipalmitoyl-sn-phosphatidylcholine (DPPC), DOPC, DPhPC, DOPS or soybean mixed phospholipids.

9. The liquid membrane matrix according to any one of the preceding claims, wherein the aquaporin or aquaglyceroporin water channel is selected from the group consisting of AQP4, AQP1, 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.

10. The liquid membrane matrix according to any one of claims 1 to 9, wherein the cells have an approximate maximal diameter of up to 1000 µm.

11. The liquid membrane matrix according to claim 10, wherein the majority of cells have diameters in the range of about 20 to about 50 µm.

12. 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 thereby immobilising the layer.

13. 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 thereby immobilising the layer.

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 11.

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 11.

16. The apparatus according to claim 15, wherein the apparatus is a hollow fiber module.

17. The apparatus according to claim 15, wherein the apparatus is a two module hollow fiber liquid - liquid membrane contactor module or a liquid cell extra-flow membrane contactor.

18. A method of preparing a liquid membrane matrix suitable for extraction of water from a liquid medium using forward osmosis, the liquid membrane matrix ~~comprising~~ consisting of a cellular structure having an internal water phase, an external oil phase and a boundary layer between cells comprising an amphiphilic non-ionic detergent and optionally one or more amphiphilic lipid components, wherein aquaporin or aquaglyceroporin water channels proteins have been incorporated in the boundary layer between the cells of the liquid membrane matrix, the method comprising:

combining an aqueous solution of the amphiphilic non-ionic detergent, and optionally one or more amphiphilic lipid components, 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,

wherein the molar ratio of protein to amphiphilic non-ionic detergent in the boundary layer is between 1: 50 and 1:400.

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

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

21. 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 1 to 11 into a filter chamber which is in 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 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.

22. The method according to claim 21, 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 and homogenized tissue.