Claims:

1. Structures for extraction of water vapor from large volumes of air into low volume of absorbing liquid comprising
   a) a surface of absorbing part, on which a thin layer of flowing hygroscopic liquid is in direct contact with air, thereby absorbing water vapor from it;
   b) a structure of desorbing part, on which a layer of water enriched hygroscopic liquid is brought into contact with a heated surface on one side and a layer of material which blocks crossing of the hydrated liquid through it, but which allows water to pass through, towards another surface which is cooled to lower temperature than the heated surface and on which water is recovered, while the regenerated, concentrated hygroscopic liquid flows from the hot surface for reuse in the next water vapor absorption cycle.
2. A process according to claim 1.
3. A structure according to claim 1, in which a hygroscopic liquid is distributed and allowed to flow by gravity on a surface of woven or non-woven fabric for its hydration.
4. A structure according to claim 1, in which the hygroscopic liquid is glycerol.
5. A structure according to claim 1, in which liquid flow occurs by pumping.
6. A structure according to claim 1, in which a layered, sandwich-like structure is used for the separation of water from hydrated solution and which consists of the following elements
   a) a sheet or layer, which is heated above the temperature of environment
   b) a space or layer of porous or filamentary material which allows the flow and even distribution of hydrated liquid along the heated layer
   c) a layer of material which allows passage of water molecules, but not of hydrated liquid, into a small space, from which it is recovered in liquid form
   d) a sheet or layer, the temperature of which is decreased by air movement
7. A structure according to claim 1 and 6, wherein the energy needed for separation of water from hydrated hydroscopic liquid is provided by solar radiation.
8. A structure according to claim 1 and 6, where the heated surface is made from metal sheet, which is provided by a solar light absorbing layer to increase heat generation.
9. A structure according to claim 6, where the heat loss on the illuminated side is limited by one or more heat isolating, but only minimally light absorbing layers.

10. A structure according to claim 6, where isolating layers are made by sheets of transparent material, supported in a distance from 0.1 to 50 mm by isolating frames made of wood, foam polystyrene or other isolating materials or their combination.
11. A structure according to claim 1 and 6, where the layer of liquid passage preventing material is a membrane of hydrophobic or super hydrophobic material.
12. A structure according to claim 1 and 6, where the glycerol blocking material is made from regenerated cellulose or its derivates.
13. A structure according to claim 11, where the hydrophobic material is a porous PTFE membrane, reinforced by suitable supporting material.
14. A structure according to claim 6, in which the heated and cooled surfaces are provided with channels or grooves facilitating flow of the hydrated solution on the heated surface and removal of condensed water on the cooled surface, while both liquids are separated by a layer of material allowing passage of water or water vapor, but not of glycerol.
15. A structure according to claim 14, in which the sense of the grooves or channels between opposite surfaces is rotated, so that, after fixing them together, the mechanical stability of the structure is increased.
16. A structure according to claim 6, where the cooling is provided by natural thermal air movement or wind.
17. A structure according to claim 1 and 6, in which water vapor is extracted from air in closed spaces, which leads to a decrease of the relative humidity to a suitable level.
18. A structure according to claim 17, where the water vapor extraction is combined with water evaporation from another water-wetted surface in a closed space, so that due to the evaporation heat of water, the resulting temperature in the same closed space is decreased.
19. A structure according to claim 1 and 6, by means of which the produced water is used for drinking.
20. A structure according to claim 1 and 6, by means of which the produced water is used in place without the needs of expensive distribution piping.
21. A structure according to claim 1 and 6, by means of which the produced water is used for the irrigation of surfaces which can be consecutively used for cultivation of crops or other plants.
22. A structure according to claim 1 and 21, in which water from air is distributed into the soil by irrigation tubes, placed at least 5 cm under the surface of the soil.

23. A structure according to claim 1 and 6, by means of which the produced water is used for soilless cultures of plants.
24. A structure according to claim 1 and 6, by means of which the produced water is used for reduction of the green house effect on Earth by cultivation of plants which reflect large portions of the incoming solar radiation and, thereby, decrease excessive heating of the surrounding space.
25. A method of cultivation of plants using structures according to claim 1 and 6, where plants cultivated with water produced from air humidity are shielded by films allowing the passage of only the photo-synthetically relevant part of the solar radiation spectrum and simultaneously reflecting other parts, thereby reducing the temperature of plants and consequently their water need for transpiration, finally leading to the reduction of their water requirements and increased growth and yield.

Claims:

1. A structure, adapted for extracting water from air, comprising an absorbing part and a desorbing part, wherein

said absorbing part comprises a surface having a thin layer of a flowing hygroscopic liquid in direct contact with air, the thin layer of hygroscopic liquid absorbing water vapor from air to form a hydrated solution;

said desorbing part comprises a sandwich-like structure to separate water from the hygroscopic liquid in said hydrated solution, said sandwich-like structure comprising:

a) a heated sheet or layer, heated to a temperature above the environment's temperature;

b) a space or layer filled with porous or filamentary material, allowing the flow and even distribution of hydrated solution along the heated layer;

c) a layer of material, allowing passage of water molecules but preventing passage of the hygroscopic liquid;

d) a cooled sheet or layer, the temperature of which is decreased relative to the temperature of the heated sheet or layer, allowing water to be removed in liquid form.

2. The structure of claim 1, wherein the hygroscopic liquid is glycerol.

3. The structure of any of the preceding claims, wherein said hygroscopic liquid is distributed and allowed to flow by gravity through said porous or filamentary material.

4. The structure of any of the preceding claims, wherein energy needed for separation of water from the hygroscopic solution is obtained from solar radiation.

5. A structure according to claim 1, in which liquid flow occurs by pumping.

6. A structure according to claim 1, where the heated sheet or layer is made from a metal sheet or layer, and is heated by absorbing solar radiation.

7. A structure according to claim 1, wherein heat loss from the heated sheet or layer is reduced by one or more heat isolating, but only minimally light absorbing layers.

8. A structure according to claim 1, wherein the heated sheet or layer is isolated by sheets of transparent material, supported in a distance from 0.1 to 50 mm by isolating frames made of wood, foam polystyrene or other isolating materials or their combination.

9. A structure according to claim 1, wherein the layer of material allowing passage of water molecules but preventing passage of the hygroscopic liquid is a membrane of hydrophobic or super hydrophobic material.

10. A structure according to claim 1, wherein the layer of material allowing passage of water molecules but preventing passage of the hygroscopic liquid is made from regenerated cellulose or its derivates.

11. A structure according to claim 1, wherein the layer of material allowing passage of water molecules but preventing passage of hydrated liquid is a porous PTFE membrane reinforced by suitable supporting material.

12. A structure according to claim 1, in which the heated sheet or layer, and the cooled sheet or layer, are provided with channels or grooves facilitating flow of the hydrated solution on a heated surface of the heated sheet or layer and removal of condensed water on a cooled surface of the cooled sheet or layer, while both liquids are separated by a layer of material allowing passage of water molecules but preventing passage of the hygroscopic liquid.

13. A structure according to claim 12, in which the sense of the grooves or channels between opposite surfaces is rotated, so that, after fixing them together, the mechanical stability of the structure is increased.

14. A structure according to claim 1, where the decrease of the temperature is provided by natural thermal air movement or wind and thermal radiation.

15. A structure according to claim 1, in which water vapor is extracted from air in closed spaces, which leads to a decrease of the relative humidity of the closed space.

16. A structure according to claim 15, where the water vapor extraction is combined with water evaporation from another water-wetted surface in a closed space, so that due to the

evaporation heat of water, the resulting temperature in the same closed space is decreased.

17. Use of a structure according to any of claims 1 to 16

a) for producing drinking water; or

b) for irrigation of surfaces which can be consecutively used for cultivation of plants, particularly crops; or

c) for soilless cultures of plants.

18. A structure according to claim 1, further comprising irrigation tubes which are located at least 5 cm under a soil surface.

19. A structure according to claim 1, by means of which the recovered water is used for reduction of the green house effect on Earth by cultivation of plants which reflect large portions of the incoming solar radiation and, thereby, decrease excessive heating of the surrounding space.

20. A method of cultivation of plants using structures according to claim 1, where plants cultivated with the recovered water are shielded by films allowing the passage of only the photo-synthetically relevant part of the solar radiation spectrum and simultaneously reflecting other parts, thereby reducing the temperature of plants and consequently their water need for transpiration, finally leading to the reduction of their water requirements and increased growth and yield.