CLAIMS

1. A device for reducing biofouling on a surface at least partially submerged in an aqueous environment, the device comprising:

a structure comprising at least one vertically extending flexible sheet layer formed from permeable fabric material which forms at least one enclosure wall which is or becomes water permeable during use, the at least one vertically extending flexible sheet layer substantially surrounding at least a portion of a periphery of the surface in the aqueous environment, the at least one vertically extending flexible sheet layer having an upper end at or near a surface of the aqueous environment and a lower end which extends downward into the aqueous environment to a first depth;

in which the at least one enclosure wall forms a skirt-type enclosure which creates, in use:

(a) a barrier to significant levels of oxygen transport through the skirt-type enclosure;

(b) a potential reduction of available energy and/or nutrient supplies within the skirt-type enclosure for organisms and/or chemical reactions, which may reduce and/or prevent natural photosynthesis or other metabolic processes of microorganisms and/or undesirably chemical reactions from occurring within skirt-type enclosure; and/or

(c) reduces and/or prevents oxygen and/or other chemicals/elements from diffusing and/or mixing into enclosed water at a top of skirt-type enclosure;

in which the skirt-type enclosure comprises an open bottom and/or there is provided in the at least one enclosure wall openings and/or perforations in which some level of dissolved oxygen may be replenished via the open bottom of the structure and/or through openings and/or perforations in or between the at least one enclosure wall.

2. A device according to Claim 1, in which the structure is configured to attach to a floatable device to extend downwardly into the aqueous environment from a top to a bottom.

3. A device according to Claim 2, further comprising one or more connection features configured to attach to the floatable device, in which the structure is connected to the one or more connection features so as to extend downwardly into the aqueous environment below the floatable device.

4. A device according to Claim 2, in which the structure forms a skirt for the floatable device.

5. A device according to Claim 1, in which the structure is configured to attach to and surround a floatable device to reduce biofouling on the floatable device.

6. A device according to Claim 1, in which the structure is flexible and defines a first side and a second side,

in which, when the structure at least partially surrounds the surface in the aqueous environment such that the first side of the structure faces the surface, the structure allows fluid exchange through the structure to the surface while preventing or limiting biofouling on the surface such that a first chemistry of the aqueous environment between the surface and the first side of the structure is different than a second chemistry of the aqueous environment on the second side of the structure, in which the first chemistry is measured in the aqueous environment proximate the surface, in which the second chemistry is measured in the aqueous environment at a spaced apart distance from the second side of the structure facing away from the surface.

7. A device according to Claim 6, in which, when the structure at least partially surrounds the surface in the aqueous environment, the structure modulates dissolved oxygen content between the second side and the first side.

8. A device according to Claim 1, in which the structure further comprises a plurality of flexible layers, in which at least one of the plurality of flexible layers is removeable from a remaining set of the plurality of flexible layers.

9. A device according to Claim 1, in which the structure comprises biocide.

10. A device according to Claim 6, in which the spaced apart distance from the second side of the structure is 12 inches.

11. A device according to Claim 1, in which a surface area of the structure is less than a surface area of the surface.

12. A device according to Claim 1, in which a lowest point of the surface extends to a second depth into the aqueous environment, and the first depth is greater than the second depth.

13. A device according to Claim 1, in which the surface extends into the aqueous environment to a second depth, and the first depth is less than or equals the second depth.

14. A device according to Claim 1, in which the structure provides an average water exchange of about 0.1% to 500% of a volume of water each hour therethrough.

15. A device according to Claim 1, further comprising an aqueous flow mechanism that is positioned between the structure and the surface, in which the aqueous flow mechanism is configured to at least one of disturb the aqueous environment or add or remove liquid, compounds, or other materials to or from the aqueous environment.

16. A device according to Claim 1, further comprising a modification compound that is positioned between the structure and the surface, in which the modification compound is configured to condition the aqueous environment by applying a change in water chemistry of the aqueous environment.

17. A roll of material used to form a device according to any preceding claim, in which the material includes the structure.

18. A method of reducing biofouling on a surface at least partially submerged in an aqueous environment, the method comprising:

providing a structure comprising at least one vertically extending flexible sheet layer formed from permeable fabric material which forms at least one enclosure wall which is or becomes water permeable during use, the at least one vertically extending flexible sheet layer substantially surrounding at least a portion of a periphery of the surface in the aqueous environment, the at least one vertically extending flexible sheet layer having an upper end at or near a surface of the aqueous environment and a lower end which extends downward into the aqueous environment to a first depth, in which the at least one vertically extending flexible sheet layer comprises a 3-dimensional flexible material selected from the group consisting of natural fabrics, synthetic fabrics, natural membranes, synthetic membranes, natural sheets, synthetic sheets, and fabrics, membranes, or sheets made from a combination of natural and synthetic materials; and in which the at least one enclosure wall forms a skirt-type enclosure which creates, in use:

(a) a barrier to significant levels of oxygen transport through the skirt-type enclosure;

(b) a potential reduction of available energy and/or nutrient supplies within the skirt-type enclosure for organisms and/or chemical reactions, which may reduce and/or prevent natural photosynthesis or other metabolic processes of microorganisms and/or undesirably chemical reactions from occurring within skirt-type enclosure; and/or

(c) reduces and/or prevents oxygen and/or other chemicals/elements from diffusing and/or mixing into enclosed water at a top of skirt-type enclosure;

in which the skirt-type enclosure comprises an open bottom and/or there is provided in the at least one enclosure wall openings and/or perforations in which some level of dissolved oxygen may be replenished via the open bottom of the structure and/or through openings and/or perforations in or between the at least one enclosure wall;

positioning the structure into the aqueous environment so as to substantially surround at least a portion of a periphery of the surface in the aqueous environment and such that the structure has an upper end and a lower end which extends downward into the aqueous environment to a first depth.

19. A method according to Claim 18, further comprising causing an aqueous flow mechanism to at least one of disturb the aqueous environment between the structure and the surface or add or remove liquid, compounds, or other materials to or from the aqueous environment between the structure and the surface.

20. A method according to Claim 18, further comprising positioning a modification compound between the structure and the surface, in which the modification compound is configured to condition the aqueous environment by applying a change in water chemistry of the aqueous environment.

21. A device according to Claim 1, in which the at least one vertically extending flexible sheet layer comprises a three-dimensional fabric matrix and/or fibrous matrix structure fashioned from interwoven and/or intertwined strands of thread formed in a latticelike, mesh, mat or fenestrated fabric arrangement.

22. A method according to Claim 18, in which the at least one vertically extending flexible sheet layer comprises a three-dimensional fabric matrix and/or fibrous matrix structure fashioned from interwoven and/or intertwined strands of thread formed in a latticelike, mesh, mat or fenestrated fabric arrangement.