CLAIMS

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

a structure which is or becomes water permeable during use, the structure adapted to receive the substrate in a not fully sealed arrangement, in which the structure comprises at least one of mesh, lattice, fenestration, or holes that allows fluid flow therethrough,

in which the structure separates an aqueous environment into a local aqueous environment and an open aqueous environment, in which the local aqueous environment extends from a surface of the substrate to at least an inner surface of the structure,

in which the structure modulates dissolved oxygen content from the open aqueous environment into the local aqueous environment.

2. A device according to Claim 1, in which the structure modulates the dissolved oxygen content within the local aqueous environment by maintaining the dissolved oxygen content at or above an average of 10% dissolved oxygen within a 24-hour period.

3. A device according to Claim 1, in which the structure modulates the dissolved oxygen content within the local aqueous environment by maintaining the dissolved oxygen content within a range of 20% to 120% dissolved oxygen within a 24-hour period.

4. A device according to Claim 1, in which the local aqueous environment comprises a first dissolved oxygen content and the open aqueous environment comprises a second dissolved oxygen content, in which the first dissolved oxygen content is different from the second dissolved oxygen content as measured over at least 24 hours.

5. A device according to Claim 1, in which the local aqueous environment comprises a first dissolved oxygen content and the open aqueous environment comprises a second dissolved oxygen content, in which, on average, the first dissolved oxygen content is less than the second dissolved oxygen content as measured over at least 24 hours.

6. A device according to Claim 1, in which the local aqueous environment comprises a first dissolved oxygen content and the open aqueous environment comprises a second dissolved oxygen content, in which the first dissolved oxygen content comprises a first rate of change over a period of time and the second dissolved oxygen content comprises a second rate of

change over the period of time, in which the first rate of change is the same as, faster or higher than the second rate of change.

7. A device according to Claim 1, in which the local aqueous environment comprises a first dissolved oxygen content and the open aqueous environment comprises a second dissolved oxygen content, in which the first dissolved oxygen content comprises a first rate of change over a period of time and the second dissolved oxygen content comprises a second rate of change over the period of time, in which the first rate of change is slower or less than the second rate of change.

8. A device according to Claim 1, in which the local aqueous environment has a first dissolved oxygen content proximate to the inner surface of the structure and a second dissolved oxygen content proximate to an outer wall of the substrate, in which the first dissolved oxygen content is different from the second dissolved oxygen content.

9. A device according to Claim 8, in which the second dissolved oxygen content is less than the first dissolved oxygen content.

10. A device according to Claim 4, in which there is at least 5% difference between the first dissolved oxygen content and the second dissolved oxygen content as measured after the structure is at least partially submerged in the aqueous environment for at least 2 days.

11. 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 in the local aqueous environment each hour between the local aqueous environment and the open aqueous environment.

12. A device according to Claim 1, in which the structure includes a water permeable surface having a permeability of about 100 millilitres of water per second per square centimetre of the structure or less.

13. A device according to Claim 1, in which the structure comprises a 3-dimensional flexible material selected from a group consisting of natural and synthetic fabrics, natural and synthetic membranes, natural and synthetic sheets, and fabrics, membranes, films and sheets made from a combination of natural and synthetic materials.

14. A device according to Claim 1, in which a first water chemistry within the local aqueous environment is different from a second water chemistry within the open aqueous environment.

15. A device according to Claim 4, in which, on average, the first dissolved oxygen content is less than the second dissolved oxygen content during daylight hours.

16. A device according to Claim 4, in which, on average, the first dissolved oxygen content lags the second dissolved oxygen content as measured over at least 24 hours.

17. A device according to Claim 4, in which a continuous reading of the first dissolved oxygen content is more buffered compared to a continuous reading of the second dissolved oxygen content as measured over at least 24 hours.

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

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

using a structure which is or becomes water permeable during use, the structure adapted to receive the substrate in a not fully sealed arrangement, in which the structure comprises at least one of mesh, lattice, fenestration, or holes that allows fluid flow therethrough, in which the structure separates an aqueous environment into a local aqueous environment and an open aqueous environment, in which the local aqueous environment extends from a surface of the substrate to at least an inner surface of the structure,

dispensing a substance which reduces dissolved oxygen content within the local aqueous environment by at least 10%.

20. A method according to Claim 19, in which the substance comprises nitrogen gas.

21. A method according to Claim 20, in which dispensing the substance comprises sparging the local aqueous environment with nitrogen gas.

22. A method according to Claim 19, in which the substance comprises iron filings.

23. A method according to Claim 19, in which the structure provides an average water exchange of about 0.1% to 500% of a volume of water in the local aqueous environment each hour between the local aqueous environment and the open aqueous environment.

24. A method according to Claim 19, in which the structure includes a water permeable surface having a permeability of about 100 millilitres of water per second per square centimetre of the structure or less.

25. A method according to Claim 19, in which the structure comprises a 3-dimensional flexible material selected from a group consisting of natural and synthetic fabrics, natural and synthetic membranes, natural and synthetic sheets, and fabrics, membranes, films and sheets made from a combination of natural and synthetic materials.

26. A method according to Claim 19, in which the structure maintains a dissolved oxygen content of the local aqueous environment of at least an average of 10% or greater as measured over at least 24 hours.

27. A method according to Claim 19, in which a first water chemistry within the local aqueous environment is different from a second water chemistry within the open aqueous environment.

28. A method according to Claim 19, in which the substrate comprises biocide.

29. A device according to Claim 4, in which the structure modulates the dissolved oxygen content such that the first dissolved oxygen content lags behind changes in the second dissolved oxygen content at a reduced level.

30. A device according to Claim 14, in which the first water chemistry differs from the second water chemistry by having at least one difference of a water chemistry characteristic, in which the water chemistry characteristic is one of pH, total dissolved nitrogen, ammonium, nitrates, orthophosphates, total dissolved phosphates, alkalinity or silica.

31. A device according to Claim 30, in which the at least one difference of the water chemistry characteristic is at least a 10% difference as measured after the structure is at least partially submerged in the aqueous environment for at least 2 days.

32. A device according to Claim 1 further comprising at least one floating boom attached to the structure, in which the at least one floating boom is configured to float on a top surface of the aqueous environment to enable the structure to maintain a depth within the aqueous environment.

33. A device according to Claim 1, in which the structure is flexible.

34. A device according to Claim 1, in which the structure comprises at least one of mesh, lattice, fenestration, or holes that enable fluid flow therethrough.

35. A device according to Claim 1, in which the structure defines a first side including the inner surface and an opposite second side, in which, when the structure at least partially surrounds the substrate in the aqueous environment such that the first side of the structure faces the surface of the substrate, the structure enables fluid exchange therethrough to the substrate while preventing or limiting biofouling on the substrate such that a first chemistry of the aqueous environment on the first side of the structure is different from a second chemistry of the aqueous environment on the second side of the structure.

36. A roll of material used to form a device according to Claim 1, in which the material includes the structure.

37. A method according to Claim 19, in which a surface area of the structure is at least equal to or greater than a surface area of the substrate.

38. A method according to Claim 19, in which a surface area of the structure is less than a surface area of the substrate.