cation permeable membrane. In the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the ion exchange material domain is contiguous, is an anion permeable membrane, the ion exchange material domain is an anion exchange material predominant domain. In the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the ion exchange material domain is contiguous, is a cation permeable membrane, the ion exchange material domain is a cation exchange material predominant domain.

In ~~another aspect~~one embodiment, there is provided an electrodeionization apparatus comprising an ion-concentrating compartment partially bounded by a first ion permeable membrane and also partially bounded by a separator element, wherein the first ion permeable membrane is one of an anion permeable membrane and a cation permeable membrane, a first ion exchange material domain disposed within the ion-concentrating compartment, wherein the first ion exchange material domain is contiguous with at least a portion of an ion-concentrating compartment side surface of the first ion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the first ion permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the first ion permeable membrane, and a second ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the separator element defines a first space between the first ion exchange material domain and the separator element, and wherein at least a portion of the second ion exchange material domain is disposed within the first space. Where the first ion permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, the first ion exchange material domain is an anion exchange material predominant domain and the second ion exchange material domain is a non-anion exchange material predominant domain. Where the first ion permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is a cation permeable membrane, the first ion exchange material domain is a cation exchange material predominant domain and the second ion exchange material domain is a non-cation exchange material predominant domain.

In ~~a further aspect~~another embodiment, there is provided an electrodeionization apparatus comprising an ion-concentrating compartment partially bounded by an anion permeable membrane and also partially bounded by a cation permeable membrane, wherein the anion permeable membrane includes an ion-concentrating compartment side surface which defines an ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the cation permeable membrane includes an ion-concentrating compartment side surface which defines an ion-concentrating compartment side surface area of the cation permeable membrane, and a first ion exchange material domain within the ion-concentrating compartment, wherein the first ion exchange material domain is contiguous with at least a portion of the ion-concentrating compartment side surface of one of the anion permeable membrane and the cation permeable membrane, wherein the at least a portion of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the one of the anion permeable membrane and the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the one of the anion permeable membrane and the cation permeable membrane, and wherein the first ion exchange material domain is spaced apart from at least a portion of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface fraction of the other one of the one of the anion permeable membrane and the cation permeable membrane, and

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An electrodeionization apparatus comprising:

an ion-concentrating compartment partially bounded by an anion permeable membrane and also partially bounded by a cation permeable membrane; and

a first ion exchange material domain disposed within the ion-concentrating compartment, wherein the first ion exchange material domain is contiguous with at least a portion of an ion-concentrating compartment side surface of one of the anion permeable membrane and the cation permeable membrane, and is spaced apart from the other one of the one of the anion permeable membrane and the cation permeable membrane;

wherein the at least a portion of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane;

such that,

in the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, the first ion exchange material domain is an anion exchange material predominant domain;

and in the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is a cation permeable membrane, the first ion exchange material domain is a cation exchange material predominant domain.

2. The electrodeionization apparatus as claimed in claim 1, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the other one of the one of the anion permeable membrane and the cation permeable membrane defines a respective space

between the first ion exchange material domain and the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

3. The electrodeionization apparatus as claimed in claim 1, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, such that the first ion exchange material phase is an anion exchange material predominant domain.

4. The electrodeionization apparatus as claimed in claim 3, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective space between the anion exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

5. The electrodeionization apparatus as claimed in claim 3, further comprising a cation exchange material predominant domain disposed within the ion-concentrating compartment, wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane and is spaced apart from the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane.

6. The electrodeionization apparatus as claimed in claim 5, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion

permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

7. The electrodeionization apparatus as claimed in claim 1, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is a cation permeable membrane, such that the first ion exchange material domain is a cation exchange material predominant domain.

8. The electrodeionization apparatus as claimed in claim 7, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

9. The electrodeionization apparatus as claimed in claim 1, wherein the ion-concentrating compartment side surface of the anion permeable membrane defines an ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the ion-concentrating compartment side surface of the cation permeable membrane defines an ion-concentrating side surface area of the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the one of the anion permeable membrane and the cation permeable membrane.

10. The electrodeionization apparatus as claimed in claim 9, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the other one of the one of the anion permeable membrane and the cation permeable membrane defines a respective space between the first ion exchange material domain and the other one of the one of the anion

permeable membrane and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

11. The electrodeionization apparatus as claimed in claim 9, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, such that the first ion exchange material domain is an anion exchange material predominant domain, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane.

12. The electrodeionization apparatus as claimed in claim 11, further comprising at least one mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective space between the anion exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

13. The electrodeionization apparatus as claimed in claim 11, further comprising a cation exchange material predominant domain disposed within the ion-concentrating compartment, wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane and is spaced apart from the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane.

14. The electrodeionization apparatus as claimed in claim 13, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment

side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane.

15. The electrodeionization apparatus as claimed in claim 13, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

16. The electrodeionization apparatus as claimed in claim 9, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material phase is contiguous, is a cation permeable membrane, such that the first ion exchange material domain is a cation exchange material predominant domain, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane.

17. The electrodeionization apparatus as claimed in claim 16, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

18. The electrodeionization apparatus as claimed in claim 16, further comprising an anion exchange material predominant domain disposed within the ion-concentrating compartment, wherein the anion exchange material predominant domain is contiguous with at least a portion of

the ion-concentrating compartment side surface of the anion permeable membrane and is spaced apart from the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane.

19. The electrodeionization apparatus as claimed in claim 18, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

20. The electrodeionization apparatus as claimed in claim 9, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the one of the anion permeable membrane and the cation permeable membrane.

21. The electrodeionization apparatus as claimed in claim 20, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the other one of the one of the anion permeable membrane and the cation permeable membrane defines a respective space between the first ion exchange material domain and the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

22. The electrodeionization apparatus as claimed in claim 11, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the anion permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the anion permeable membrane.

23. The electrodeionization apparatus as claimed in claim 22, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of anion exchange material predominant domain relative to the cation permeable membrane defines a respective space between the anion exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

24. The electrodeionization apparatus as claimed in claim 22, further comprising a cation exchange material predominant domain disposed within the ion-concentrating compartment, wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane and is spaced apart from the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane.

25. The electrodeionization apparatus as claimed in claim 24, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane.

26. The electrodeionization apparatus as claimed in claim 25, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane.

27. The electrodeionization apparatus as claimed in claim 24, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

28. The electrodeionization apparatus as claimed in claim 16, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane.

29. The electrodeionization apparatus as claimed in claim 28, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

30. The electrodeionization apparatus as claimed in claim 28, further comprising an anion exchange material predominant domain disposed within the ion-concentrating compartment, wherein the anion exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane and is spaced apart from the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane.

31. The electrodeionization apparatus as claimed in claim 30, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane.

32. The electrodeionization apparatus as claimed in claim 30, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

33. An electrodeionization apparatus comprising:

an ion-concentrating compartment partially bounded by a first ion permeable membrane and also partially bounded by a separator element, wherein the first ion permeable membrane is one of an anion permeable membrane and a cation permeable membrane;

a first ion exchange material domain disposed within the ion-concentrating compartment, wherein the first ion exchange material domain is contiguous with at least a portion of an ion-concentrating compartment side surface of the first ion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the first ion permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the first ion permeable membrane; and

a second ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the separator element defines a first space between the first ion exchange material domain and the separator

element, and wherein at least a portion of the second ion exchange material domain is disposed within the first space;

such that,

where the first ion permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, the first ion exchange material domain is an anion exchange material predominant domain and the second ion exchange material domain is a non-anion exchange material predominant domain;

and where the first ion permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is a cation permeable membrane, the first ion exchange material domain is a cation exchange material predominant domain and the second ion exchange material domain is a non-cation exchange material predominant domain.

34. The electrodeionization apparatus as claimed in claim 33, wherein the second ion exchange material domain is contiguous with the first ion exchange material domain.

35. The electrodeionization apparatus as claimed in claim 33, wherein the separator element is a second ion permeable membrane, and the second ion permeable membrane is the other one of the one of the anion permeable membrane and the cation permeable membrane, and the at least a portion of the ion-concentrating compartment side surface of the first ion permeable membrane defines an operative side surface fraction.

36. The electrodeionization apparatus as claimed in claim 35, wherein the first ion permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the ion exchange material domain is contiguous, is an anion permeable membrane, such that the ion exchange material domain is an anion exchange material predominant domain and the second ion exchange material is a non-anion exchange material predominant domain.

37. The electrodeionization apparatus as claimed in claim 36, further comprising a cation exchange material predominant domain disposed within the ion-concentrating compartment and

contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane, wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a second space, and wherein the non-anion exchange material predominant domain is a mixed ion exchange material domain and at least a portion of the mixed ion exchange material domain is disposed within at least one of the first and second spaces.

38. The electrodeionization apparatus as claimed in claim 35, wherein the first ion permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is a cation permeable membrane, such that first ion exchange material domain is a cation exchange material predominant domain and the second ion exchange material is a non-cation exchange material predominant domain.

39. The electrodeionization apparatus as claimed in claim 35, wherein the operative side surface fraction defines an operative side surface area fraction of the ion-concentrating compartment side surface of the first ion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the first ion permeable membrane.

40. The electrodeionization apparatus as claimed in claim 39, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the first ion permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the first ion permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the first ion permeable membrane.

41. An electrodeionization apparatus comprising:

an ion-concentrating compartment partially bounded by an anion permeable membrane and also partially bounded by a cation permeable membrane, wherein the anion permeable membrane includes an ion-concentrating compartment side surface which defines an ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the cation

permeable membrane includes an ion-concentrating compartment side surface which defines an ion-concentrating compartment side surface area of the cation permeable membrane;

a first ion exchange material domain within the ion-concentrating compartment, wherein the first ion exchange material domain is contiguous with at least a portion of the ion-concentrating compartment side surface of one of the anion permeable membrane and the cation permeable membrane, wherein the at least a portion of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the one of the anion permeable membrane and the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the one of the anion permeable membrane and the cation permeable membrane, and wherein the first ion exchange material domain is spaced apart from at least a portion of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface fraction of the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the

other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane, in comparison to substantially any remaining portions of the ion-concentrating compartment side surface of the other one of the one of the anion permeable membrane and the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the other one of the one of the anion permeable membrane and the cation permeable membrane;

such that,

in the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is the anion permeable membrane, the first ion exchange material domain is an anion exchange material predominant domain, and wherein the anion exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines a first operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines a first operative side surface area fraction of the ion-concentrating compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the anion permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the anion permeable membrane, and wherein the anion exchange material predominant domain is spaced apart from at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines a first operative side surface fraction of the ion-concentrating

compartment side surface of the cation permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines a first operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane; and

in the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is the cation permeable membrane, the first ion exchange material domain is a cation exchange material predominant domain, and wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines a second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines a second operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane, and wherein the cation exchange material predominant domain is spaced apart from at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines a second operative side surface fraction of the ion-

concentrating compartment side surface of the anion permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines a second operative side surface area fraction of the ion-concentrating compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the anion permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the anion permeable membrane.

42. The electrodeionization apparatus as claimed in claim 41, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the other one of the one of the anion permeable membrane and the cation permeable membrane defines a respective space between the first ion exchange material domain and the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

43. The electrodeionization apparatus as claimed in claim 41, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is the anion permeable membrane;

such that the first ion exchange material domain is an anion exchange material predominant domain, and wherein the anion exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines a first operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines a first operative side surface area fraction of the ion-concentrating

compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the anion permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the anion permeable membrane, and wherein the anion exchange material predominant domain is spaced apart from at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines a first operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines a first operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane, and wherein the first operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane.

44. The electrodeionization apparatus as claimed in claim 43, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective space between the anion exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

45. The electrodeionization apparatus as claimed in claim 43, further comprising a non-anion exchange material predominant domain contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane.

46. The electrodeionization apparatus as claimed in claim 45, wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines a second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines a second operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane.

47. The electrodeionization apparatus as claimed in claim 45 or 46, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the non-anion exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

48. The electrodeionization apparatus as claimed in claim 41, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is the cation permeable membrane, the first ion exchange material domain is a cation exchange material predominant domain, and wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines a second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable

membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines a second operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane, and wherein the cation exchange material predominant domain is spaced apart from at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines a second operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines a second operative side surface area fraction of the ion-concentrating compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the second operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the anion permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the anion permeable membrane.

49. The electrodeionization apparatus as claimed in claim 48, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

50. The electrodeionization apparatus as claimed in claim 48, further comprising a non-cation exchange material predominant domain contiguous with at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane.

51. The electrodeionization apparatus as claimed in claim 50, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective first space between the cation exchange material predominant domain and the anion permeable membrane, and wherein the disposition of the non-cation exchange material predominant domain relative to the cation permeable membrane defines a respective second space between the non-cation exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

52. The electrodeionization apparatus as claimed in claim 42, wherein the mixed ion exchange material domain is contiguous with the first ion exchange material domain.

53. The electrodeionization apparatus as claimed in claim 2, wherein the mixed ion exchange material domain is contiguous with the first ion exchange material domain.

Claims:

1. An electrodeionization apparatus comprising:

an ion-concentrating compartment having opposed side surfaces at least partially bounded by an anion permeable membrane on one side surface and at least partially bounded by a cation permeable membrane on the other side surface; and

a first ion exchange material domain disposed within the ion-concentrating compartment, wherein the first ion exchange material domain is contiguous with at least a portion of the ion-concentrating compartment side surface of one of the anion permeable membrane and the cation permeable membrane, and is spaced apart from the other one of the one of the anion permeable membrane and the cation permeable membrane; wherein the at least a portion of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane; such that, in the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, the first ion exchange material domain is an anion exchange material predominant domain; and in the case where the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is a cation permeable membrane, the first ion exchange material domain is a cation exchange material predominant domain.

2. The electrodeionization apparatus as claimed in claim 1, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the other one of the one of the anion permeable membrane and the cation permeable membrane defines a respective space between the first ion exchange material domain and the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

3. The electrodeionization apparatus as claimed in claim 2, wherein the mixed ion exchange material domain is contiguous with the first ion exchange material domain.

4. The electrodeionization apparatus as claimed in claim 1, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of the ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, such that the first ion exchange material phase is an anion exchange material predominant domain.

5. The electrodeionization apparatus as claimed in claim 4, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective space between the anion exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

6. The electrodeionization apparatus as claimed in claim 4, further comprising a cation exchange material predominant domain disposed within the ion-concentrating compartment, wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane and is spaced apart from the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane.

7. The electrodeionization apparatus as claimed in claim 6, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

8. The electrodeionization apparatus as claimed in claim 1, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is a cation permeable membrane, such that the first ion exchange material domain is a cation exchange material predominant domain.

9. The electrodeionization apparatus as claimed in claim 8, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

10. The electrodeionization apparatus as claimed in claim 1, wherein the ion-concentrating compartment side surface of the anion permeable membrane defines an ion-concentrating compartment side surface area of the anion permeable membrane, and wherein the ion-concentrating compartment side surface of the cation permeable membrane defines an ion-concentrating side surface area of the cation permeable membrane, and wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the one of the anion permeable membrane and the cation permeable membrane.

11. The electrodeionization apparatus as claimed in claim 10, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the other one of the one of the anion permeable membrane and the cation permeable membrane defines a respective space between the first ion exchange material domain and the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

12. The electrodeionization apparatus as claimed in claim 10, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material domain is contiguous, is an anion permeable membrane, such that the first ion exchange material domain is an anion exchange material predominant domain, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane.

13. The electrodeionization apparatus as claimed in claim 12, further comprising at least one mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective space between the anion exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

14. The electrodeionization apparatus as claimed in claim 12, further comprising a cation exchange material predominant domain disposed within the ion-concentrating compartment, wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane and is spaced apart from the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane.

15. The electrodeionization apparatus as claimed in claim 14, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane.

16. The electrodeionization apparatus as claimed in claim 14, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the

disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

17. The electrodeionization apparatus as claimed in claim 12, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the anion permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the anion permeable membrane.

18. The electrodeionization apparatus as claimed in claim 17, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of anion exchange material predominant domain relative to the cation permeable membrane defines a respective space between the anion exchange material predominant domain and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

19. The electrodeionization apparatus as claimed in claim 17, further comprising a cation exchange material predominant domain disposed within the ion-concentrating compartment, wherein the cation exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane and is spaced apart from the anion permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane.

20. The electrodeionization apparatus as claimed in claim 19, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment

side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane.

21. The electrodeionization apparatus as claimed in claim 20, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane.

22. The electrodeionization apparatus as claimed in claim 19, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

23. The electrodeionization apparatus as claimed in claim 10, wherein the one of the anion permeable membrane and the cation permeable membrane, having the at least a portion of an ion-concentrating compartment side surface with which the first ion exchange material phase is contiguous, is a cation permeable membrane, such that the first ion exchange material domain is a cation exchange material predominant domain, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the cation permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the cation permeable membrane.

24. The electrodeionization apparatus as claimed in claim 23, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective space between the cation exchange material predominant

domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

25. The electrodeionization apparatus as claimed in claim 23, further comprising an anion exchange material predominant domain disposed within the ion-concentrating compartment, wherein the anion exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane and is spaced apart from the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane.

26. The electrodeionization apparatus as claimed in claim 25, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

27. The electrodeionization apparatus as claimed in claim 23, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the cation permeable membrane.

28. The electrodeionization apparatus as claimed in claim 27, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.

29. The electrodeionization apparatus as claimed in claim 27, further comprising an anion exchange material predominant domain disposed within the ion-concentrating compartment, wherein the anion exchange material predominant domain is contiguous with at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane and is spaced apart from the cation permeable membrane, and wherein the at least a portion of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane.

30. The electrodeionization apparatus as claimed in claim 29, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the anion permeable membrane defines an operative side surface area fraction of the ion-concentrating compartment side surface of the anion permeable membrane which is at least 10% of the ion-concentrating compartment side surface area of the anion permeable membrane.

31. The electrodeionization apparatus as claimed in claim 29, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the anion exchange material predominant domain relative to the cation permeable membrane defines a respective first space between the anion exchange material predominant domain and the cation permeable membrane, and wherein the disposition of the cation exchange material predominant domain relative to the anion permeable membrane defines a respective second space between the cation exchange material predominant domain and the anion permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within at least one of the respective first and second spaces.

32. The electrodeionization apparatus as claimed in claim 10, wherein the operative side surface fraction of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, in comparison to substantially any remaining fractions of the ion-concentrating compartment side surface of the one of the anion permeable membrane and the cation permeable membrane, is closest to an outlet of an ion-depleting compartment disposed on an opposite side of the one of the anion permeable membrane and the cation permeable membrane.

33. The electrodeionization apparatus as claimed in claim 32, further comprising a mixed ion exchange material domain disposed within the ion-concentrating compartment, wherein the disposition of the first ion exchange material domain relative to the other one of the one of the anion permeable membrane and the cation permeable membrane defines a respective space between the first ion exchange material domain and the other one of the one of the anion permeable membrane and the cation permeable membrane, and wherein at least a portion of the mixed ion exchange material domain is disposed within the respective space.