CLAIMS

1. A conditioning system for pre-treatment or maintenance of an offline filter module, comprising:

an inlet fluidly connectable to a source of ultrapure water;

a heat exchanger configured to heat the ultrapure water comprising a lining formed of a first corrosion resistant material, the heat exchanger positioned downstream from the inlet;

a magnetically levitated pump in fluid communication with the heat exchanger;

an outlet positioned downstream from the magnetically levitated pump, the outlet fluidly connectable to the offline filter module positioned downstream from the outlet;

a channel comprising a lining formed of a second corrosion resistant material, the channel constructed and arranged to bypass the heat exchanger;

a controller configured to selectively direct the ultrapure water to the heat exchanger or to the channel, the controller being programmable to act responsive to at least one of a concentration of total organic carbon (TOC) in the source of ultrapure water and a concentration of TOC in the ultrapure water at the outlet; in accordance with a protocol for cycling between rinsing the offline filter module with heated water from the heat exchanger and flushing the offline filter module with ambient temperature water from the channel

an inlet sensor electronically connected to the controller configured to detect the concentration of TOC in the source of ultrapure water and an outlet sensor electronically connected to the controller configured to detect the concentration of TOC in the ultrapure water at the outlet; and

a base supporting the heat exchanger, the magnetically levitated pump, the channel, and the controller, dimensioned to support the conditioning system without the source of ultrapure water.

2. The conditioning system of claim 1, wherein the inlet is fluidly connectable downstream from the offline filter module.

3. The conditioning system of claim 2, wherein the offline filter module is an ultrafiltration module.

4. The conditioning system of claim 1, wherein the first corrosion resistant material is stable at a water temperature of up to 190º F.

5. The conditioning system of claim 1, wherein at least one of the first and the second corrosion resistant material is a fluoropolymer.

6. The conditioning system of claim 5, wherein the at least one of the first and the second corrosion resistant material is ethylene tetrafluoroethylene (ETFE), polyvinylfluoride (PVF), polyvinylidene fluoride (PVDF), perfluoroalkoxy alkane (PFA), fluorinated ethylene propylene (FEP), polytetrafluoroethylene (PTFE), ethylene chlorotrifluoroethylene (ECTFE), polychlorotrifluoroethylene (PCTFE), and combinations thereof.

7. The conditioning system of claim 1, wherein the conditioning system comprises at least one metal component, the at least one metal component of the conditioning system being substantially free of stainless steel.

8. The conditioning system of claim 7, wherein the at least one metal component comprises at least one of titanium, incoloy, hastelloy, and combinations thereof.

9. The conditioning system of claim 1, wherein the conditioning system is portable.

10. The conditioning system of claim 1, wherein the magnetically levitated pump comprises a lining formed of a corrosion resistant plastic.

11. The conditioning system of claim 1, wherein the controller is further programmable to set a speed of the magnetically levitated pump responsive to an indication of capacity of the offline filter module.

12. The conditioning system of claim 7, wherein the conditioning system comprises more than one metal component, at least one of the more than one metal component comprising at least one of titanium, incoloy, hastelloy, and combinations thereof.

13. The conditioning system of claim 1, wherein at least one of the inlet sensor and the outlet sensor is further configured to detect particle sizes of 10 nm or less.

14. The conditioning system of claim 1, wherein the heat exchanger is configured to heat the ultrapure water to a temperature of between about 170º F and about 190º F.

15. The conditioning system of claim 1, wherein the controller is configured to continue the protocol until water at an outlet of the offline filter module has less than 100 counts per liter of particles having a particle size less than 14 nm.

16. The conditioning system of claim 1, wherein the controller is further configured to selectively direct the ultrapure water to the heat exchanger or to the channel to cycle between rinsing the offline filter module with heated ultrapure water from the heat exchanger and flushing the offline filter module with ambient temperature ultrapure water from the channel.

17. The conditioning system of claim 16, wherein the controller is programmable to set a speed of the magnetically levitated pump, the controller being configured to direct the magnetically levitated pump to rinse the offline filter module with the heated ultrapure water at a first flow rate of between about 2 gpm and about 15 gpm for a first predetermined period of time sufficient to stabilize a concentration of TOC in water at the outlet of the offline filter module.

18. The conditioning system of claim 17, wherein the controller is further programmable to direct the magnetically levitated pump to flush the offline filter module with the ambient temperature ultrapure water at a second flow rate of between about 2 gpm and about 40 gpm for a second predetermined period of time, the second flow rate being greater than the first flow rate.

19. The conditioning system of claim 1, wherein the controller is further configured to perform one or more of: alter temperature of the heat exchanger or alter flow rate of the ultrapure water.

20. The conditioning system of claim 19, wherein the controller is configured to alter temperature of the heat exchanger or alter flow rate of the ultrapure water responsive to at least one of TOC in the source of ultrapure water and the concentration of TOC in the ultrapure water at the outlet.