## CLAIMS

1. A mobile, modular water treatment system for the production of ultrapure water for use as primary level water for rinse or makeup water in a semiconductor fabrication facility, the system comprising:

a storage tank having an inlet configured to receive pretreated water from an upstream water pretreatment system, and an outlet;

a mobile platform;

an actinic radiation treatment apparatus disposed on the mobile platform, the actinic radiation treatment apparatus having an inlet configured to receive the pretreated water from the outlet of the storage tank, and a source of actinic radiation configured to irradiate the pretreated water and destroy organic contaminants in the pretreated water to form a first partially treated water;

an electrically driven water treatment apparatus disposed on the mobile platform, the electrically driven water treatment apparatus having an inlet configured to receive the first partially treated water from the actinic radiation treatment apparatus and configured to remove ionic contaminants from the first partially treated water to form a second partially treated water;

an ion exchange media apparatus disposed on the mobile platform and including ion exchange media, the ion exchange media apparatus configured to receive the second partially treated water from the electrically driven water treatment apparatus and remove one or more ionic species from the second partially treated water to form a third partially treated water; and

a pressure driven filtration sub-system disposed on the mobile platform and configured to filter particulate matter from the third partially treated water to form the ultrapure water, the pressure driven filtration sub-system being connectable to a water distribution system for the semiconductor fabrication facility and for recirculation of a portion of the ultrapure water to the storage tank.

2. The system of claim 1, wherein the storage tank is insulated and includes a nitrogen blanket system configured to cover the pretreated water in the storage tank with nitrogen gas.

3. The system of claim 1, wherein the actinic radiation treatment apparatus is configured to perform an advanced oxidation process on the pretreated water.

4. The system of claim 1, wherein the electrically driven water treatment apparatus includes a continuous electrodeionization apparatus.

5. The system of claim 1, wherein the ion exchange media apparatus includes a mixed bed of ion exchange media.

6. The system of claim 1, wherein the pressure driven filtration sub-system includes a first particle filter having a particle retention size of about 0.1 μm or greater.

7. The system of claim 6, wherein the pressure driven filtration sub-system further includes a membrane filtration apparatus.

8. The system of claim 7, wherein the membrane filtration apparatus includes an ultrafilter.

9. The system of claim 1, configured produce the ultrapure water with an electrical resistivity of greater than or equal to 18 MΩ, a total organic contaminant level of less than 10 ppb, and 1000 particles per liter or fewer having a size of from 0.1 – 0.2 microns from the pretreated water having an electrical resistivity of 0.1 MΩ or less, and a total organic contaminant level of 50 ppb or less.

10. The system of claim 1, wherein the mobile platform includes at least two mobile containers.

11. The system of claim 1, wherein the storage tank includes a second inlet configured to receive ultrapure water.

12. The system of claim 1, further comprising water quality and flow sensors disposed downstream of the pressure driven filtration sub-system, and a controller configured to control output of the ultrapure water to the semiconductor fabrication facility based on measurements from the water quality and flow sensors.

13. The system of claim 1, further comprising a second mobile platform configured to produce the pretreated water from city water and deliver the pretreated water to the storage tank.

14. A method of facilitating temporary production of ultrapure water for use in a pre-commissioned semiconductor fabrication facility as primary level water for rinse or makeup water, the method comprising:

providing a storage tank configured to connect to and receive pretreated water from an upstream water pretreatment system;

delivering a mobile platform to the pre-commissioned semiconductor fabrication facility, the mobile platform including:

an actinic radiation treatment apparatus having an inlet configured to connect to and receive the pretreated water from the storage tank, and a source of actinic radiation configured to irradiate the pretreated water to destroy organic contaminants in the pretreated water and form a first partially treated water;

an electrically driven water treatment apparatus having an inlet configured to connect to and receive the first partially treated water from the actinic radiation treatment apparatus and to remove ionic contaminants from the first partially treated water and form a second partially treated water;

an ion exchange media apparatus including ion exchange media, the ion exchange media apparatus configured to connect to and receive the second partially treated water from the electrically driven water treatment apparatus and remove one or more ionic species from the second partially treated water and form a third partially treated wastewater; and

a pressure driven filtration sub-system configured to connect to and receive the third partially treated water from the ion exchange media apparatus and remove particulate matter from the third partially treated water to form the ultrapure water, the pressure driven filtration sub-system including an outlet connectable to a water distribution system for the pre-commissioned semiconductor fabrication facility and for recirculation of a portion of the ultrapure water to the storage tank.

15. The method of claim 14, wherein providing the storage tank includes providing a nitrogen blanket production sub-system configured to maintain a blanket of nitrogen gas over the pretreated water in the storage tank.

16. The method of claim 14, further comprising configuring the actinic radiation treatment apparatus to perform an advanced oxidation process on the pretreated water.

17. The method of claim 14, further comprising configuring the electrically driven water treatment apparatus to subject the first partially treated water to a continuous electrodeionization process.

18. The method of claim 14, further comprising configuring the ion exchange media apparatus to pass the second partially treated water through a mixed bed of ion exchange media.

19. The method of claim 14, further comprising configuring the pressure driven filtration sub-system to include an upstream particle filter configured to remove particulate matter with a size of about 0.1 μm or greater from the third partially treated water, and an ultrafiltration apparatus downstream of the upstream particle filter.

20. The method of claim 14, further comprising providing water quality and flow sensors to be disposed downstream of the pressure driven filtration sub-system and a controller configured to control output of the ultrapure water to the semiconductor fabrication facility based on measurements from the water quality and flow sensors.

21. The method of claim 14, further comprising providing instructions to mix recirculated ultrapure water from the pressure driven filtration sub-system with the pretreated water in the storage tank.

22. The method of claim 14, further comprising providing a second mobile platform including the upstream water pretreatment system.