CLAIMS

1. A substrate treatment method of treating a substrate using a substrate treatment equipment, the substrate treatment equipment including a plurality of treatment chambers in each of which the substrate is to be disposed, and a plurality of treatment solution supply pipes branching from a main pipe that is connected to a subsystem of an ultrapure water production equipment, the plurality of treatment solution supply pipes being respectively connected to the plurality of treatment chambers, the method comprising:

providing a catalytic unit filled with a platinum-group metal catalyst on each of the treatment solution supply pipes or in each of the treatment chambers, the platinum-group metal catalyst being obtained as a result of supporting a palladium catalyst on a monolithic organic porous anion exchanger;

filling a treatment chamber of the plurality of treatment chambers with an inert gas, the treatment chamber having the substrate disposed therein;

supplying a hydrogen-dissolved treatment solution, which is to be obtained by passing a hydrogen-dissolved solution prepared by adding hydrogen to a solution to be treated through the platinum-group metal catalyst, into the treatment chamber filled with the inert gas, and

treating the substrate by the hydrogen-dissolved treatment solution.

2. The substrate treatment method according to claim 1, wherein the treatment chamber is filled with the inert gas so that a concentration of oxygen gas in the treatment chamber is 2% or less,

wherein the hydrogen is added to the solution to be treated so that a concentration of dissolved hydrogen in the hydrogen-dissolved solution is 8 μg/L or

higher, and

wherein a concentration of dissolved oxygen is adjusted to 2 μg/L or less and a concentration of hydrogen peroxide is adjusted to 2 μg/L or less in the hydrogen-dissolved treatment solution by passing the hydrogen-dissolved solution through the platinum-group metal catalyst.

3. The substrate treatment method according to claim 1 or 2, wherein the hydrogen-dissolved treatment solution is supplied into the treatment chamber and is discharged towards the substrate disposed in the treatment chamber.

4. The substrate treatment method according to claim 3, wherein a shield member having a substrate facing surface facing the substrate is provided in each of the treatment chambers, and the method comprising:

when filling the treatment chamber having the substrate disposed therein with the inert gas, making the substrate facing surface of the shield member face a surface of the substrate in the treatment chamber, and supplying the inert gas into a space between the shield member and the substrate.

5. The substrate treatment method according to claim 1 or 2, wherein a treatment tank is provided in each of the treatment chambers, and the method comprising supplying the hydrogen-dissolved treatment solution into the treatment tank and disposing the substrate in the treatment tank to treat the substrate.

6. The substrate treatment method according to any one of claims 1 to 5, wherein an outer side of a pipe configured to supply the hydrogen-dissolved treatment solution into the treatment chamber is surrounded by the inert gas.

7. The substrate treatment method according to any one of claims 1 to 6, comprising preparing a dilute chemical solution by mixing the hydrogen-dissolved treatment solution with a chemical solution, supplying the dilute chemical solution into the treatment chamber filled with the inert gas, and treating the substrate by the dilute chemical solution.

8. The substrate treatment method according to claim 7, wherein the mixing of the hydrogen-dissolved treatment solution and the chemical solution is carried out by supplying the chemical solution into a tank, supplying the inert gas into the tank, and pumping out the chemical solution from the tank to inject the same into the hydrogen-dissolved treatment solution.

9. The substrate treatment method according to any one of claims 1 to 6, comprising supplying and mixing a chemical solution and the hydrogen-dissolved treatment solution into a tank, and pumping out and supplying a dilute chemical solution obtained by diluting the hydrogen-dissolved treatment solution with the chemical solution from the tank into the treatment chamber.

10. The substrate treatment method according to claim 9, comprising supplying the inert gas into the tank.

11. The substrate treatment method according to any one of claims 1 to 10, comprising providing a drainpipe for draining the hydrogen-dissolved treatment solution at each of the treatment solution supply pipes.

12. The substrate treatment method according to any one of claims 1 to 11, wherein the substrate that is to be treated by the hydrogen-dissolved treatment solution is a substrate of which a single body of any one element or a compound of at least copper, molybdenum and tungsten is exposed on a surface thereof.

13. The substrate treatment method according to any one of claims 1 to 12, wherein the solution to be treated is ultrapure water.

14. The substrate treatment method according to any one of claims 1 to 13, wherein the solution to be treated is a solution containing at least dilute hydrofluoric acid.

15. A substrate treatment equipment comprising:

a plurality of treatment chambers in each of which a substrate is to be disposed and to each of which a substrate treatment solution for treating the substrate is to be supplied;

an inert gas filling mechanism configured to fill an inert gas in each of the treatment chambers;

a plurality of treatment solution supply pipes branching from a main pipe that is connected to a subsystem of an ultrapure water production equipment, the plurality of treatment solution supply pipes being respectively connected to the plurality of treatment chambers; and

a catalytic unit provided on each of the treatment solution supply pipes or in each of the treatment chambers, and filled with a platinum-group metal catalyst through which a hydrogen-dissolved solution prepared by adding hydrogen to a solution to be treated is to be passed, the platinum-group metal catalyst being

obtained as a result of supporting a palladium catalyst on a monolithic organic porous anion exchanger,

wherein a hydrogen-dissolved treatment solution obtained by passing the hydrogen-dissolved solution through the platinum-group metal catalyst can be supplied as the substrate treatment solution into each of the treatment chambers.

16. The substrate treatment equipment according to claim 15, wherein a concentration of dissolved hydrogen in the hydrogen-dissolved solution is 8 μg/L or higher,

wherein the inert gas filling mechanism is configured to fill each of the treatment chambers with the inert gas so that a concentration of oxygen gas in each of the treatment chambers is 2% or less, and

wherein the catalytic unit is configured to adjust a concentration of dissolved oxygen to 2 μg/L or less and a concentration of hydrogen peroxide to 2 μg/L or less in the hydrogen-dissolved treatment solution.

17. The substrate treatment equipment according to claim 15 or 16, wherein each of the treatment chambers is provided with a substrate holding mechanism configured to hold at least the substrate and a treatment solution nozzle configured to supply the substrate treatment solution to the substrate held by the substrate holding mechanism.

18. The substrate treatment equipment according to claim 17, wherein each of the treatment chambers includes a shield member having a substrate facing surface facing the substrate held by the substrate holding mechanism, and

wherein the treatment solution nozzle and the inert gas filling mechanism are

provided for the shield member, so that the substrate treatment solution and the inert gas can be supplied to a space between the substrate held by the substrate holding mechanism and the substrate facing surface of the shield member.

19. The substrate treatment equipment according to claim 15 or 16, wherein each of the treatment chambers is provided with a treatment tank in which at least the substrate is disposed and a treatment solution nozzle configured to supply the substrate treatment solution into the treatment tank.

20. The substrate treatment equipment according to any one of claims 15 to 19, wherein a pipe configured to supply the substrate treatment solution into each of the treatment chambers comprises an inner pipe through which the substrate treatment solution passes and an outer pipe configured to surround the inner pipe, and

further comprising a unit configured to supply the inert gas to a space between the inner pipe and the outer pipe.

21. The substrate treatment equipment according to any one of claims 15 to 19, further comprising a chemical solution preparation unit configured to prepare a dilute chemical solution by injecting a chemical solution into a pipe configured to supply the substrate treatment solution into each of the treatment chambers and mixing the chemical solution and the substrate treatment solution in the pipe.

22. The substrate treatment equipment according to claim 21, further comprising a chemical solution tank configured to store therein the chemical solution and a unit configured to supply the inert gas into the chemical solution tank.

23. The substrate treatment equipment according to any one of claims 15 to 19, comprising a chemical solution dilution tank into which a chemical solution and the substrate treatment solution are supplied to dilute the substrate treatment solution with the chemical solution, and configured to supply a dilute chemical solution obtained by diluting the substrate treatment solution with the chemical solution into each of the treatment chambers.

24. The substrate treatment equipment according to claim 23, further comprising a unit configured to supply the inert gas into the chemical solution dilution tank.

25. The substrate treatment equipment according to claim 21, wherein a pipe configured to supply the dilute chemical solution into each of the treatment chambers comprises an inner pipe through which the dilute chemical solution passes and an outer pipe configured to surround the inner pipe, and

further comprising a unit configured to supply the inert gas to a space between the inner pipe and the outer pipe.

26. The substrate treatment equipment according to any one of claims 15 to 25, wherein a drainpipe for draining the hydrogen-dissolved treatment solution is provided at each of the treatment solution supply pipes.

27. The substrate treatment equipment according to any one of claims 15 to 26, wherein the substrate that is to be treated by the substrate treatment solution is a substrate of which a single body of any one element or a compound of at least copper,

molybdenum and tungsten is exposed on a surface thereof.

28. The substrate treatment equipment according to any one of claims 15 to 27, wherein the solution to be treated is ultrapure water.

29. The substrate treatment equipment according to any one of claims 15 to 27, wherein the solution to be treated is a solution containing at least dilute hydrofluoric acid.

30. A catalytic unit being disposed on each of the treatment solution supply pipes or in each of the treatment chambers of the substrate treatment equipment according to any one of claims 15 to 29 and having a platinum-group metal catalyst filled therein, the platinum-group metal catalyst being obtained as a result of supporting a palladium catalyst on a monolithic organic porous anion exchanger, wherein a hydrogen-dissolved treatment solution obtained by passing a hydrogen-dissolved solution through the platinum-group metal catalyst can be supplied as a substrate treatment solution into each of the treatment chambers.