Claims

1. A method for removing volatile residues from a substrate, comprising:

treating a substrate in a processing chamber of a processing system with a chemistry comprising halogen;

transferring the treated substrate from processing chamber to a load lock chamber of the processing system, wherein the load lock chamber is configured to transfer the substrate from a vacuum environment inside the processing system to an ambient environment outside the processing system; and

removing volatile residues from the treated substrate within the load lock chamber in the presence of a gas mixture supplied to the load lock chamber, the gas mixture selected from the group consisting of O_2, O_3, H_2O, alkenes, alkanes, N_2, and H_2.

2. The method of claim 1, wherein removing the volatile residues from the treated substrate further comprises:

exposing the treated substrate to a plasma in the load lock chamber.

3. The method of claim 2, wherein exposing the treated substrate further comprises:

forming the plasma in a remote plasma source.

4. The method of claim 2, wherein forming the plasma further comprises:

maintaining a plasma power at between about 500 Watts and about 6000 Watts.

5. The method of claim 1, wherein removing the volatile residues from the treated substrate further comprises:

detecting an end point.

6. The method of claim 1, wherein the gas mixture comprises an O_2 to N_2 ratio of between about 1:1 to about 1:20.

7. The method of claim 1, wherein removing volatile residues from the treated substrate further comprises:

heating the treated substrate to a temperature between about 20 degrees Celsius and about 400 degrees Celsius.

8. The method of claim 7, further comprising:

cooling the treated substrate in the load lock chamber after heating the treated substrate in the load lock chamber; and

removing the cooled substrate from the load lock chamber.

9. The method of claim 1, wherein treating the substrate further comprises:

treating the substrate using at least one of hydrogen bromide (HBr), chlorine (Cl_2) and carbon tetrafluoride (CF_4).

10. The method of claim 1, wherein removing volatile residues from the treated substrate further comprises:

maintaining the load lock chamber at a pressure at between about 10 mTorr and about 5000 mTorr.

11. The method of claim 10, wherein the gas mixture supplied in the load lock chamber includes at least one of O_2 and O_3.

12. The method of claim 1, wherein the volatile residues are halogen containing residuals.

13. A method for removing volatile residues from a substrate, comprising:

treating a substrate in a processing chamber of a processing system with a chemistry comprising halogen;

transferring the treated substrate from processing chamber through a transfer chamber to a load lock chamber of the processing system, wherein the load lock chamber is configured to transfer the substrate from a vacuum environment inside the processing system to an ambient environment outside the processing system;

heating the treated substrate; and

removing volatile residues from the heated substrate in the presence of a gas mixture having one or more members selected from the group consisting of O_2, O_3, alkenes, alkanes, N_2, and H_2.

14. The method of claim 13, wherein heating further comprises:

heating the substrate by heating the substrate on a blade of a robot disposed in the transfer chamber or heating the substrate in the load lock chamber.

15. The method of claim 13, wherein the gas mixture includes at least one of O_2 and O_3.

16. The method of claim 14, wherein heating the substrate further comprises:

sensing a change in a signal passing through the substrate while heating the substrate.

17. The method of claim 16, further comprising:

determining a substrate temperature correlating to the signal change.

18. The method of claim 13, wherein volatile residues are halogen containing residuals.

19. The method of claim 13, wherein removing volatile residues from the heated substrate further comprises:

forming a plasma from the gas mixture.

20. The method of claim 12, wherein treating the substrate further comprises:

treating the substrate using at least one of hydrogen bromide (HBr), chlorine (Cl_2) and carbon tetrafluoride (CF_4).

The invention claimed is:

1. A method for removing volatile residues from a substrate, comprising:

providing a processing system having a load lock chamber and at least one processing chamber coupled to a transfer chamber, wherein the load lock chamber is configured to transfer a substrate from an ambient environment outside the processing system to a vacuum environment inside the transfer chamber;

treating a substrate in the processing chamber with a chemistry comprising halogen; and

removing volatile residues from the treated substrate in the load lock chamber.

2. The method of claim **1**, wherein the volatile residues are halogen-containing residues.

3. The method of claim **1**, wherein the step of removing the volatile residues from the treated substrate further comprises:

heating the treated substrate to a temperature between about 20 degrees Celsius and about 400 degrees Celsius.

4. The method of claim **1**, wherein the step of removing volatile residues from the substrate further comprises:

exposing the treated substrate to a gas mixture in the load lock chamber prior to venting the load lock chamber.

5. The method of claim **4**, wherein the gas mixture comprises at least one of O_2, O_3, water vapor (H_2O), H_2, alkanes, alkenes and nitrogen gas (N_2).

6. The method of claim **4**, wherein the gas mixture comprises at least one of nitrogen gas (N_2), argon (Ar) and helium (He).

7. The method of claim **4**, wherein the step of exposing the treated substrate to the gas mixture further comprises:

supplying the gas mixture at a flow rate between about 500 sccm and about 5000 sccm.

8. The method of claim 4, wherein the gas mixture comprises an O_2 to N_2 ratio between about 1:1 and about 1:20.

9. The method of claim 4, wherein the step of exposing the treated substrate further comprises:

exposing the treated substrate to the gas mixture between about 10 seconds to about 120 seconds.

10. The method of claim 4, wherein the gas mixture further comprises O_2 and water vapor (H_2O) or H_2, and wherein the chemistry further comprises chlorine.

11. The method of claim 1, wherein the step of removing the volatile residues further comprises:

maintaining the load lock chamber at a pressure at between about 10 mTorr and about 5000 mTorr.

12. The method of claim 1, wherein the step of removing volatile residues from the treated substrate further comprises:

exposing the treated substrate to a plasma in the load lock chamber.

13. The method of claim 12, wherein the step of exposing the treated substrate to the plasma further comprises:

forming the plasma in a remote plasma source.

14. The method of claim 12, wherein the plasma is formed from at least one of O_2, O_3, water vapor (H_2O), H_2, alkanes, alkenes, and nitrogen gas (N_2) and wherein the plasma further comprises at least one of argon (Ar) and helium (He).

15. The method of claim 13, wherein the step of forming the plasma further comprises:

maintaining a plasma power at between about 500 Watts and 6000 Watts.

16. The method of claim 12, wherein the step of forming the plasma further comprises:

supplying a gas mixture at a flow rate between about 500 sccm and about 5000 sccm.

17. The method of claim 1 further comprising:

cooling the treated substrate in the load lock chamber after the volatile residues removal step; and

removing the substrate from the load lock chamber.

18. The method of claim 17, wherein the step of removing the volatile residues from the treated substrate further comprises:

detecting an end point of the removing step in the load lock chamber; and

transferring the substrate back into the transfer chamber.

19. The method of claim **1**, wherein the step of treating the substrate further comprising:

treating the substrate using at least one of hydrogen bromide (HBr), chlorine (Cl_2), and carbon tetrafluoride (CF_4).

20. A method for removing halogen-containing residues from a substrate, comprising:

providing a processing system having a load lock chamber and at least one processing chamber coupled to a transfer chamber, wherein the load lock chamber is configured to transfer a substrate from an ambient environment outside the processing system to a vacuum environment inside the transfer chamber;

etching a substrate in the processing chamber with chemistry comprising halogen;

removing halogen-containing residues from the etched substrate in the load lock chamber;

cooling the substrate in the load lock chamber after the residue removing step; and

removing the cooled substrate from the load lock chamber.

21. The method of claim **20**, wherein the step of removing halogen-containing residues further comprises:

supplying a gas mixture comprising at least one of O_2, O_3, water vapor (H_2O), H_2, alkanes, alkenes, and nitrogen gas (N_2) prior to venting the load lock chamber.

22. The method of **20**, wherein the step of removing halogen-containing residues further comprises:

supplying a gas mixture comprising at least one of nitrogen gas (N_2), argon (Ar) and helium (He) prior to venting the load lock chamber.

23. The method of claim **20**, wherein the step of removing halogen-containing residues further comprises:

heating the etched substrate to a temperature between about 20 degrees Celsius and about 400 degrees Celsius; and

maintaining a pressure of the load lock chamber at between about 10 mTorr and about 5000 mTorr.

24. The method of claim **20**, wherein the step of removing halogen-containing residues further comprises:

exposing the etched substrate to a plasma in the load lock chamber.

25. The method of claim **24**, wherein the step of exposing the substrate to the plasma further comprises:

forming the plasma by a remote plasma source.

26. The method of claim **24**, wherein the plasma is formed from at least one of O_2, O_3, water vapor (H_2O), H_2, alkanes, alkenes, and wherein the plasma further comprises at least one of nitrogen gas (N_2), argon (Ar) and helium (He).