Claims:

1. A vacuum multi-chamber deposition apparatus for a substrate comprising:
a degas chamber comprising:
a chamber body;
a substrate support configured to support the substrate;
a substrate heating mechanism configured to heat the substrate;
a temperature measuring device; and
a variable frequency microwave radiation source configured to deliver microwave radiation of varying frequency toward the substrate support; and
a pre-metallization clean chamber connected to the degas chamber.

2. The apparatus of claim 1, wherein the variable frequency microwave radiation source uses two or more frequencies which vary by between 200Hz and 280Hz.

3. The apparatus of claim 1, wherein the frequency of the variable frequency microwave radiation changes every 25 microseconds.

4. The apparatus of claim 1, wherein the frequency of the variable frequency microwave radiation ranges from 5.85GHz to 7.0GHz.

5. The apparatus of claim 1, wherein the degas chamber further comprises a plasma source.

6. The apparatus of claim 1, wherein the degas chamber and the pre-metallization clean chamber are fluidly connected.

7. The apparatus of claim 1, wherein the variable frequency microwave radiation source comprises a microwave power supply selected from the group consisting of: magnetrons, klystrons, gyrotrons, and traveling wave tubes.

8. A method for degassing a substrate, sequentially comprising:

positioning a substrate comprising a polymer or an epoxy within a processing chamber;

maintaining the chamber between a degas temperature and a glass transition temperature;

flowing an inert gas into the chamber;

creating a plasma comprising the inert gas;

exposing the substrate to a plasma comprising the inert gas;

removing oxygen containing compounds from the chamber;

raising the pressure of inert gas in the chamber; and

maintaining the pressure of inert gas while cooling the substrate to a temperature lower than the degas temperature.

9. The method of claim 8, wherein the substrate is maintained at a temperature between the degas temperature and the glass transition temperature from positioning the substrate in the processing chamber until oxygen containing compounds have been removed from the chamber.

10. The method of claim 8, further comprising delivering variable frequency microwave radiation to the substrate prior to flowing an inert gas into the chamber.

11. The method of claim 10, wherein the frequency of the variable frequency microwave radiation varies within the ranges from 5.85GHz to 7.0GHz.

12. A method for degassing a substrate, sequentially comprising:

positioning a substrate comprising a polymer or an epoxy within a processing chamber;

directing a variable frequency microwave radiation source to deliver microwave radiation to the substrate;

delivering microwave radiation to the substrate at a frequency which changes over short bursts of time while maintaining the temperature of the substrate at a degas temperature; and

removing a first set of oxygen containing compounds from the chamber.

13. The method of claim 12, further comprising:

flowing an inert gas into the chamber;

creating a plasma comprising the inert gas;

exposing the substrate to a plasma comprising the inert gas;

removing a second set of oxygen containing compounds from the chamber;

raising the pressure of inert gas in the chamber; and

maintaining the pressure of inert gas while cooling the substrate to a temperature lower than the degas temperature.

14. The method of claim 12, wherein the short bursts of time are from 20 microseconds to 30 microseconds.

15. The method of claim 14, wherein the substrate is maintained at a temperature between the degas temperature and the glass transition temperature from positioning the substrate in the processing chamber until the second set of oxygen containing compounds have been removed from the chamber.

CLAIMS

1. A method for degassing a substrate, sequentially comprising:

positioning a substrate comprising a polymer or an epoxy within a processing chamber;

maintaining the chamber between a degas temperature and a glass transition temperature;

flowing an inert gas into the chamber;

creating a plasma comprising the inert gas;

exposing the substrate to a plasma comprising the inert gas;

removing oxygen containing compounds from the chamber;

raising the pressure of inert gas in the chamber; and

maintaining the pressure of inert gas while cooling the substrate to a temperature lower than the degas temperature.

2. The method of claim 1, wherein the inert gas is argon or helium.

3. The method of claim 1, wherein the substrate is maintained at a temperature between the degas temperature and the glass transition temperature from positioning the substrate in the processing chamber until oxygen containing compounds have been removed from the chamber.

4. The method of claim 1, further comprising delivering variable frequency microwave radiation to the substrate prior to flowing an inert gas into the chamber.

5. The method of claim 4, wherein the frequency of the variable frequency microwave radiation varies within the ranges from 5.85GHz to 7.0GHz.

6. A method for degassing a substrate, sequentially comprising:

positioning a substrate comprising a polymer or an epoxy within a processing chamber;

directing a variable frequency microwave radiation source to deliver microwave radiation to the substrate;

delivering microwave radiation to the substrate at a frequency which changes over short bursts of time while maintaining the temperature of the substrate at a degas temperature; and

removing a first set of oxygen containing compounds from the chamber.

7. The method of claim 6, further comprising:

flowing an inert gas into the chamber;

creating a plasma comprising the inert gas;

exposing the substrate to a plasma comprising the inert gas;

removing a second set of oxygen containing compounds from the chamber;

raising the pressure of inert gas in the chamber; and

maintaining the pressure of inert gas while cooling the substrate to a temperature lower than the degas temperature.

8. The method of claim 6, wherein the short bursts of time are from 20 microseconds to 30 microseconds.

9. The method of claim 8, wherein the substrate is maintained at a temperature between the degas temperature and the glass transition temperature from positioning the substrate in the processing chamber until the second set of oxygen containing compounds have been removed from the chamber.

10. A vacuum multi-chamber deposition tool comprising:

a load lock chamber;

a first transfer chamber with a first central robot mounted therein;

a second transfer chamber with a second central robot mounted therein;

a degas chamber comprising:

a chamber body;

a substrate support configured to support a substrate having a selected diameter;

a substrate heating mechanism configured to heat the substrate;

a temperature measuring device; and

a variable frequency microwave radiation source using two or more frequencies selected from the range of 5.85GHz to 7.0GHz which vary by between 200Hz and 280Hz and configured to deliver the microwave radiation of varying frequency toward the surface of the substrate support;

a pre-metallization clean chamber fluidly connected with the degas chamber and employing a sputtering clean process comprising an inert gas; and

a deposition chamber fluidly connected with the pre-metallization clean chamber.