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(54) SUBSTRATE SUPPORT WITH GAS INTRODUCTION OPENINGS

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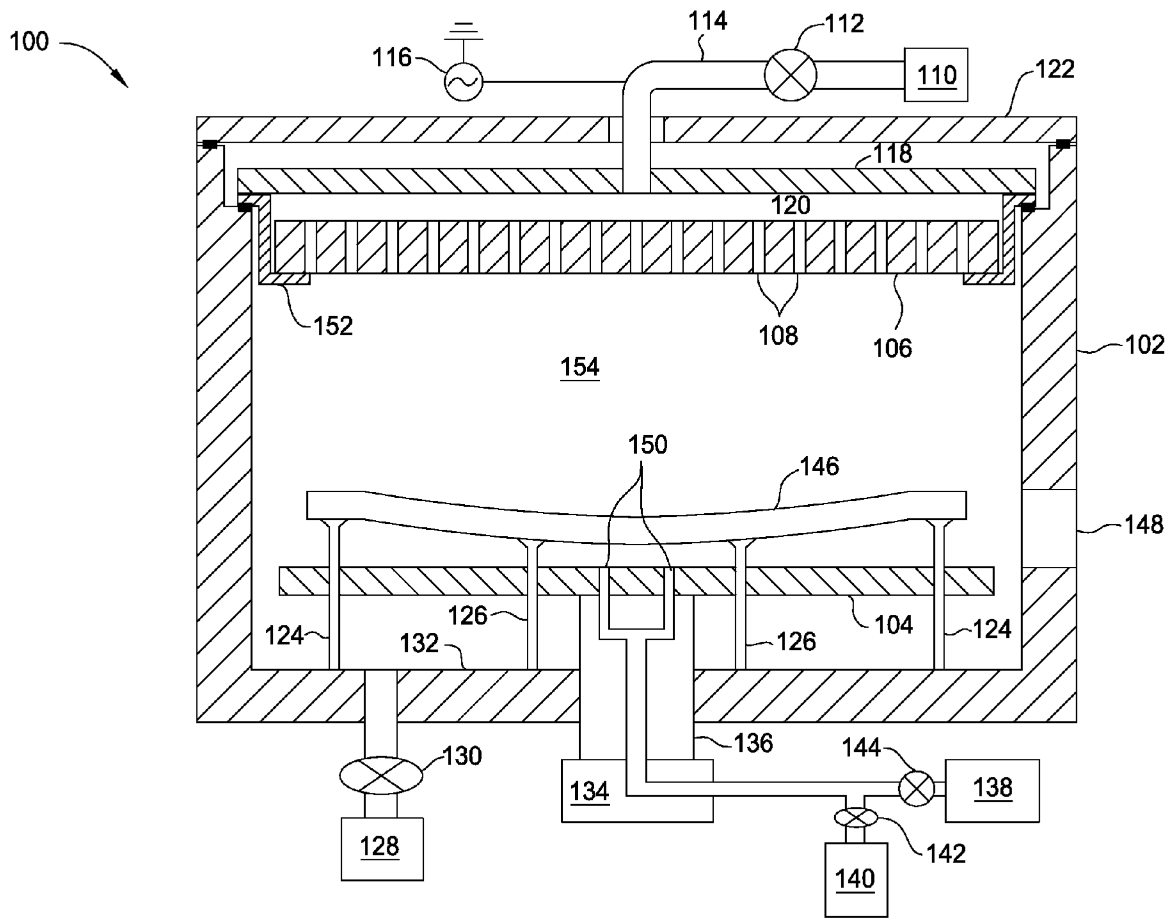
(57) **ABSTRACT**

Embodiments disclosed herein generally relate to an apparatus and a method for placing a substrate substantially flush against a substrate support in a processing chamber. When a large area substrate is placed onto a substrate support, the substrate may not be perfectly flush against the substrate support due to gas pockets that may be present between the substrate and the substrate support. The gas pockets can lead to uneven deposition on the substrate. Therefore, pulling the gas from between the substrate and the support may pull the substrate substantially flush against the support. During deposition, an electrostatic charge can build up and cause the substrate to stick to the substrate support. By introducing a gas between the substrate and the substrate support, the electrostatic forces may be overcome so that the substrate can be separated from the susceptor with less or no plasma support which takes extra time and gas.



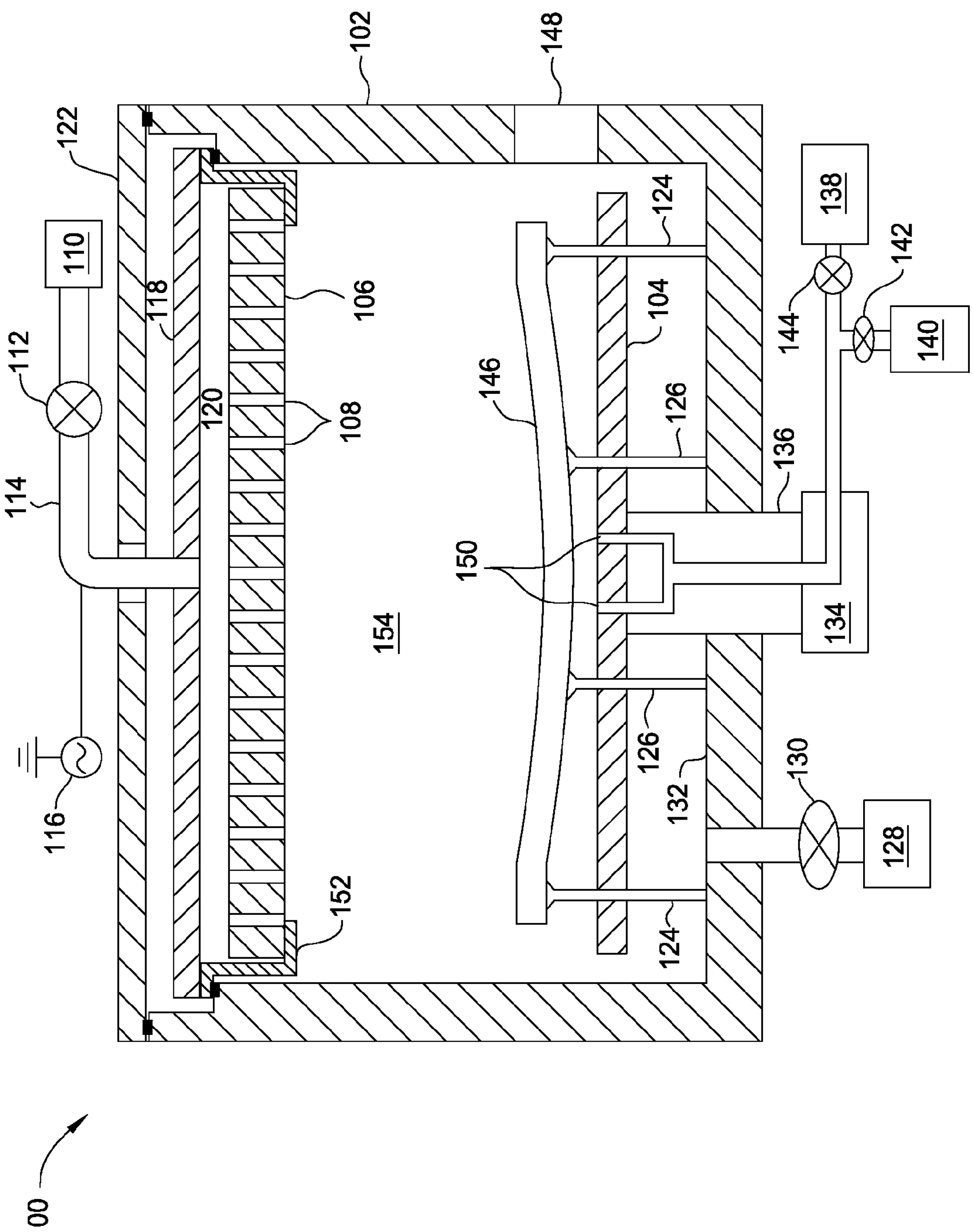

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FIG. 1A

FIG. 1B

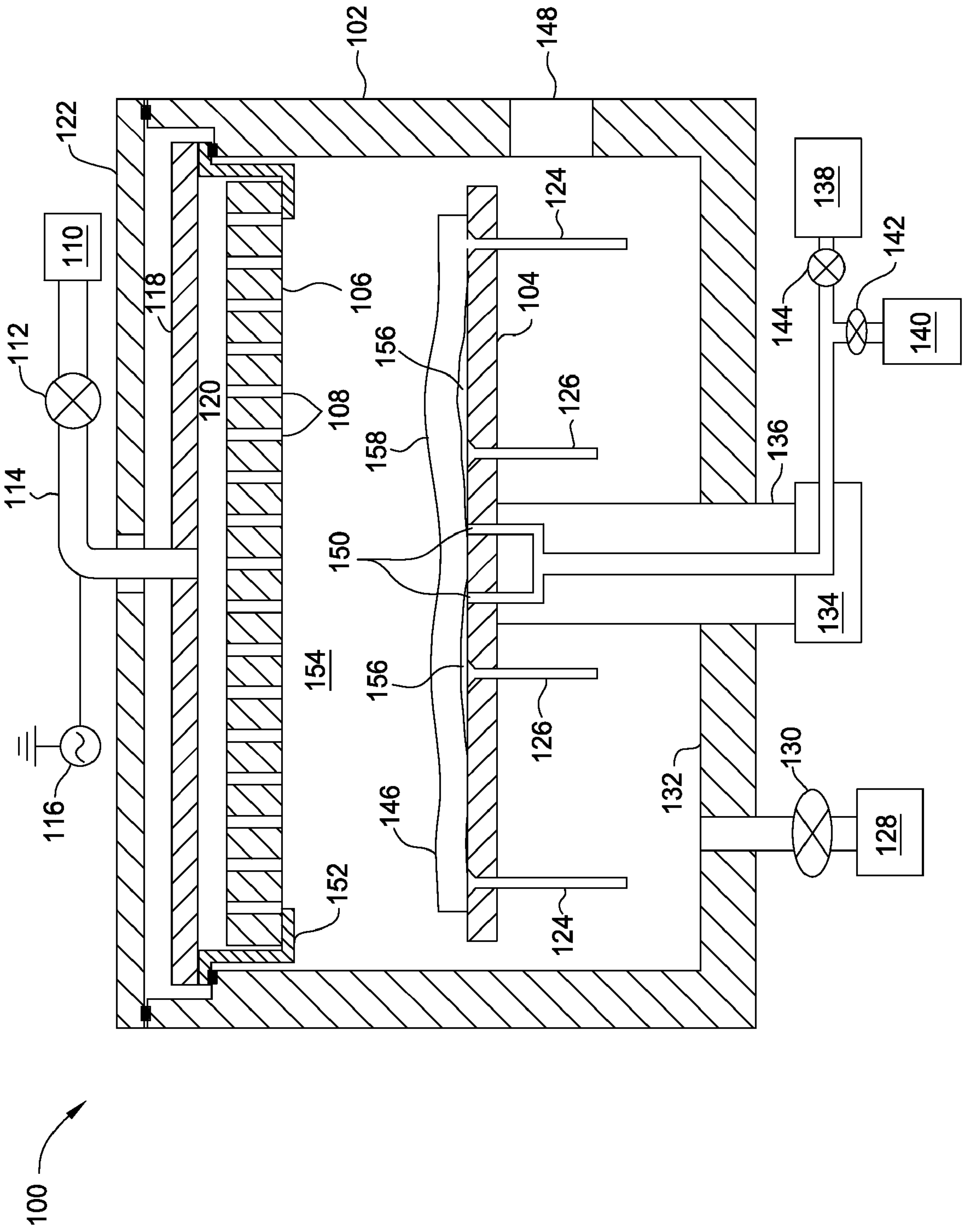
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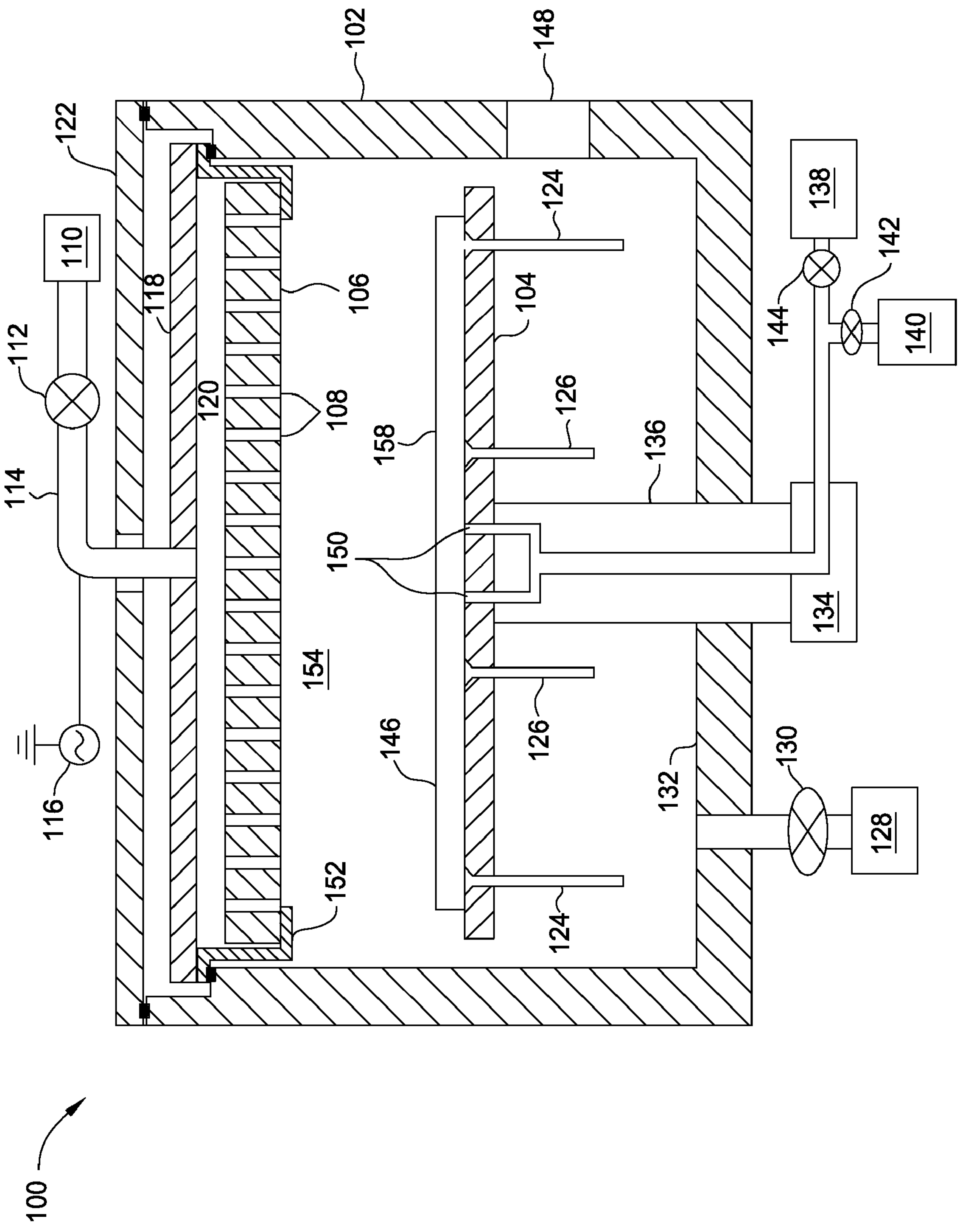
FIG. 1C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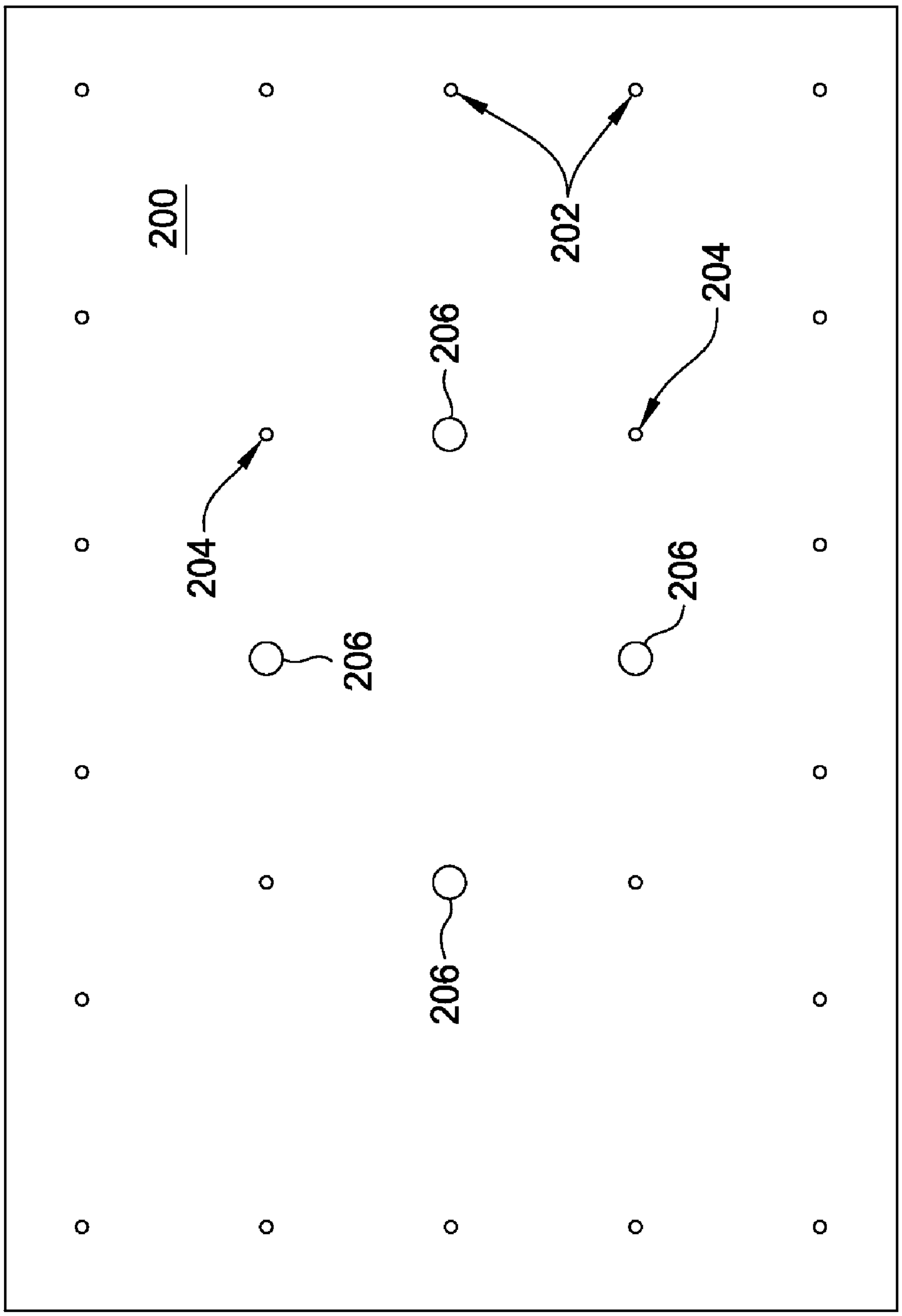

FIG. 2

SUBSTRATE SUPPORT WITH GAS INTRODUCTION OPENINGS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of U.S. Provisional Patent Application Ser. No. 61/145,361 (APPM/14002L), filed Jan. 16, 2009, which is herein incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] Embodiments disclosed herein generally relate to an apparatus and a method for placing a substrate substantially flush against a substrate support in a processing chamber.

[0004] 2. Description of the Related Art

[0005] As the demand for larger flat panel displays (FPDs) and larger solar panels continues to grow, so does the size of the substrates used in forming the FPDs and solar panels. With an increase in substrate size, the chambers used to process the substrate increase as well. It is not uncommon for chambers to be sized to process a substrate having a surface area of greater than about two square meters.

[0006] Deposition processes such as plasma enhanced chemical vapor deposition (PECVD), physical vapor deposition (PVD), atomic layer deposition (ALD), and chemical vapor deposition (CVD) may be performed to deposit desired layers onto the large area substrates. Removal processes such as etching, either plasma or liquid, may also be performed on the large area substrates as well.

[0007] For semiconductor wafer processing, the wafers may have a diameter of about 200 mm or about 300 mm. It is believed that the next generation of semiconductor wafers will be about 400 mm in diameter. Thus, the surface area for semiconductor wafers is significantly smaller than the surface area for large area substrates.

[0008] Scaling up the size of semiconductor wafer processing chambers to the size used to process large area substrates is not simple. Many complications may arise such as maintaining a uniform plasma within the chamber, providing sufficient power to generate a plasma in the chamber, and cleaning the chamber to name only a few. Additionally, semiconductor wafers are generally round substrates while many large area substrates are polygonal or rectangular. Scaling up a round processing chamber to process a large area rectangular or polygonal substrate may not work.

[0009] Therefore, there is a need for a processing chamber to process large area substrates.

SUMMARY OF THE INVENTION

[0010] Embodiments disclosed herein generally relate to an apparatus and a method for placing a substrate substantially flush against a substrate support in a processing chamber. When a large area substrate is placed onto a substrate support, the substrate may not be perfectly flush against the substrate support due to gas pockets that may be present between the substrate and the substrate support. The gas pockets can lead to uneven deposition on the substrate. Therefore, pulling the gas from between the substrate and the substrate support may pull the substrate substantially flush against the substrate support. During deposition, an electrostatic charge can build up and cause the substrate to stick to the substrate support. By introducing a gas between the substrate and the substrate support, the electrostatic forces may be overcome so that the substrate can be separated from the susceptor with less or no plasma support which takes extra time and gas.

[0011] In one embodiment, an apparatus is disclosed. The apparatus may include a substrate support having one or more first holes therethrough having a first diameter, a vacuum pump coupled with the substrate support at a location corresponding to the one or more first holes, and a gas supply coupled with the substrate support at a location corresponding to the one or more first holes.

[0012] In another embodiment, a method is disclosed. The method includes inserting a substrate into a processing chamber, positioning the substrate onto one or more lift pins, raising a substrate support from a position spaced from the substrate to a position in contact with the substrate, and evacuating gas from any spaces between the substrate and the substrate support such that the substrate is pulled into a position substantially flush with the substrate support. The evacuating occurs through the substrate support.

[0013] In another embodiment, a method includes igniting a plasma within a processing chamber containing a substrate support having a substrate thereon, injecting a first gas between the substrate support and the substrate, and lowering the substrate support or raising one or more lift pins to space the substrate from the substrate support.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] So that the manner in which the above recited features of the present invention can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

[0015] FIG. **1**A is a schematic cross sectional view of an apparatus according to one embodiment in which the substrate is raised above the substrate support.

[0016] FIG. **1**B is a schematic cross sectional view of the apparatus of FIG. **1**A where the substrate rests on the substrate support.

[0017] FIG. **1**C is a schematic cross sectional view of the apparatus of FIG. **1**A where the substrate rests substantially flush against the substrate support.

[0018] FIG. **2** is a schematic top view of a substrate support according to one embodiment.

[0019] To facilitate understanding, identical reference numerals have been used, where possible, to designate identical elements that are common to the figures. It is contemplated that elements disclosed in one embodiment may be beneficially utilized on other embodiments without specific recitation.

DETAILED DESCRIPTION

[0020] The embodiments disclosed herein will be described in reference to a PECVD chamber. A suitable PECVD chamber may be purchased from AKT America, Inc., a subsidiary of Applied Materials, Inc., Santa Clara, Calif. It is to be understood that the embodiments disclosed herein may be practiced in other processing chambers, including those sold by other manufacturers.

[0021] FIG. **1**A is a schematic cross sectional view of an apparatus **100** according to one embodiment in which the substrate **146** is raised above the substrate support **104**. The substrate **146** is initially brought into the chamber through a slit valve opening **148** that is present in at least one wall **102** of the chamber. The substrate **146** is placed on the lift pins **124**, **126** above the substrate support **104**.

[0022] Opposite to the substrate support **104**, a gas distribution showerhead **106** may be present. The showerhead **106** may have a plurality of gas passages **108** extending therethrough. Processing gas and/or cleaning gas may be fed to the chamber from a gas source **110**. The amount of processing and/or cleaning gas delivered may be regulated by a valve **112** that is selectively opened and closed. The processing gas travels to the processing chamber through a tube **114** that is coupled to the backing plate **118** such that the gas flows through the backing plate **118** above the showerhead **106** and expands into a plenum **120** between the backing plate **118** and the showerhead **106**. The plenum **120** permits the gas to substantially evenly distribute behind the showerhead **106** before passing through the gas passages **108** so that the amount of processing gas that passes through the gas passages **108** near the center is substantially equal to the amount of gas that passes through the gas passages **108** near the edge of the showerhead **106**.

[0023] A power source **116** may be coupled with the processing chamber. In one embodiment, the power source **116** may comprise an RF power source capable of delivering currents at a frequency between about 10 MHz and about 100 MHz. The power source **116** may be coupled with the tube **114**. RF current penetrates only a certain, predeterminable distance into conductive material. The predetermined penetration is sometimes referred to as a 'skin effect'. Due to the 'skin effect' of RF current, the tube **114** may be conductive to permit the RF current to travel along the outside surface while permitting the gas to be flowing through the inside of the tube **114**. The gas within the tube **114** does not 'see' the RF current due to the 'skin effect' and thus may not ignite into a plasma within the tube **114**.

[0024] The RF current travels from the power source **116** to the tube **114**. The RF current then travels along the outside surface of the tube **114** down to the backing plate **118**. Rather than penetrating through the backing plate **118**, the RF current travels along the backside of the backing plate **118** because the backing plate **118** is conductive. The bracket **152** that electrically couples the showerhead **106** to the backing plate **118** is also conductive and thus the RF current travels along the surface of the bracket **152** to the front surface of the showerhead **106**. The RF current then ignites the processing gas into a plasma within the processing area **154**.

[0025] RF current returns to the source driving it. Therefore, the RF current will seek to return to the power source **116**. The RF current will travel along the substrate support **104**, down the pedestal **136**, along the bottom **132** of the chamber, up the chamber walls **102**, along the bottom of the lid **122** and back to the power source **116**. It is to be understood that RF return path may be shortened by coupling straps between the substrate support **104** and the bottom **132** and/or walls **102**.

[0026] During processing, the processing gas is delivered to the chamber from the gas source **110**, through the tube **114** into the plenum **120** between the backing plate **118** and the showerhead **106**. The gas then evenly distributes within the plenum **120** and then passes through the gas passages **108** into the processing area **154**. The RF current, which travels from the power source **116** along the tube **114**, the back surface of the backing plate **118**, the bracket **152**, and the front surface of the showerhead **106**, ignites the gas into a plasma within the processing area **154**. Material is then deposited onto the substrate **146**.

[0027] Prior to processing, the substrate **146** is initially placed into the processing chamber through the slit valve opening **148** on an end effector. The end effector lowers the substrate **146** and places the substrate **146** on the lift pins **124**, **126**. The lift pins **124**, **126** rest on the bottom **132** of the chamber. The end effector then retracts. The processing chamber may be evacuated by a vacuum pump **128**. The level of vacuum may be controlled by a valve **130** that is opened and closed.

[0028] After the substrate **146** is placed on the lift pins **124**, **126** and the end effector retracts out of the chamber, the substrate support **104** may be raised by an actuator **134** such that the substrate **146** rests on the substrate support **104**. FIG. 1B is a schematic cross sectional view of the apparatus of FIG. 1A where the substrate **146** rests on the substrate support **104**. When the substrate support **106** has raised to the processing position, the lift pins **124**, **126** are lifted off of the bottom **132** of the chamber.

[0029] It is to be understood that while description has been made regarding the lift pins **124**, **126** resting on the bottom **132** of the chamber and the substrate support **104** moving relative to the lift pins **124**, **126**, the discussion contained herein is equally applicable to the situation where the lift pins **124**, **126** may move independent of the substrate support **104**. For example, the substrate support **104** may remain stationary while the lift pins **124**, **126** raise and lower to move the substrate **146** from a position spaced from the substrate support **104** to a position in contact with the substrate support **104**. Additionally, both the substrate support **104** and the lift pins **124**, **126** may move independently such that the lift pins **124**, **126** lower while the substrate support **104** raises and vice versa. The center to edge progression discussed herein and the edge to center progression discussed herein would be applicable to each situation.

[0030] Because the substrate **146** is so large, in some cases at least two square meters in surface area, the substrate **146** may not rest perfectly flush against the substrate support **104**. Thus, gaps **156** may be present between the substrate **146** and the substrate support **104**. The gaps **156** may be due to several factors. One factor is the heating of the substrate **146** may cause the substrate **146** to buckle. The substrate **146** may initially be heated upon entry into the chamber. The temperature of the chamber may be greater than the substrate due to the heating of the chamber during a previous process. The plasma in the previous process may heat the chamber to temperatures of about 200 degrees Celsius in some cases. The substrate **146**, however, may be placed into the processing chamber after being retrieved from a load lock chamber. The substrate **146** may, just prior to entry into the chamber, be at a temperature lower than the chamber and thus buckle when entering the chamber.

[0031] Additionally, the gaps **156** may be present because gas unfortunately gets trapped between the substrate **146** and the substrate support **104** when the substrate support **104** raises to contact the substrate **146**. Lift pins **126** are shorter than lift pins **124**. Thus, then the substrate support **104** is raised, the substrate **146** contacts the substrate support **104** in the center and generally rolls out to the edge of the substrate **146**. In so rolling, gas between the substrate **146** and the substrate support **104** is generally pushed out from between the substrate **146** and the substrate support **104**. However, some gas may remain trapped between the substrate **146** and the substrate support **104** to produce gaps **156** therebetween.

[0032] The gaps **156** between the substrate **146** and the substrate support **104** lead to an uneven deposition surface **158** on the substrate **146**. The uneven deposition surface **158** may lead to uneven deposition thereon including thin spots where not as much deposition occurs. Not wishing to be bound by theory unless explicitly claimed, it is believed that the gaps **156** lead to the thin spots. The thin spots may form on the substrate **146** because the deposited material may tend to deposit in the lower areas and build up. The material would continue to deposit until the desired thickness has been reached. Once the desired thickness has been reached, the top surface of the film is expected to be substantially planar. While the gaps **156** are present, the deposited layer may appear even. However, once the substrate **146** is removed from the chamber and substantially leveled, the material deposited on the substrate **146** would no longer be planar and thin spots would remain.

[0033] Another reason that the thin spots may form is due to the plasma density. The RF current that travels from the power source **116** along the tube **114**, backing plate **118**, bracket **152**, and showerhead **106** ignites the processing gas into a plasma. The showerhead **106** is considered RF 'hot' because the RF current is directly applied to the showerhead **106**. The substrate support **104**, on the other hand, is a part of the RF return path. Some refer to the substrate support **104** as an anode in opposition to the cathode or showerhead **106**. Nonetheless, the RF current from the plasma travels along the substrate support **104** and eventually back to the power source **116**. The RF current couples to the substrate support **104** through the substrate **106**. Because the substrate **146** is not substantially flush against the substrate support **104** due to the gaps **156**, the RF current does not couple to the substrate support **104** at the locations corresponding to the gaps **156**. Without RF current coupling to the substrate support **104** at the gaps **156**, the plasma may be non-uniformly distributed within the chamber. The non-uniform plasma distribution may lead to uneven deposition on the substrate **146**.

[0034] To combat the uneven plasma distribution, it would be beneficial for the substrate **146** to be substantially flush against the substrate support **104**. When the substrate **146** is substantially flush against the substrate support **104**, substantially no gaps **156** should be present and the RF current can couple to the substrate support **104** through the substrate **146** at substantially the entire bottom surface of the substrate **146**. FIG. **1C** is a schematic cross sectional view of the apparatus of FIG. **1A** where the substrate **146** rests substantially flush against the substrate support **104**. In order to pull the substrate **146** substantially flush against the substrate support **104**, the gas that is trapped between the substrate **146** and substrate support **104** is removed so that the gaps **156** are removed.

[0035] As discussed above, the substrate **146** is initially placed on the lift pins **124**, **126** by an end effector. The end effector then retracts out of the chamber. The substrate support **104** then raises to meet the substrate **146**. The substrate **146** comes into contact with the substrate support **104** in a center to edge progression until the substrate **146** is supported by the substrate support **104** and not the lift pins **124**, **126**. Similar to the substrate **146**, the lift pins **124**, **126** are supported by the substrate support **104**. Any gas remaining trapped between the substrate **146** and the substrate support **104** may be removed by evacuating the gas from the gaps **156** and thereby pull the substrate **146** substantially flush against the substrate support **104**. The gaps **156** may be evacuated by a vacuum pump **140** that is coupled to the substrate support **104**. One or more openings **150** through the substrate support **104** permit the gas to be pulled through the substrate support **104** and out of the chamber through the vacuum pump **140**. A valve **142** may be opened and closed as necessary to control the vacuum pull from the vacuum pump **140**.

[0036] In addition to pulling any gas trapped in the gaps **156**, the substrate **146** may be plasma loaded or pre-plasma loaded. Plasma loading is a process for thermophoresis that is used to heat the substrate **146** to a temperature greater than its surroundings. Because the substrate **146** is heated to a temperature greater than its surroundings, any negatively charged particles or other contaminants tend to gravitate towards the coolest surface. When a substrate **146** is introduced into a processing chamber, the substrate **146** may be the coolest surface and thus, risk contamination. By heating the substrate **146** to a temperature greater than the surroundings, the negatively charged particles may gravitate to a surface other than the substrate **146**. Plasma loading, which is different from pre-plasma loading, involves rapidly raising the temperature of the substrate **146**.

[0037] A plasma loading sequence involves inserting a substrate **146** into a processing chamber and placing the substrate **146** onto the substrate support **104**. No plasma is ignited prior to placing the substrate **146** onto the substrate support **104**. Then, the pressure of the chamber is increased above the normal processing pressure. An inert gas such as a noble gas or a gas that does not chemically react with the substrate **146** is introduced into the chamber and ignited into a plasma. The plasma heats the substrate up to a temperature that is greater than the other electrode (a showerhead **106** in a PECVD system). Then, the plasma is extinguished, the gas evacuated, and the pressure reduced to normal. The substrate **146** may then be processed. Alternatively, plasma loading may comprise igniting a plasma while the substrate support **104** is moving upwards to make contact with the substrate **146**. The gaps **156** may be evacuated in addition to the plasma loading.

[0038] Pre-plasma loading, on the other hand, is a process to help bring the substrate **146** into contact with the substrate support **104**. For pre-plasma loading, a substrate **146** is supported by an end effector as it is brought into a processing chamber. The end effector is then lowered to place the substrate **146** on the lift pins **124**, **126** that extend from the bottom **132** of the chamber through the substrate support **104**. Once the substrate **146** is resting on the lift pins **124**, **126**, the end effector is retracted from the chamber.

[0039] While the substrate **146** is resting on the lift pins **124**, **126** and before the substrate **146** rests on the substrate support **104**, a gas may be introduced into the chamber. The gas may comprise a gas that does not chemically react with the substrate **146** or cause any deposition onto the substrate **146**. Examples of gases that may be used include hydrogen, nitrogen, ammonia, argon, and combinations thereof. The gas is then ignited into a plasma.

[0040] Similar to the situation that occurs during plasma deposition, an electrostatic charge develops on the substrate **146** and/or the substrate support **104**. The power applied to ignite the plasma may be discontinued and the chamber may then be pumped down to the base pressure for processing. The substrate support **104** may then be raised and the substrate **146** may contact the substrate support **104** in a center to edge manner at a slow speed. The substrate support **104** is raised without any gas or plasma until the substrate **146** is supported by the substrate support **104**. It is only after the plasma is extinguished that the substrate support **104** is raised.

[0041] The electrostatic charge that has built up on the substrate **146** and/or the substrate support **104** may pull the substrate **146** into greater contact with the substrate support **104** such that the amount of gaps **156** that may be present between the substrate **146** and the substrate support **104** may be reduced below what would be present in absence of the pre-plasma loading process.

[0042] Any gases that remain trapped in the gaps **156** may then be evacuated by the vacuum pump **140** through the openings **150** to pull the substrate **146** substantially flush against the substrate support **104**. Once the substrate **146** is supported by the substrate support **104**, processing gases may be introduced into the chamber and ignited into a plasma by RF power. The substrate **146** may thus be processed.

[0043] Once processing has been completed, the substrate **146** may be power lifted from the substrate support **104**. To power lift the substrate **146** from the substrate support **104**, a gas may be introduced into the chamber. The gas may be a gas that does not chemically react with the processed substrate **146**. If a gas that chemically reacts with the substrate **146** were used, then undesirable processing of the substrate **146** may occur. Therefore, the gas should be chemically inert relative to the processed substrate **146**. In one embodiment, the gas may be selected from hydrogen, nitrogen, argon, and ammonia.

[0044] The gas that has been introduced is ignited into a plasma. In one embodiment, the RF power used to ignite the plasma is lower than the RF power applied to generate the plasma used to deposited material onto the substrate **146**. The processed substrate **146** is exposed to the plasma for a predetermined time period. In one embodiment, the time period is between about 5 seconds and about 15 seconds. Not wishing to be bound by theory, it is believed that the plasma of non-reactive gas removes, reduces or redistributes the electrostatic charge built up on the substrate **146** and substrate support **104** such that the substrate **146** may be removed from contact with the substrate support **104** without damaging the substrate **146**. The removal, reduction or redistribution of the electrostatic charge reduces the stiction between the substrate **146** and the substrate support **104** and thus allows the substrate **146** to be more easily separated from the substrate support **104**. By using a power lower than used for the depositing of material, the charge applied to the substrate **146** and the substrate support **104** during the power lifting is limited.

[0045] To separate the substrate **146** from the substrate support **104** after the power lifting, the substrate support **104** is lowered and the substrate **146** is supported by the lift pins **124**, **126**. The substrate **146** separates from the substrate support **104** in an edge to center progression. The substrate **146** may, however, still stick to the substrate support **104** in areas away from the edge of the substrate **146**. If the substrate **146** sticks to the substrate support **104**, the substrate **146** may break or be damaged. To additionally overcome the stiction, gas may be introduced between the substrate **146** and the substrate support **104**.

[0046] The gas may be introduced to form gaps **156** between the substrate **146** and the substrate support **104**. The gaps **156** may reduce stiction between the substrate **146** and the substrate support **104** to aid in removing the substrate **146** from the substrate support **104**. The gas may be introduced by opening a valve **144** and permitting gas to be introduced between the substrate **146** and the substrate support **104** through the openings **150** from a gas source **138**. The gas from the gas source **138** may comprise a gas that does not chemically react with the substrate **146** or cause any deposition onto the substrate **146**. Examples of gases that may be used include hydrogen, nitrogen, ammonia, argon, and combinations thereof. Introducing gas between the substrate **146** and the substrate support **104** may be performed in addition to the power lifting. The gas may be introduced to form the gaps **156** prior to the power lifting, concurrent with the power lifting, or after the power lifting.

[0047] FIG. **2** is a schematic top view of a substrate support **200** according to one embodiment. The substrate support has openings **202** for outer lift pins and openings **204** for inner lift pins. The openings **202**, **204** have substantially the same diameter. Openings **206** are also present for introducing or withdrawing gas through the substrate support **200**. It is to be understood that while four openings **206** have been shown, more or less openings **206** may be present. Additionally, while the openings **206** have been shown disposed near the openings **204**, the openings **206** may be at other locations in addition to, or alternative to the locations shown in FIG. **2**. The diameters of the openings **206** are shown to be greater than the diameters of the openings **202**, **204**, but it is to be understood that the openings **206** may have the same diameter or a smaller diameter than the openings **202**, **204**.

[0048] There are numerous advantages to the embodiments discussed herein. By withdrawing gas from between a substrate and a substrate support, a substrate may be brought into intimate contact with the substrate support such that the substrate is substantially flush against the substrate support. With the substrate substantially flush against the substrate support, material may deposit uniformly on the substrate. By introducing gas between the substrate and the substrate support, stiction forces that hold the substrate in intimate contact with the substrate support may be overcome so that the substrate may be more easily removed from contact with the substrate support. Thus, uniformity issues and breakage issues for large area substrates may be overcome.

[0049] While the foregoing is directed to embodiments of the present invention, other and further embodiments of the invention may be devised without departing from the basic scope thereof, and the scope thereof is determined by the claims that follow.

1. An apparatus, comprising:
- a substrate support having a plurality of first holes therethrough having a first diameter;
- a vacuum pump coupled with each of the plurality of first holes in the substrate support; and
- a gas supply coupled with each of the plurality of first holes in the substrate support.

2. The apparatus of claim **1**, wherein the apparatus is a plasma enhanced chemical vapor deposition apparatus.

3. The apparatus of claim **1**, wherein the substrate support has a plurality of second holes therethrough having a second diameter, the apparatus further comprising:
- a lift pin movably disposed within each of the plurality of second holes.

4. The apparatus of claim **3**, wherein the plurality of second holes are spaced further from the center of the substrate support than the plurality of first holes.

5. The apparatus of claim **1**, wherein the substrate support is coupled to a support shaft, the apparatus further comprising:

one or more tubes extending through the support shaft and coupled to the substrate support at a location corresponding to the plurality of first openings, the one or more tubes additionally coupled to at least one of the gas supply and the vacuum pump.

6. A method, comprising:

inserting a substrate into a processing chamber;

positioning the substrate onto one or more lift pins;

causing relative movement between the one or more lift pins and a substrate support to place the substrate in a position in contact with the substrate; and

evacuating gas from at least one space between the substrate and the substrate support such that the substrate is pulled into a position substantially flush with the substrate support, the evacuating occurring through the substrate support.

7. The method of claim **6**, wherein the substrate rests on the one or more lift pins such that a center of the substrate sags towards the substrate support.

8. The method of claim **6**, further comprising moving the substrate support relative to the one or more lift pins by moving the substrate support from a position spaced from the substrate to the position in contact with the substrate, wherein the substrate support contacts the substrate in a center to edge progression.

9. The method of claim **6**, further comprising:

evacuating the processing chamber, wherein the evacuating gas from at least one space between the substrate and the substrate support is separate from the evacuating of the processing chamber.

10. The method of claim **6**, wherein the substrate support has a plurality of openings therethrough to permit the gas to be evacuated through the substrate support.

11. The method of claim **6**, wherein the method is a plasma enhanced chemical vapor deposition method.

12. The method of claim **6**, further comprising:

igniting a plasma within the processing chamber;

inject a gas between the substrate support and the substrate; and

lowering the substrate support or raising the one or more lift pins to space the substrate from the substrate support.

13. The method of claim **12**, wherein the gas injected is a noble gas.

14. A method, comprising:

igniting a plasma within a processing chamber containing a substrate support having a substrate thereon;

injecting a first gas between the substrate support and the substrate; and

causing relative movement between the substrate support and one or more lift pins to space the substrate from the substrate support.

15. The method of claim **14**, wherein the first gas is a noble gas.

16. The method of claim **14**, further comprising injecting a second gas into the processing chamber prior to igniting a plasma, wherein the second gas is injected at a different location than the first gas.

17. The method of claim **14**, wherein the method is a plasma enhanced chemical vapor deposition method.

18. The method of claim **14**, wherein the substrate is supported by one or more lift pins during the relative movement.

19. The method of claim **14**, wherein the first gas is injected through the substrate support.

20. The method of claim **14**, wherein the substrate support spaces from the substrate in an edge to center progression.

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