

DESCRIPTION

Invention Title: SUBSTRATE PROCESSING DEVICE

TECHNICAL FIELD

[1] The present invention relates to a substrate processing apparatus, and more particularly, to a substrate processing apparatus for processing a substrate using plasma.

BACKGROUND ART

[2] Plasma refers to an ionized gaseous state composed of ions, radicals, electrons, and the like. Plasma is generated by a very high temperature, a strong electric field, or a Radio-Frequency (RF) electromagnetic field. Semiconductor device manufacturing processes include an ashing process or an etching process for removing a thin film on a substrate using plasma. The ashing or etching process is performed by ions and/or radical particles contained in the plasma colliding with or reacting with a film on the substrate.

[3] FIG. 1 illustrates an example of a remote plasma processing apparatus. Referring to FIG. 1, the remote plasma processing apparatus includes a plasma generation chamber 21 and a processing chamber 22, and plasma generated in the plasma generation chamber 21 is introduced into the processing chamber 22 through an adapter 24 and a baffle 23, thereby performing plasma processing on a wafer W1.

[4] In the plasma processing apparatus of FIG. 1, the baffle 23 is screw-fastened to the processing chamber 22 or the adapter 24 by bolts. However, during the fastening process, particles T1 may be generated due to wear of the threads of the bolts B1 or the threads formed in the processing chamber 22 or the adapter 24 for being fastened with the bolts B1. In addition, the bolts B1 are generally formed of an alloy containing iron. Accordingly, when process gas contains oxygen, the surfaces of the bolts B1 may be oxidized by oxygen plasma, thereby generating particles. These particles may fall onto the wafer W1 and cause process defects.

SUMMARY

TECHNICAL PROBLEM

[5] An object of the present invention is to provide a substrate processing apparatus capable of preventing fine debris and particles generated around a fastening region to which a baffle is coupled from being introduced toward a substrate.

[6] The problem to be solved by the present invention is not limited to the above-mentioned problems, and the problems not mentioned will be clearly understood by those skilled in the art from the present specification and the accompanying drawings.

TECHNICAL SOLUTION

[7] An exemplary embodiment of the present invention provides an apparatus for processing a substrate, the apparatus including: a processing chamber having a processing space therein for processing a substrate; a support unit for supporting the substrate in the processing space; a plasma generation chamber provided outside the processing chamber and having a discharge space for generating plasma from process gas; an adapter connected to the processing chamber and the plasma generation chamber and having a guide space configured to guide the plasma generated in the discharge space to the processing chamber; and a baffle assembly disposed in the processing space, the guide space, or between the processing space and the guide space, in which the baffle assembly includes: a baffle plate having a plurality of baffle holes providing passages for gas flowing between the guide space and the processing space; a fastening member configured to fasten the baffle plate to the processing chamber or the adapter; and a cover surrounding a fastening space in which the fastening member is positioned so that the fastening member is not exposed to the processing space.

[8] According to the exemplary embodiment, the fastening member may include a bolt.

[9] According to the exemplary embodiment, the baffle plate may include: an injection

region in which the baffle holes are formed; and a fastening region positioned outside the injection region and having a fastening hole into which the bolt is inserted, and the cover includes: a first region which is in contact with the fastening region; and a second region which is in contact with the injection region.

[10] According to the exemplary embodiment, the fastening region and the injection region may be provided at different levels such that the fastening region is positioned higher than the injection region.

[11] According to the exemplary embodiment, the first region may be in contact with an outer surface of the fastening region, and the second region is in contact with a lower surface of the injection region.

[12] According to the exemplary embodiment, the first region may be formed in a ring shape, and the second region is formed in a ring shape.

[13] According to the exemplary embodiment, the baffle assembly further may include a sealing member inserted between the second region and the injection region.

[14] According to the exemplary embodiment, the sealing member may be provided only between the second region and the injection region, and not between the first region and the fastening region.

[15] According to the exemplary embodiment, the baffle assembly further may include a fixing member configured to secure the cover to the baffle plate.

[16] According to the exemplary embodiment, the fixing member may secure the first region to the fastening region.

[17] According to the exemplary embodiment, the baffle assembly may be provided with a discharge passage configured to discharge particles within the fastening space to an outside of the cover.

[18] According to the exemplary embodiment, the discharge passage may be formed between the first region and the fastening region.

[19] According to the exemplary embodiment, the baffle assembly further may include a guide body configured to guide particles discharged through the discharge passage to an edge region of the processing space.

[20] According to the exemplary embodiment, the guide body may be coupled to an outer side surface of the second region of the cover and extends downward beyond a lower end of the cover.

[21] According to the exemplary embodiment, an apparatus for processing a substrate, the apparatus including: a processing chamber having a processing space therein for processing a substrate; a support unit for supporting the substrate in the processing space; a plasma generation chamber provided outside the processing chamber and having a discharge space for generating plasma from process gas; an adapter connected to the processing chamber and the plasma generation chamber and having a guide space configured to guide the plasma generated in the discharge space to the processing chamber; and a baffle assembly disposed between the processing space and the guide space, wherein the baffle assembly includes: a baffle plate including an injection region in which a plurality of baffle holes are formed, the plurality of baffle holes providing passages for gas flowing between the guide space and the processing space, and a fastening region positioned outwardly of the injection region and having a fastening hole formed therein; a bolt configured to fasten the baffle plate to the processing chamber or the adapter through the fastening hole; a cover surrounding a fastening space in which the bolt is positioned; and a sealing member inserted between the cover and the injection region.

[22] According to the exemplary embodiment, the fastening region and the injection region may be provided at different levels such that the fastening region is positioned higher than the

injection region, the cover includes: a first region coupled to an outer surface of the fastening region; and a second region coupled to a lower surface of the injection region, and the baffle assembly further includes a fixing bolt configured to secure the first region to the fastening region.

[23] According to the exemplary embodiment, the sealing member may be provided only between the second region and the injection region, and not between the first region and the fastening region, and a discharge passage configured to discharge particles within the fastening space to an outside of the cover is provided between the first region and the fastening region or in the first region.

[24] According to the exemplary embodiment, the baffle assembly further may include a guide body configured to guide particles discharged through the discharge passage to an edge region of the processing space, and the guide body is coupled to an outer side surface of the second region of the cover and extends downward beyond a lower end of the cover.

ADVANTAGEOUS EFFECTS

[25] According to the exemplary embodiment of the present invention, it is possible to prevent fine debris and particles generated in a fastening member for fixing a baffle plate from being introduced toward a substrate.

[26] The effect of the present invention is not limited to the foregoing effects, and the not-mentioned effects will be clearly understood by those skilled in the art from the present specification and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[27] Various features and advantages of the non-limiting exemplary embodiments of the present specification may become apparent upon review of the detailed description in conjunction with the accompanying drawings. The attached drawings are provided for

illustrative purposes only and should not be construed to limit the scope of the claims. The accompanying drawings are not considered to be drawn to scale unless explicitly stated. Various dimensions in the drawing may be exaggerated for clarity.

[28] FIG. 1 is a diagram illustrating an example of a remote plasma processing apparatus.

[29] FIG. 2 is a cross-sectional view schematically illustrating an example of a substrate processing apparatus according to an exemplary embodiment of the present invention.

[30] FIG. 3 is an enlarged view of region "A" of FIG. 2.

[31] FIG. 4 is a cross-sectional view illustrating a disassembled state of a baffle assembly of FIG. 2.

[32] FIG. 5 is a perspective view of a baffle plate viewed from below.

[33] FIG. 6 is a diagram illustrating a movement path of particles in FIG. 4.

[34] FIGS. 7 to 12 are diagrams illustrating substrate processing apparatuses according to other exemplary embodiments of the present invention.

MODE FOR CARRYING OUT THE INVENTION

[35] Exemplary embodiments will now be described more fully with reference to the accompanying drawings. The exemplary embodiments are provided in order to make the disclosure exhaustive and will fully convey the scope to one of ordinary skill in the art. To provide a complete understanding of exemplary embodiments of the present invention, a number of specific details are presented, such as examples of certain components, devices, and methods. It will be apparent to those skilled in the art that specific details need not be utilized and that the exemplary embodiments may be implemented in many different forms, neither of which should be construed as limiting the scope of the present invention. In some exemplary embodiments, known processes, known device structures, and known techniques are not described in detail.

[36] The terminology used herein is intended to describe certain exemplary embodiments

only and is not intended to limit the exemplary embodiments. Singular expressions, such as those used herein, or expressions where the singular is not specified, are intended to include the plural expressions unless the context clearly indicates otherwise. The terms "includes", "comprising", "including", and "having" have an open-ended meaning and are therefore intended to specify the presence of the features, configurations, integers, steps, operations, elements, and/or components mentioned and do not exclude the presence or addition of one or more other features, configurations, steps, operations, elements, components, and/or groups thereof. The method steps, processes, and operations described herein are not to be construed as necessarily being performed in the particular order in which they are discussed or described, unless the order in which they are performed is specified. In addition, additional or alternative steps may be selected.

[37] When an element or layer is referred to as being "on", "connected to", "bonded to", "attached to", "adjacent to", or "covering" another element or layer, the element or layer may be directly on, connected to, bonded to, attached to, adjacent to, or covering the other element or layer, or intermediate elements or layers may be present. Conversely, when an element is referred to as being "directly on", "directly connected to", or "directly bonded to" another element or layer, it is to be understood that no intervening elements or layers are present. Throughout the specification, the same reference numeral refers to the same element. As used in the present invention, the term "and/or" includes all combinations and sub-combinations of one or more of the enumerated items.

[38] Although terms, such as first, second, and third, may be used to describe various elements, regions, layers, and/or sections of the present invention, it is to be understood that these elements, regions, layers, and/or sections are not to be limited by these terms. These terms are used to distinguish one element, region, layer, or section from another element, region,

layer, or section only. Accordingly, the first element, first region, first floor, or first section discussed below may be referred to as the second element, second region, second floor, or second section without departing from the teachings of the exemplary embodiments.

[39] Spatially relative terms (for example, "beneath", "underneath", "below", "on", "above", and "on top") may be used for ease of description to describe the relationship of one element or feature to another element(s) or feature(s) as illustrated in the drawings. It is to be understood that spatially relative terms are intended to include not only the orientations illustrated in the drawings, but also other orientations of the apparatus in use or operation. For example, when the device in the drawing is flipped, the elements described as "underneath" or "below" other elements or features may be oriented "above" other elements or features. Thus, the term "below" above may include both up and down orientations. The apparatus may be oriented differently (rotated 90 degrees, or otherwise oriented), and the spatially relative descriptive phrases used in the present invention may be construed accordingly.

[40] It should be understood that when the terms "same" or "equal" are used in the description of exemplary embodiments, some imprecision may exist. Accordingly, when an element or value is referred to as being equal to another element or value, it is to be understood that the corresponding element or value is equal to the other element or value within manufacturing or operating tolerances (e.g., $\pm 10\%$).

[41] Where the words "approximately" or "substantially" are used in the present specification with respect to a numerical value, the corresponding numerical value should be understood to include manufacturing or operating tolerances (e.g., $\pm 10\%$) of the mentioned numerical value. It should also be understood that the use of the words "generally" and "substantially" in reference to geometric shapes does not require geometric shape accuracy, but latitude for shape is within the scope of the disclosure.

[42] Unless otherwise defined, all terms used in the present invention, including technical and scientific terms, have the same meaning as commonly understood by one of ordinary skill in the art to which the exemplary embodiments belong. It is also to be understood that terms, including commonly used dictionary-defined terms, are to be interpreted to have a meaning consistent with their meaning in the context of the relevant art and are not to be construed in an idealized or overly formal sense unless expressly defined in the present invention.

[43] In the present exemplary embodiment, a wafer is described as an example as an object to be treated. However, the technical idea of the present invention may be applied to devices used for processing other types of substrates other than wafers as objects to be processed.

[44] FIG. 2 is a cross-sectional view schematically illustrating a substrate processing apparatus according to an exemplary embodiment of the present invention.

[45] Referring to FIG. 2, a substrate processing apparatus according to an exemplary embodiment of the present invention includes a plasma generation unit 100, an adapter 200, and a process processing unit 300.

[46] The plasma generation unit 100 may be positioned above a processing chamber 310. The plasma generation unit 100 may generate plasma by discharging process gas and may supply the generated plasma into a processing space 301. The plasma may include ions or radical particles for performing an ashing process or an etching process.

[47] The plasma generation unit 100 may include a plasma generation chamber 110, a gas supply unit 120, a power source 130, and an antenna 140.

[48] The plasma generation chamber 110 may have a plasma generation space 101 having an open upper end and an open lower end. The plasma generation chamber 110 may be formed of a ceramic material. For example, the plasma generation chamber 110 may be formed of an insulating material, such as quartz or aluminum oxide (Al_2O_3). An upper surface of the plasma

generation chamber 110 may be sealed by a gas supply port 114. Process gas may be supplied into the plasma generation space 101 through the gas supply port 114. The gas supplied into the plasma generation space 101 may flow into the processing space 301 through the baffle assembly 350.

[49] The gas supply unit 120 may supply the process gas. The gas supply unit 120 may be connected to the gas supply port 114. The process gas supplied by the gas supply unit 120 may be gas containing fluorine and/or hydrogen.

[50] The power source 130 may supply power to the antenna 140. The power source 130 may apply a high-frequency alternating current to the antenna 140. The high-frequency alternating current applied to the antenna 140 may generate an induced electric field in the plasma generation space 101. Within the plasma generation space 101, the process gas may obtain energy required for ionization from the induced electric field and be converted into a plasma state.

[51] The antenna 140 may be provided to surround the plasma generation chamber 110 from a height corresponding to an upper end of the plasma generation chamber 110 to a height corresponding to a lower end thereof. An upper end of the antenna 140 may be connected to the power source 130, and a lower end of the antenna 140 may be grounded.

[52] The adapter 200 may be disposed between the plasma generation chamber 110 and the processing chamber 310. The adapter 200 may diffuse the plasma generated in the plasma generation chamber 110 into the processing space 301. The adapter 200 may have a guide space 201. The guide space 201 may be open at both an upper side and a lower side thereof. The adapter 200 may have an inverted funnel shape. An upper end of the adapter 200 may have a diameter corresponding to that of the plasma generation chamber 110. A lower end of the adapter 200 may have a diameter greater than that of the upper end of the adapter 200.

[53] The process processing unit 300 provides a processing space 301 in which processing of a substrate W is performed. Plasma generated by the plasma generation unit 100 is supplied to the processing space 301 of the process processing unit 300.

[54] The process processing unit 300 may include the processing chamber 310, a support unit 320, an exhaust unit 330, and a baffle assembly 350.

[55] The processing chamber 310 defines the processing space 301 therein. The processing space 301 may be provided with an open upper side. A substrate entrance opening (not illustrated) may be formed in a sidewall of the processing chamber 310. The substrate entrance opening may be opened and closed by a door (not illustrated). An exhaust hole 314 is formed in a bottom surface of the processing chamber 310. The exhaust hole 314 may exhaust process gas and/or by-products in the processing space 301 to the outside of the processing space 301. An exhaust pipe 331 is connected to the exhaust hole 314, and a decompression pump may be installed in the exhaust pipe 331.

[56] The support unit 320 supports the substrate W in the processing space 301. According to one example, the support unit 320 may include a support plate 321 on which the substrate W is placed and a support shaft 322 supporting the support plate 321. The support plate 321 may be provided to secure the substrate W by electrostatic force. Alternatively, the support plate 321 may be provided to secure the substrate W by vacuum pressure. An exhaust baffle 323 may further be provided outside the support plate 321. The exhaust baffle 323 may provide a uniform exhaust flow throughout the entire region in the processing chamber.

[57] The exhaust unit 330 includes the exhaust pipe 331 and a decompression pump. The decompression pump may be installed in the exhaust pipe, and the exhaust pipe 331 is connected to the exhaust hole 314. The exhaust unit 330 exhausts process gas remaining inside the process processing unit 300 and/or reaction by-products generated during substrate processing

and maintains the pressure within the process processing unit 300 at a predetermined pressure.

[58]

[59] The baffle assembly will hereinafter be described in greater detail with reference to FIGS. 3 to 5.

[60] FIG. 3 is an enlarged view of region "A" of FIG. 2. FIG. 4 is a cross-sectional view illustrating a disassembled state of the baffle assembly of FIG. 2. FIG. 5 is a perspective view of a baffle plate viewed from below.

[61] Referring to FIGS. 3 to 5, the baffle assembly 350 is positioned above the support unit 320 so as to face the support unit 320. The baffle assembly 350 may be disposed between the support unit 320 and the plasma generation unit 100. For example, the baffle assembly 350 may be disposed between the processing space 301 and the guide space 201. Alternatively, the baffle assembly 350 may be positioned in the processing space 301 and positioned in the guide space 201. Plasma generated by the plasma generation unit 100 may be introduced into the processing space 301 through the baffle assembly 350.

[62] The baffle assembly 350 may include a baffle plate 351, a fastening member 352, a cover 353, and a sealing member 355.

[63] According to one example, the baffle plate 351 may be coupled to the adapter 200.

[64] The baffle plate 351 includes an injection region 351a and a fastening region 351b.

[65] The injection region 351a may have a plate shape with a predetermined thickness. The injection region 351a may be substantially disk-shaped. A plurality of baffle holes 351e may be formed in the injection region 351a. Each baffle hole 351e is provided as a through-hole extending from an upper surface of the baffle plate 351 to a lower surface thereof. Plasma may flow from the guide space 201 into the processing space 301 through the baffle holes 351e. The baffle holes 351e may have different diameters from one another.

[66] The fastening region 351b is positioned outside the injection region 351a. The fastening region 351b may be provided in a ring shape. The fastening region 351b and the injection region 351a may be arranged at different levels. The fastening region 351b may be positioned higher than the injection region 351a. A fastening hole 351b1 is formed in the fastening region 351b. A threaded hole 201a is formed in the adapter 200 at a position corresponding to the fastening hole 351b1.

[67] The fastening member 352 secures the baffle plate 351 to the adapter 200. According to one example, the fastening member 352 may be a bolt.

[68] The fastening member 352 is inserted through the fastening hole 351b1 of the baffle plate 351 and into the threaded hole 201a of the adapter 200. The fastening member 352 includes a head portion 352a and a threaded portion 352b. The fastening member 352 is inserted into the fastening hole 351b1 of the baffle plate 351 and the threaded hole 201a of the adaptor in an upward direction from below such that the head portion 352a is positioned below the threaded portion 352b. Hereinafter, a region in which the head portion 352a of the fastening member 352 is positioned will be referred to as a fastening space 351b2. For example, in FIG. 3, the fastening space 351b2 may be a region adjacent to both the fastening region 351b of the baffle plate 351 and the injection region 351a of the baffle plate 351.

[69] The cover 353 is provided to surround the fastening space 351b2 such that the fastening member 352 is not exposed to the processing space 301. The cover 353 may have a ring shape.

[70] The cover 353 may include a first region 353a and a second region 353b.

[71] The first region 353a may be provided in a substantially ring shape. The first region 353a may form a side portion of the cover. The first region 353a is positioned to face an outer surface of the fastening region 351b. The first region 353a may be provided in contact with the

outer surface of the fastening region 351b.

[72] The second region 353b may be provided in a substantially ring shape. The second region 353b may form a bottom portion of the cover 353. The second region 353b is positioned to face an edge region of a lower surface of the injection region 351a. The second region 353b may be provided in contact with the lower surface of the injection region 351a.

[73] The cover 353 may be fixed to the baffle plate 351 by a fixing member 354. The fixing member 354 may be a screw. The fixing member 354 may secure the first region 353a to the fastening region 351b. Threaded holes 353d may be formed in a side surface of the fastening region 351b of the baffle plate 351 and in the first region 353a of the cover 353, and the fixing member 354 may be inserted into the corresponding threaded holes 353d formed in the fastening region 351b of the baffle plate 351 and the first region 353a of the cover 353, respectively.

[74] The sealing member 355 may be disposed between the cover 353 and the baffle plate 351. The sealing member 355 may be formed of a resin material, such as Teflon.

[75] The sealing member 355 may be inserted between the second region 353b and the injection region 351a. The sealing member 355 may have a ring shape. A seal groove 353f into which the sealing member 355 is inserted may be formed in an upper surface of the first region 353a of the cover 353. The sealing member 355 may be provided only between the second region 353b and the injection region 351a, and not between the first region 353a and the fastening region 351b.

[76]

[77] FIG. 6 is a diagram illustrating a movement path of particles in FIG. 3.

[78] Referring further to FIG. 6, a gap may be provided between the first region 353a and the fastening region 351b. The gap may function as a discharge passage G1 through which

particles P1 are discharged. When the baffle plate 351 is secured to the adapter 200 through screw engagement with the fastening member 352, particles P1 may be detached from the threads. Due to the cover 353, the particles P1 do not fall into the processing space 301 but remain within the fastening space 351b2. In addition, since the space between the injection region 351a of the baffle plate 351 and the cover 353 is sealed by the sealing member 355, introduction of the particles P1 into a central region of the processing space 301 through the space between the injection region 351a of the baffle plate 351 and the cover 353 is completely blocked. Further, by providing the discharge passage G1 functioning as the gap between the first region 353a and the fastening region 351b, the particles P1 within the fastening space 351b2 may be discharged toward an edge region of the processing space 301. The particles P1 discharged into the edge region of the processing space 301 do not flow toward the central region of the processing space 301 and may instead be exhausted to the outside through the exhaust baffle 323 positioned vertically therebelow.

[79]

[80] Meanwhile, as illustrated in FIG. 7, a substrate processing apparatus according to another exemplary embodiment of the present invention may further include a discharge passage G1 in the baffle assembly 350 through which fine debris and particles P1 are discharged.

[81] The discharge passage G1 is a passage configured to induce fine particles P1 within the fastening space 351b2 to be discharged to the outside of the cover 353. The discharge passage G1 may be provided in the form of a passage extending between the first region 353a and the fastening region 351b. The discharge passage G1 may be positioned at a position higher than the fastening space 351b2. In this case, the sealing member 355 is not provided between the first region 353a and the fastening region 351b so as to permit discharge of the particles P1.

[82] The fine particles P1 within the fastening space 351b2 may be discharged to the

outside of the cover 353 through the discharge passage G1 and may subsequently fall toward the exhaust hole 314 and be discharged. In this case, particles P1 remaining within the fastening space 351b2 are continuously discharged through the discharge passage G1. Accordingly, since most of the particles P1 generated by abrasion of the fastening member 352 are discharged after a certain period of time, process defects on the substrate W may be prevented.

[83] In addition, the baffle assembly 350 of the substrate processing apparatus according to the exemplary embodiment of the present invention may further include a guide body 365.

[84] The guide body 365 may have a cylindrical shape. The guide body 365 may be disposed on an outer side surface of the cover 353 while being arranged so as not to block the discharge passage G1. A lower surface of the guide body 365 may extend to a height lower than a lower surface of the cover 353.

[85] The guide body 365 forms a guide space H1 between the discharge passage G1 and the processing chamber 310, thereby inducing particles P1 discharged from the discharge passage G1 toward the exhaust hole 314. Accordingly, the guide body 365 may facilitate smooth discharge of the particles P1 while preventing the particles P1 from flowing toward the substrate W.

[86]

[87] Furthermore, the substrate processing apparatus according to the present invention may be modified and implemented in various forms as follows.

[88] First, as illustrated in FIG. 8, the discharge passage G1 may be provided in the form of a through-hole penetrating the first region 353a of the cover 353. Further, as illustrated in FIG. 9, the fastening space 351b2 of the baffle plate 351 may be provided in the form of a hole. Further, as illustrated in FIG. 10, the baffle plate 351 may be provided in the form of a flat plate. In this case, the second region 353b of the cover 353 may define the fastening space 351b2 and

may be provided to surround the head portion 352a of the fastening member 352. Further, as illustrated in FIG. 11, the sealing member 355 may be omitted between the baffle plate 351 and the cover 353. Further, as illustrated in FIG. 12, the sealing member 355 may be provided not only between the injection region 351a and the second region 353b, but also between the first region 353a and the fastening region 351b.

[89] As described above, the present invention has been described with specific matters such as specific components and limited exemplary embodiments and drawings, but the present invention is not limited to the above exemplary embodiments, and various modifications and modifications may be made from these descriptions by those of ordinary skill in the field to which the present invention belongs.

[90] Therefore, the spirit of this invention should not be limited to the described exemplary embodiments, and not only the claims described below, but also all those with modifications equal to or equivalent to the claims will fall within the scope of the present invention.

CLAIMS

[Claim 1]

An apparatus for processing a substrate, the apparatus comprising:

- a processing chamber having a processing space therein for processing a substrate;
- a support unit for supporting the substrate in the processing space;
- a plasma generation chamber provided outside the processing chamber and having a discharge space for generating plasma from process gas;
- an adapter connected to the processing chamber and the plasma generation chamber and having a guide space configured to guide the plasma generated in the discharge space to the processing chamber; and
- a baffle assembly disposed in the processing space, the guide space, or between the processing space and the guide space,

wherein the baffle assembly includes:

- a baffle plate having a plurality of baffle holes providing passages for gas flowing between the guide space and the processing space;
- a fastening member configured to fasten the baffle plate to the processing chamber or the adapter; and
- a cover surrounding a fastening space in which the fastening member is positioned so that the fastening member is not exposed to the processing space.

[Claim 2]

The apparatus of claim 1, wherein the fastening member includes a bolt.

[Claim 3]

The apparatus of claim 2, wherein the baffle plate includes:

- an injection region in which the baffle holes -are formed; and

a fastening region positioned outside the injection region and having a fastening hole into which the bolt is inserted, and

the cover includes:

a first region which is in contact with the fastening region; and

a second region which is in contact with the injection region.

[Claim 4]

The apparatus of claim 3, wherein the fastening region and the injection region are provided at different levels such that the fastening region is positioned higher than the injection region.

[Claim 5]

The apparatus of any one of claims 3 and 4, wherein the first region is in contact with an outer surface of the fastening region, and

the second region is in contact with a lower surface of the injection region.

[Claim 6]

The apparatus of any one of claims 3 and 4, wherein the first region is formed in a ring shape, and

the second region is formed in a ring shape.

[Claim 7]

The apparatus of any one of claims 3 and 4, wherein the baffle assembly further includes a sealing member inserted between the second region and the injection region.

[Claim 8]

The apparatus of claim 7, wherein the sealing member is provided only between the second region and the injection region, and not between the first region and the fastening region.

[Claim 9]

The apparatus of any one of claims 3 and 4, wherein the baffle assembly further includes a fixing member configured to secure the cover to the baffle plate.

[Claim 10]

The apparatus of claim 9, wherein the fixing member secures the first region to the fastening region.

[Claim 11]

The apparatus of claim 3, wherein the baffle assembly is provided with a discharge passage configured to discharge particles within the fastening space to an outside of the cover.

[Claim 12]

The apparatus of claim 11, wherein the discharge passage is formed between the first region and the fastening region.

[Claim 13]

The apparatus of claim 11, wherein the baffle assembly further includes a guide body configured to guide particles discharged through the discharge passage to an edge region of the processing space.

[Claim 14]

The apparatus of claim 13, wherein the guide body is coupled to an outer side surface of the second region of the cover and extends downward beyond a lower end of the cover.

[Claim 15]

An apparatus for processing a substrate, the apparatus comprising:
a processing chamber having a processing space therein for processing a substrate;
a support unit for supporting the substrate in the processing space;
a plasma generation chamber provided outside the processing chamber and having a discharge space for generating plasma from process gas;

an adapter connected to the processing chamber and the plasma generation chamber and having a guide space configured to guide the plasma generated in the discharge space to the processing chamber; and

a baffle assembly disposed between the processing space and the guide space,

wherein the baffle assembly includes:

a baffle plate including an injection region in which a plurality of baffle holes are formed, the plurality of baffle holes providing passages for gas flowing between the guide space and the processing space, and a fastening region positioned outwardly of the injection region and having a fastening hole formed therein;

a bolt configured to fasten the baffle plate to the processing chamber or the adapter through the fastening hole;

a cover surrounding a fastening space in which the bolt is positioned; and

a sealing member inserted between the cover and the injection region.

[Claim 16]

The apparatus of claim 15, wherein the fastening region and the injection region are provided at different levels such that the fastening region is positioned higher than the injection region,

the cover includes:

a first region coupled to an outer surface of the fastening region; and

a second region coupled to a lower surface of the injection region, and

the baffle assembly further includes a fixing bolt configured to secure the first region to the fastening region.

[Claim 17]

The apparatus of claim 16, wherein the sealing member is provided only between the

second region and the injection region, and not between the first region and the fastening region, and

a discharge passage configured to discharge particles within the fastening space to an outside of the cover is provided between the first region and the fastening region or in the first region.

[Claim 18]

The apparatus of claim 17, wherein the baffle assembly further includes a guide body configured to guide particles discharged through the discharge passage to an edge region of the processing space, and

the guide body is coupled to an outer side surface of the second region of the cover and extends downward beyond a lower end of the cover.