PROCESS TRAY AND TREATMENT APPARATUS USING THE SAME

BACKGROUND OF THE INVENTION

[0001] The present invention disclosed herein relates to a apparatus for performing a plasma treatment on an object to be treated.

[0002] Since semiconductor apparatuses are very small and very sensitive to external impacts, they are not transferred separately and are contained in a receiving container that is called a tray. The tray has an almost flat rectangular shape and has a plurality of pocket on the top surface thereof where semiconductor products are received. The tray moves to a place of the next process by tray conveying equipment.

[0003] FIG. 1 is a view illustrating a semiconductor chip where a solder ball1 is provided on the top surface of a pad 2. Referring to FIG. 1, before chips are stacked and bonded, an oxide layer and an organic material on the surfaces of the solder ball 1 and the pad 2, which are the cause of bonding yield deterioration, need to be removed. At this pint, when a chip tray loaded with chips passes through a container containing a solvent, it is difficult for the solvent to penetrate between balls 3. Thus, removal effect is reduced.

SUMMARY OF THE INVENTION

[0004] The present invention provides a process tray and a treatment apparatus for efficiently removing an oxide layer and an organic material on a substrate surface.

[0005] Embodiments of the present invention provide apparatuses for treating an object to be treated, the apparatus including: a loader unit carrying a

conveying tray where a plurality of objects to be treated are loaded into a carrying-in unit; a dumping unit picking up the objects to be treated from the conveying tray and performing a dumping to load the picked-up objects into a process tray; a treatment unit performing a treatment on the objects to be treated after the process tray where the objects to be treated are loaded is carried in; and a conveying unit conveying the conveying tray or the process tray between the carrying-in unit, the dumping unit, and the treatment unit, wherein the process tray includes: a lower member formed of a first material; and an upper member formed of a second material and provided to cover a top surface and a side surface of the lower member, wherein the first material is a material including metal and the second material is a material including dielectric.

[0006] In some embodiments, the metal may be aluminum.

[0007] In other embodiments, the dielectric may be provided as an oxide layer of the metal.

[0008] In still other embodiments, the dielectric may be provided as ceramic.

[0009] In even other embodiments, the process tray may include: a plurality of first guides provided on a top surface of the process tray and having a length direction parallel to a first direction; and a plurality of second guides provided on the top surface of the process tray and having a length direction parallel to a second direction vertical to the first direction, wherein the first guides may be arranged in the first direction and the second direction at regular intervals; the second guides may be arranged in the first direction and the second direction at regular intervals; and objects to be treated may be disposed in an area defined by the first guides adjacent to each other and the second guides adjacent to each other.

[0010] In yet other embodiments, the top surface of the process tray may be flat and the first guides and the second guides may be spaced apart from each other.

[0011] In further embodiments, the lower member may have a thickness of about 2 cm and about 10 cm.

[0012] In still further embodiments, the upper member may have a thickness of about 0.05 mm to about 100 mm.

[0013] In other embodiments of the present invention, provided are process trays where objects to be treated are loaded. The process trays include: a lower member formed of a first material; and an upper member formed of a second material and provided to cover a top surface and a side surface of the lower member, wherein the first material is formed of a material including metal; and the second material is formed of a material including dielectric.

[0014] In some embodiments, the metal may be provided as aluminum.

[0015] In other embodiments, the dielectric may be provided as an oxide layer of the metal.

[0016] In still other embodiments, the dielectric may be provided as ceramic.

[0017] In even other embodiments, the process trays may include: a plurality of first guides provided on a top surface of the process tray and having a length direction parallel to a first direction; and a plurality of second guides provided on the top surface of the process tray and having a length direction parallel to a second direction vertical to the first direction, wherein the first guides may be arranged in the first direction and the second direction at regular intervals; the second guides may be arranged in the first direction and the second direction at regular

intervals; and objects to be treated may be disposed in an area defined by the first guides adjacent to each other and the second guides adjacent to each other.

[0018] In yet other embodiments, the top surface of the process tray may be flat and the first guides and the second guides may be spaced apart from each other.

[0019] In further embodiments, the lower member may have a thickness of about 2 cm and about 10 cm.

[0020] In still further embodiments, the upper member may have a thickness of about 0.05 mm to about 100 mm.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The accompanying drawings are included to provide a further understanding of the present invention, and are incorporated in and constitute a part of this specification. The drawings illustrate exemplary embodiments of the present invention and, together with the description, serve to explain principles of the present invention. In the drawings:

[0022] FIG. 1 is a view illustrating a semiconductor chip where a solder ball is provided on the top surface of a pad;

[0023] FIG. 2 is a plan view illustrating a treatment apparatus according to an embodiment of the present invention;

[0024] FIG. 3 is a sectional view illustrating a conveying tray conveyed by a loader unit of FIG. 2;

[0025] FIG. 4 is a perspective view illustrating a process tray of FIG. 2;

[0026] FIG. 5 is a sectional view illustrating a portion of the process tray of FIG. 4;

[0027] FIG. 6 is a plan view illustrating a portion of the top surface of a process tray of FIG. 4;

[0028] FIG. 7 is a perspective view illustrating a dumping unit of FIG. 2;

[0029] FIG. 8 is a sectional view illustrating a treatment unit of FIG. 2;

[0030] FIG. 9 is a perspective view illustrating a reverse unit of FIG. 2; and

[0031] FIG. 10 is a plan view illustrating a carrying-out unit of FIG. 2.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0032] Hereinafter, various embodiments of the present invention will be described with reference to the accompanying drawings. However, embodiments of the present invention may be modified in various forms, and the scope of the present invention is not limited to the following embodiments. These embodiments are provided so that the present invention will be further completely described to those skilled in the art. Accordingly, the forms of elements in the drawings are exaggerated for clarity of description.

[0033] Hereinafter, a treatment apparatus 10 according to an embodiment of the present invention will be described.

[0034] FIG. 2 is a plan view illustrating a treatment apparatus according to an embodiment of the present invention. Referring to FIG. 2, the treatment apparatus 10 includes a loader unit 1000, a dumping unit 200, a treatment unit 3000, a conveying unit 4000, a reverse unit 5000, a standby unit 6100, a carrying-in unit 6200, a carrying-out unit 6400, a radio frequency identifier 8100, and a radio frequency identification reader 8200. The dumping unit 200, the carrying-out unit 6400, the reverse unit 5000, and the carrying-in unit 6200 are sequentially disposed along one direction. A direction in which the dumping unit 200, the carrying-out

unit 6400, the reverse unit 5000, and the carrying-in unit 6200 are arranged is referred to as a first direction 1 and a direction vertical to the first direction (when seen from the top) is referred to as a second direction 2. The dumping unit 2000 and the treatment unit 3000 are disposed along the second direction 2.

[0035] The loader unit 1000 carries a conveying tray 7200, where a plurality of objects 20 to be treated are loaded, into the carrying-in unit 6200. The loader unit 7200 moves along a rail provided on the treatment apparatus 10 with its length direction parallel to the first direction 1 to convey the conveying tray 7200 or to move a cover member on the conveying tray 7200. The loader unit 1000 includes a main loader 1100, a sub loader 1200, and a push member 1300.

[0036] FIG. 3 is a sectional view illustrating the conveying tray 7200 conveyed by the loader unit 1000 of FIG. 2. Referring to FIG. 3, a plurality of conveying trays 7200 are stacked vertically and conveyed by the loader unit 100.

[0037] The top of the conveying tray 7200 is covered by a cover member 7230. The cover member 7230 protects objects 20 to be treated on the uppermost conveying tray 7200 from external impacts.

[0038] The radio frequency identifier (for example, RFID) 8100 may be provided between the conveying tray 7200 and the cover member 7230.

[0039] Referring to FIG. 2 again, the main loader 1100 picks up the conveying tray 7200 from an entrance 6600 and carries the conveying tray 7200 into the standby unit 6100. Additionally, the main loader 1100 carries the conveying tray 7200 from the carrying-out unit 6400 to the entrance 6600.

[0040] The sub loader 1200 picks up the cover member 7230 on the top of the conveying tray 7200 to be carried in and then positions the cover member 7230 at one side 6500 of the standby unit 6100. Additionally, the sub loader 1200 picks up

the cover member 7230 at one side 6500 of the standby unit 6100 and then covers the top of the conveying tray 7200 carried from the carrying-out unit 6400 with the cover member 7230.

[0041] The push member 1300 pushes the conveying tray 7200 without the cover member 7230 from the standby unit 6100 toward the carrying-in unit 6200. When a plurality of stacked conveying trays 7200 are provided to the standby unit 6100, the push member 1300 sequentially pushes the conveying trays 7200 in order from the lowest one toward the carrying-in unit 6200.

[0042] The dumping unit 2000 picks up the objects 20 to be treated from the conveying tray 7200 and performs dumping to load them into the process tray 7100. Additionally, the dumping unit 2000 picks up the objects 20 to be treated, which are treated completely by the treatment unit 3000, from the process tray 7100 and performs dumping to load them into the conveying tray 7200. The dumping unit 200 includes a first dumping support 2100, a second dumping support 2200, and a dumping member 2300.

[0043] The objects 200 to be treated are arranged in a matrix on the process tray 7100. The process tray 7100 is carried in or carried-out from the treatment unit 300, while a plurality of objects 20 to be treated are disposed on the process tray 7100. The process tray 7100 is formed of a strong heat resistance material. According to the treatment apparatus 10 of the present invention, a plurality of objects 20 to be treated are loaded into the process tray 7100 formed of a strong heat resistance material and then are treated in the treatment unit 300. Thus, compared to a typical treatment apparatus, a large amount of objects 20 are treated at the same time. FIG. 4 is a perspective view illustrating the process tray 7100 of FIG. 2. FIG. 5 is a sectional view illustrating a portion of the process tray 7100 of FIG. 4.

FIG. 6 is a plan view illustrating a portion of a top surface of the process tray 7100 of FIG. 4. Referring to FIGS. 4 to 6, the process tray 7100 is provided in a rectangular plate form. The process tray 7100 includes a lower member 7110, an upper member 7129, a first guide 7130, and a second guide 7140.

[0044] The lower member 7110 is formed of a first material. The first material is a material including metal. For example, the first material is a material including aluminum (AI). Accordingly, when disposed on the support unit 3200 formed of metallic material, the lower member 7110 serves as an electrode. The lower member 7110 may have a thickness of about 2 cm to about 10 cm.

[0045] The upper member 7120 is formed of a second material. The second material is a material including dielectric. For example, the second material may be provided as an oxide layer obtained by oxidizing the surface of a first metallic material. Or, the second material may be provided as a material including ceramic. The upper member 7120 is provided to cover the top surface and the side surface of the lower member 7110. By providing the upper member 7120 as a dielectric material, arching occurring at the metallic surface is prevented. Additionally, the upper member 7120 provided as a dielectric material may uniformly distribute an electric field delivered from the lower member 7110 to the process tray 7100. The upper member 7120 may have a thickness of about 0.05 mm to about 100mm.

[0046] As mentioned above, the lower member 7110 is formed of metallic material. The upper member 7120 is formed of dielectric material. Compared to the case that the entire process tray 7100 is formed of a dielectric material that is expensive and difficult to be treated, the process tray 7100 that is inexpensive and easy to be treated may be manufactured.

[0047] The first guide 7130 is provided in a bar shape. The first guide 7130 is provided in plurality on the top surface of the process tray 7100. The first guide 7130 is provided with its length direction parallel to the second direction 11. The first direction 11 may be the length direction of the process tray 7100. The first guides 7130 are arranged in the first direction 11 and the second direction 12 at predetermined intervals.

[0048] The second guide 7140 is provided in a bar shape. The second guide 7140 is provided in plurality on the top surface of the process tray 7100. The second guide7140 is provided with its length direction parallel to the second direction 12 vertical to the first direction 12. The second guides 7140 are arranged in the first direction 11 and the second direction 12 at predetermined intervals.

[0049] The objects 20 to be treated are disposed on an area defined by the first guides 7130 adjacent to each other and the second guides 7140 adjacent to each other. The bottoms of the first guide 7130 and the second guide 7140 are connected to the lower member 7110 and the insides thereof are formed of the same material as the lower member 7110 and the top and side surfaces thereof are covered with the same material as the upper member 7120. Accordingly, the insides serve as an electrode and the outers serve to uniformly distribute electric field, thereby enhancing an electric field around the side surfaces of objects to be treated. However, if an area that the first guide 7130 and the second guide 7140 occupy is too broad, plasma is generated excessively in an area where the first guide 7130 and the second guide 7140 are provided instead of objects to be treated. Therefore, treatment efficiency may be reduced.

[0050] The top surface of the process tray 7100 is provided flat. The first guide 7130 and the second guide 7140 are provided spaced apart from each other.

Accordingly, an area 7160 where the first guide 7130 and the second guide 7140 are not provided increases relatively, thereby improving the above issue.

[0051] The conveying tray 7200 has a similar structure to the process tray 7100. A plurality of objects 20 to be treated may be disposed on the top of the conveying tray 7200. The conveying tray 7200 supports a plurality of objects 20 to be treated when conveying the plurality of objects 20 to be treated between units of the treatment apparatus 10, excluding the treatment unit 3000. The conveying tray 7200 and the process tray 7100 are formed of different materials. The conveying tray 7200 is formed of a single material. The conveying tray 7200 may be formed of a weaker heat resistance material than the process tray 7100. For example, the conveying tray 7200 is formed of plastic material.

[0052] FIG. 7 is a perspective view illustrating the dumping unit 2000 of FIG. 2. Referring to FIG. 7, the conveying tray 7200 is disposed on the first dumping support 2100. The process tray 7100 is disposed on the second dumping support 2200. The dumping member 7300 transfers the objects 20 to be treated between the conveying tray 7200 and the process tray 7100. For example, the dumping member 7300 moves in parallel to the first direction 1 and transfers the objects 20 to be treated. Simultaneously, along the second direction 2 by a predetermined interval, the conveying tray 7200 on the first dumping support 2100 moves from a first position 2110 to a second position 2120 and the process tray 7100 on the second dumping support 2200 moves from a third position 2210 to a fourth position 2220. Thereby, a portion where the objects 20 to be treated are disposed and a portion where the objects 20 to be treated are to be disposed are positioned at a place where the dumping member 7300 transfers the objects 20 to be treated.

[0053] Referring to FIG. 2 again, the treatment apparatus 10 may further include a standby part 6300. When the objects 20 to be treated in the conveying tray 7200 are sequentially dumped in the process tray 7100 by each conveying tray 7200, the first dumped conveying tray 7200 may stand by in the standby part 6300 until the dumping of a later conveying tray 7200 is completed. For example, when two conveying trays 7200 are dumped sequentially, while the objects 20 are treated in the treatment unit 3000, the later dumped conveying tray 7200 stands by on the first dumping support 2100 and the first dumped conveying tray 7200 stands by in the standby part 6300 until the dumping of the later conveying tray 7200 is completed. After the treatment is completed in the treatment unit 3000, the objects 20 to be treated are dumped from the process tray 7100 to the two conveying trays 7200 in the reverse order of dumping the objects 20 to the process tray 7100. The conveyance of the conveying tray 7200 between the first dumping support 2100 and the standby part 6300 may be performed by the second conveying unit 4200. Accordingly, the objects 20 to be treated in the two conveying trays 7200 may be dumped and treated in the treatment unit 3000 simultaneously.

[0054] FIG. 8 is a sectional view illustrating the treatment unit 3000 of FIG. 2. Referring to FIG. 8, the process tray 7100 having loaded objects 20 to be treated are carried in the treatment unit 3000 and then a treatment is performed on the objects 20 to be treated. The treatment unit 3000 may be a plasma treatment unit of a capacitively coupled plasma reactive-ion etching method.

[0055] The treatment unit 3000 includes a process chamber 3100, a support unit 3200, a shower head 3300, a gas supply unit 3400, and a radio frequency (RF) power 3500.

[0056] The process chamber 3100 provides a space where a process treatment is performed. The process chamber 3100 has a space therein. An opening (not shown) through which the process tray 7100 having a plurality of objects 20 to be treated enters or leaves may be formed at the top of the sidewall of the process chamber 3100 and may be opened/closed by a opening/closing member such as a slit door (not shown). The opening/closing member closes the opening while the objects 20 are treated in the process chamber 3100 and opens the opening while the process tray 7100 is carried in the process chamber 3100 and carried out to the outside of the process chamber 3100.

[0057] A discharge hole 3100 is formed at the bottom wall of the process chamber 3100. The discharge hole 3111 is connected to a discharge line 3112. The internal pressure of the process chamber 3100 is adjusted and by-products generated from a process are discharged to the outside of the process changer 3100 through the discharge line 3112.

[0058] The support unit 3200 is disposed inside the process chamber 3100. The process tray 7100 having the objects 20 to be treated are disposed on the top surface of the support unit 3200. A cooling channel (not shown) where cooling fluid circulates may be formed inside the support unit 3200. The cooling fluid circulates along the cooling channel and cools the support unit 3200 and the process tray 7100. Power may be applied from a power supply 3210 to the support unit 3200 so as to generate plasma from process gas. The support unit 3200 is formed of metallic material. Accordingly, the support unit 3200 serves as an electrode. The power that the power supply 3210 applies may be radio frequency (RF) power. The support unit 3200 forms sheaths by a power that the power supply 3210 supplies and forms high density plasma in the area where the sheaths are formed.

[0059] The shower head 3300 is coupled with the top wall of the process chamber 3100. The shower head 3300 may have a disc form and may be disposed in parallel to the top surface of the support unit 3200. The surface of the shower head 3300 may be formed of oxidized aluminum. Distribution holes 3310 are formed at the shower head 3300. The distribution holes 3310 may be formed at predetermined intervals on the concentric circumference in order to supply uniform process gas.

[0060] A plasma supplied from the gas supply unit 3400 flows into the distribution holes 3310. The shower head 3300 is grounded. The shower head 3300 may be grounded indirectly through the process chamber 3100.

[0061] The gas supply unit 3400 supplies process gas to the inside of the process chamber 3100. The plasma supply unit 3400 may be disposed at the top of the process chamber 3100. The plasma supply unit 3400 includes a storage container 3410, a supply pipe 3420, and a valve 3430. The storage container 3410 stores process gas. The supply pipe 3420 connects a gas injection hole 3120 formed on the top of the process chamber 3100 and the storage container 3410. Process gas is delivered from the storage container 3410 to the gas injection hole 3120 through the supply pile 3420. The process gas is supplied from the gas injection hole 3120 to the process chamber 3100.

[0062] Referring to FIG. 2 again, the conveying unit 4000 conveys the conveying tray 7200 or the process tray 7100 between the carrying-in unit 6200, the dumping unit 2000, and the treatment unit 3000. The conveying unit 4000 includes a first conveying unit 4100, a second conveying unit 4200, and a third conveying unit 4300.

[0063] The first conveying unit 4100 moves along a rail provided on the treatment apparatus 10 with its length direction parallel to the first direction 1 and conveys the conveying tray 7200. When objects 20 to be treated need to be reversed in the reverse unit 5000, the first conveying unit 4100 conveys the conveying tray 7200 between the carrying-in unit 6200 and the reverse unit 5000, between the reverse unit 5000 and the dumping unit 2000, or between the reverse unit 5000 and the carrying-out unit 6400. When objects 20 to be treated do not need to be reversed in the reverse unit 5000, the first conveying unit 4100 conveys the conveying tray 7200 between the carrying-in unit 6200 and the dumping unit 2000 or between the dumping unit 2000 and the carrying-out unit 6400.

[0064] The second conveying unit 4200 moves along a rail provided on the treatment apparatus 10 with its length direction parallel to the first direction 1 and conveys the conveying tray 7200. The second conveying unit 4200 and the first conveying unit 4100 are disposed sequentially along the second direction 2. The second conveying unit 4200 conveys the conveying tray 7200 between the dumping unit 2000 and the standby part 6300 or between the dumping unit 2000 and the carrying-out unit 6400. For example, the conveying tray 7200 where the objects 20 are treated completed in the treatment unit 3000 and are loaded completely may be conveyed to the carrying-out unit 6400 disposed outside the dumping unit 2000. Additionally, the second conveying unit 6400 may convey the conveying tray 7200, where dumping is completed to the process tray 7100 in the dumping unit 2000, to the standby part 6300 at the outside of the dumping unit 2000.

[0065] The third conveying unit 4300 moves along a rail provided on the treatment apparatus 10 with its length direction parallel to the second direction 2 and

conveys the process tray 7100. The third conveying unit 4300 conveys the process tray 7100 between the dumping unit 2000 and the treatment unit 3000.

[0066] FIG. 9 is a perspective view illustrating the reverse unit 5000 of FIG. 2. Referring to FIGS. 2 and 9, the reverse unit 5000 reverses the objects 20 to be treated upside down. The reverse unit 5000 includes a reverse support 5100, a buffer support 5200, and a driving member 5300.

[0067] The conveying tray 7200 includes a first conveying tray 7210 and a second conveying tray 7220.

[0068] The conveying tray 7200 includes the first conveying tray 7210 that has the objects 20 to be treated before treatment from the treatment unit 3000 and is conveyed into the treatment apparatus 10 and the second conveying tray 7220 that is provided in an empty state without the objects 20 to be treated.

[0069] The conveyed first conveying tray 7210 is disposed on the reverse support 5100. The empty second conveying tray 7220 is disposed on the buffer support 5200. The second conveying tray 7220 is picked up by the first conveying unit 4100 and then is disposed on the first conveying tray 7210 to allow the surface receiving the objects 20 to be treated to face the first conveying tray 7210.

[0070] The reverse driving member 5300 rotates the first conveying tray 7210 and the second conveying tray 7220 on the first conveying tray 7210 by 180 degrees at the same time to allow the objects 20 to be treated to transfer from the first conveying tray 7210 to the second conveying tray 7220 and to be loaded. According to an embodiment of the present invention, the reverse driving member 5300 includes a driver 5310, a driving axis 5320, and a fixing member 5330. The driver 5310 generates a driving power for reversing the first conveying tray 7210 and the second conveying tray 7220. The driving axis 5320 delivers the driving power

generated by the driver 5310 to the fixing member 5330. The fixing member 5330 fixes the first conveying tray 7210 and the second conveying tray 7220 mutually and rotates the first conveying tray 7210 and the second conveying tray 7220 by 180 degrees by using the driving power delivered from the driving axis 5320. Unlike this, the reverse unit 5000 may reverse the objects 20 to be treated upside down through various methods.

[0071] FIG. 10 is a plan view illustrating the carrying-out unit 6400 of FIG. 2. Referring to FIGS. 2 and 10, the carrying-out unit 6400 carries the conveying tray 7200, where the objects 20 are completely treated in the treatment unit 3000 and are loaded, to the outside of a apparatus. The carrying-out unit 6400 is provided with its length direction parallel to the second direction 2. The carrying-out unit 6400 moves the conveying tray 7200 along the second direction 2. Accordingly, the carrying-out unit 6400 conveys the conveying tray 7200 between a position at which the first conveying unit 4100 picks up the conveying tray 7200, a position at which the second conveying unit 4200 picks up the conveying tray 7200, and a position at which the loader unit 1000 picks up the conveying tray 7200. For example, the conveying tray 7200 conveyed from the dumping unit 2000 to the carrying-out unit 6400 by the first conveying unit 4100 or the second conveying unit 4200 moves to the position at which the loader unit 1000 picks up the conveying tray 7200 by the carrying-out unit 6400 in parallel to the second direction 2. Then, the conveying tray 7200 is carried to the outside of a apparatus by the loader unit 1000.

[0072] The process tray 7100 includes a first process tray 7110 and a second process tray 7120. The first process tray 7110 is the process tray 7100 where the objects 20 that does not require reversal in the reverse unit 5000 are loaded.

The second process tray 7120 is the process tray 7100 where the objects 20 that do not require reversal in the reverse unit 5000 are loaded.

[0073] Referring to FIGS. 2 and 3 again, the radio frequency identifier 8100 indicates whether the reverse of the objects 20 disposed on the first conveying tray 7210 is required in the reverse unit 5000. The radio frequency identifier 8100 is detachable from the first conveying tray 7210. For example, the radio frequency identifier 8100 is attached to the bottom of the cover member 7230 and is picked up together with the cover member 7230 by the sub loader 1200 before being carried into the carrying-in unit 6200 and then is positioned at one side 6500 of the standby unit 6100.

[0074] The radio frequency identification reader 8200 is provided at the entrance 6600 and reads the radio frequency identifier 8100 attached to the first conveying tray 7210 before it is carried into the standby unit 6100. The radio frequency identification reader 8200 determines whether to provide the first process tray 7110 or the second process tray 7210 to the second dumping support 2200 and whether to provide the first conveying tray 7210 to the reverse unit 5000, according to the reading result. When the type of the process tray 7100 is determined, according to the result, the first process tray 7110 or the second process tray 7120 are disposed on the second dumping support 2200 from the outside by a process tray conveying unit (not shown).

[0075] According to an embodiment of the present invention, a process tray and a treatment apparatus efficiently remove an oxide layer and an organic material on a substrate surface.

[0076] The above-disclosed subject matter is to be considered illustrative, and not restrictive, and the appended claims are intended to cover all such

modifications, enhancements, and other embodiments, which fall within the true spirit and scope of the present invention. Thus, to the maximum extent allowed by law, the scope of the present invention is to be determined by the broadest permissible interpretation of the following claims and their equivalents, and shall not be restricted or limited by the foregoing detailed description.

WHAT IS CLAIMED IS:

1. A apparatus for treating an object to be treated, the apparatus comprising:

a loader unit carrying a conveying tray where a plurality of objects to be treated are loaded into a carrying-in unit;

a dumping unit picking up the objects to be treated from the conveying tray and performing a dumping to load the picked-up objects into a process tray;

a treatment unit performing a treatment on the objects to be treated after the process tray where the objects to be treated are loaded is carried in; and

a conveying unit conveying the conveying tray or the process tray between the carrying-in unit, the dumping unit, and the treatment unit,

wherein the process tray comprises:

a lower member formed of a first material; and

an upper member formed of a second material and provided to cover a top surface and a side surface of the lower member,

wherein the first material is a material including metal and the second material is a material including dielectric.

2. The apparatus of claim 1, wherein the metal is aluminum.

3. The apparatus of claim 1, wherein the dielectric is provided as an oxide layer of the metal.

4. The apparatus of claim 1, where the dielectric is provided as ceramic.

5. The apparatus of any one of claims 1 to 4, wherein the process tray comprises:

a plurality of first guides provided on a top surface of the process tray and having a length direction parallel to a first direction; and

a plurality of second guides provided on the top surface of the process tray and having a length direction parallel to a second direction vertical to the first direction,

wherein

the first guides are arranged in the first direction and the second direction at regular intervals;

the second guides are arranged in the first direction and the second direction at regular intervals; and

objects to be treated are disposed in an area defined by the first guides adjacent to each other and the second guides adjacent to each other.

6. The apparatus of claim 5, wherein the top surface of the process tray is flat and the first guides and the second guides are spaced apart from each other.

7. The apparatus of any one of claims 1 to 4, wherein the lower member has a thickness of about 2 cm and about 10 cm.

8. The apparatus of any one of claims 1 to 4, wherein the upper member has a thickness of about 0.05 mm to about 100 mm.

9. A process tray where objects to be treated are loaded, the process tray comprising:

a lower member formed of a first material; and

an upper member formed of a second material and provided to cover a top surface and a side surface of the lower member,

wherein

the first material is formed of a material including metal; and

the second material is formed of a material including dielectric.

10. The process tray of claim 9, wherein the metal is provided as aluminum.

11. The process tray of claim 9, wherein the dielectric is provided as an oxide layer of the metal.

12. The process tray of claim 9, wherein the dielectric is provided as ceramic.

13. The process tray of any one of claims 9 to 12, wherein the process tray comprises:

a plurality of first guides provided on a top surface of the process tray and having a length direction parallel to a first direction; and

a plurality of second guides provided on the top surface of the process tray and having a length direction parallel to a second direction vertical to the first direction,

wherein

the first guides are arranged in the first direction and the second direction at regular intervals;

the second guides are arranged in the first direction and the second direction at regular intervals; and

objects to be treated are disposed in an area defined by the first guides adjacent to each other and the second guides adjacent to each other.

14. The process try of claim 13, wherein the top surface of the process tray is flat and the first guides and the second guides are spaced apart from each other.

15. The process tray of any one of claims 9 to 12, wherein the lower member has a thickness of about 2 cm and about 10 cm.

16. The process tray of any one of claims 9 to 12, wherein the upper member has a thickness of about 0.05 mm to about 100 mm.