

METAL CARRIER AND WAFER SUPPORTING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to carriers and supporting devices for supporting wafers and more particularly, to a metal carrier and a wafer supporting device including the metal carrier.

2. Description of the Related Art

With the advancement of semiconductor technology, wafers are developed thinner and thinner in thickness. Referring to FIG. 1, in a test process for chips of a thin wafer, the wafer 10 is disposed on a carrier 11, the carrier 11 carrying the wafer 10 is placed onto a supporting chuck 12 of a tester, and then the chips on the wafer 10 can be tested by the tester. For preventing the thin wafer from having a warp on the outer edge thereof, the carrier 11 is provided with a plurality of through holes 13. When the carrier 11 is disposed on the supporting chuck 12, the through holes 13 communicate with a chamber 14 of the supporting chuck 12, and the chamber 14 communicates with a vacuum source (not shown). The chamber 14 and the through holes 13 are provided with negative pressure by the vacuum source, thereby generating a suction force to hold the wafer 10 on the carrier 11, so that the wafer 10 is disposed on the carrier 11 evenly.

For some specific chips, such as vertical-cavity surface-emitting laser array chips, also referred to as 'VCSEL array chips' hereinafter, the light emitting portions and positive electrodes thereof are located on the top surface 15 of the wafer 10, and the bottom surface 16 of the wafer 10 is a ground plane. Therefore, the bottom surface 16 of the wafer 10 under test should be grounded through the carrier 11 and the supporting chuck 12 when the optical and electrical tests are performed to the chips on the wafer 10. However, the base material of the conventional carrier 11 is primarily polymer material, such as epoxy resin. Although the conventional carrier 11 of polymer material is strong enough to support the wafer 10 and capable of being provided with the

through holes 13 by drilling to attain the aforementioned effect of holding the wafer 10, the polymer material cannot conduct electricity, thereby unable to meet the aforementioned test requirement of grounding. Besides, if a high-temperature or low-temperature test should be performed to the chip under test, the thermal conductivity of the carrier 11 is an important factor affecting the test efficiency. However, the polymer material has a low thermal conductivity, resulting in low heat transfer rate, so that the conventional carrier 11 cannot meet the test requirement of fast transferring and dissipating heat.

In another aspect, the roughness values of the contact surfaces between the wafer 10, the carrier 11 and the supporting chuck 12 affect the thermal resistance thereof. The larger the surface roughness value is, the larger the thermal resistance is. Besides, the larger roughness values the contact surfaces between the wafer 10, the carrier 11 and the supporting chuck 12 have, the smaller contact areas they have. According to Ohm's Law, it can be known from the equations of $V=IR$ and $R=\rho L/A$ that the smaller the contact area A is, the larger the electric resistance R is, and the lower the electrical conductivity is. From this, it can be known that the larger the surface roughness value is, the larger the electric resistance and the thermal resistance are. Therefore, the roughness values of the contact surfaces between the wafer 10, the carrier 11 and the supporting chuck 12 will be the key to the electrical test results and efficiency.

Referring to FIG. 2, the top surface of the conventional supporting chuck 12 may be plated with a layer of metal film 17 having relatively higher electric conductivity and thermal conductivity. The carrier 11 carrying the wafer 10 is placed on the metal film 17. Alternatively, in the condition without the requirement of the vacuum suction effect, the wafer 10 may be not disposed on the carrier 11, but directly placed onto the metal film 17 of the supporting chuck 12. However, the metal film 17 will be worn gradually after contacting the carrier 11 or the wafer 10 for many times. Therefore, the surface roughness values of the contact surfaces between the metal film 17 and the carrier 11 or wafer 10 will gradually increase, so that the electric conductivity and thermal conductivity of the metal film 17 will gradually decrease, thereby affecting the electrical

test results of the chips on the wafer 10 and the heating or cooling efficiency in the test. Therefore, when the metal film 17 is worn to a certain extent, the whole supporting chuck 12 must be removed from the tester for replacement. This is not only costly, but also consumes much time for removing the supporting chuck 12, installing another supporting chuck 12, and then adjusting and calibrating the latter supporting chuck 12 before continuing the test, thereby seriously affecting the efficiency of the test.

SUMMARY OF THE INVENTION

The present invention has been accomplished in view of the above-noted circumstances. It is a primary objective of the present invention to provide a metal carrier and a wafer supporting device, which can hold a wafer by vacuum suction and have the advantages of high electric conductivity, high heat transfer rate and low surface roughness values.

To attain the above objective, the present invention provides a metal carrier, which has a top surface and a bottom surface opposite to the top surface, for being disposed on a supporting chuck in a way that the bottom surface faces toward the supporting chuck and a wafer is disposed on the top surface. The metal carrier includes a metal plate, which may be made of stainless steel, molybdenum copper alloy, and so on, a metal layer, which may be made of gold, and so on, and a plurality of vacuum suction holes. The metal plate has a top surface and a bottom surface opposite to the top surface. The metal layer includes a top section covering the top surface of the metal plate to form the top surface of the metal carrier, and a bottom section covering the bottom surface of the metal plate to form the bottom surface of the metal carrier. The arithmetical mean roughness values of the top and bottom surfaces of the metal carrier are larger than or equal to 0.01 micrometers and smaller than or equal to 0.4 micrometers. Each of the vacuum suction holes penetrates through the top surface and bottom surface of the metal plate and the top section and bottom section of the metal layer for communicating with a vacuum source for generating a vacuum suction to the wafer.

As a result, the metal carrier can be provided with the vacuum suction holes by drilling

for generating the vacuum suction effect to the wafer, and the materials thereof are all metal, so the metal carrier has high thermal conductivity and electric conductivity. Besides, the top surface and bottom surface of the metal carrier can be processed by grinding or polishing to have low surface roughness. Therefore, using the metal carrier in testing the chips of the wafer can raise the test efficiency and accuracy.

To attain the above objective, the present invention provides a wafer supporting device which includes a supporting chuck and at least one carrier. The supporting chuck has a chamber for communicating with a vacuum source. The at least one carrier is disposed on a top surface of the supporting chuck for a wafer to be disposed on a said carrier directly. In the at least one carrier, at least one aforementioned metal carrier is included, and the vacuum suction holes of the metal carrier communicate with the chamber of the supporting chuck.

Further speaking, the aforementioned at least one carrier may include only a moving carrier for supporting the wafer directly, so that the wafer going to be tested is placed on the supporting chuck along with the moving carrier. Alternatively, the aforementioned at least one carrier may include only a fixed carrier detachably and replaceably fixed on the top surface of the supporting chuck for the wafer going to be tested to be placed on the fixed carrier directly. Alternatively, the aforementioned at least one carrier may include the aforementioned moving carrier and fixed carrier for the wafer going to be tested to be indirectly placed on the fixed carrier along with the moving carrier. In the condition that the wafer supporting device includes only one carrier, which may be the moving carrier or the fixed carrier, the carrier is the aforementioned metal carrier for bringing high electric conductivity and thermal conductivity and low surface roughness values. In the condition that the wafer supporting device includes the moving carrier and the fixed carrier, the fixed carrier is the aforementioned metal carrier for bringing high electric conductivity and thermal conductivity and low surface roughness values, and the moving carrier may be the conventional carrier, or may be the aforementioned metal carrier for bringing higher electric conductivity and thermal conductivity and lower surface roughness values. Besides, in the

condition including the aforementioned fixed carrier, when the top surface of the fixed carrier is worn to a certain extent because of the contact with the moving carrier or the wafer, the user can remove the fixed carrier, install a new fixed carrier and then continue to perform the test. In this way, it can maintain high test efficiency and accuracy, consumes low cost and not much time for the replacement of the fixed carrier, and doesn't consume time for adjusting and calibrating the supporting chuck.

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given herein below and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a schematic sectional view of a conventional wafer supporting device;

FIG. 2 is a schematic sectional view of another conventional wafer supporting device;

FIG. 3 is a schematic sectional view of a metal carrier according to a first preferred embodiment of the present invention;

FIG. 4 is a schematic sectional view of a wafer supporting device according to the first preferred embodiment of the present invention;

FIG. 5 is a schematic sectional view of a wafer supporting device according to a second preferred embodiment of the present invention;

FIG. 6 is a schematic sectional view of a wafer supporting device according to a third preferred embodiment of the present invention; and

FIG. 7 is a schematic sectional view of a wafer supporting device according to a fourth

preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

First of all, it is to be mentioned that same or similar reference numerals used in the following embodiments and the appendix drawings designate same or similar elements or the structural features thereof throughout the specification for the purpose of concise illustration of the present invention. It should be noticed that for the convenience of illustration, the components and the structure shown in the figures are not drawn according to the real scale and amount, and the features mentioned in each embodiment can be applied in the other embodiments if the application is possible in practice. Besides, when it is mentioned that an element is disposed on another element, it means that the former element is directly disposed on the latter element, or the former element is indirectly disposed on the latter element through one or more other elements between aforesaid former and latter elements. When it is mentioned that an element is directly disposed on another element, it means that no other element is disposed between aforesaid former and latter elements.

Referring to FIGS. 3 and 4, a wafer supporting device 21 according to a first preferred embodiment of the present invention includes a supporting chuck 30, and a moving carrier 40A. The wafer supporting device 21 is a part of a wafer testing equipment. Specifically speaking, the aforementioned wafer testing equipment is adapted for testing a large number of tiny chips included in a wafer 10, such as VCSEL array chips, and the wafer has not been diced into the chips yet. For the simplification of the figures and the convenience of illustration, in the figures of the present invention, the wafer 10 is schematically drawn but the chips are not drawn.

The supporting chuck 30 is located on a tester (not shown). The moving carrier 40A is adapted to support the wafer 10 directly and moved by a pick-and-place device (not shown) to be placed onto the supporting chuck 30 in the status of carrying the wafer 10, so that the chips of the wafer 10 can be tested by the tester. The supporting chuck 30 has a top surface 31, a bottom surface 32, a recess 33 recessed from the top surface 31, and a through hole 34 penetrating through the

inner bottom of the recess 33 and the bottom surface 32. The recess 33 is formed therein with a chamber 35 communicating with the through hole 34. The chamber 35 communicates with a vacuum source (not shown) through the through hole 34.

The moving carrier 40A is a specially configured metal carrier provided by the present invention, which includes a metal plate 41, a metal layer 42 covering the metal plate 41, and a plurality of vacuum suction holes 45 penetrating through top and bottom surfaces 43 and 44 of the moving carrier 40A. The metal plate 41 may be made of any metal material, such as stainless steel which has high thermal conductivity, or molybdenum copper alloy which has high electric conductivity, but unlimited thereto. The metal plate 41 may be made of the material having even higher thermal conductivity or electric conductivity and having high rigidity even when it is thin in thickness. The metal layer 42 may be made of any metal material as well, and preferably made of gold which has high electric conductivity. The metal layer 42 is formed on all surfaces of the metal plate 41 by electroplating, primarily for covering the top and bottom surfaces 411 and 412 of the metal plate 41 so as to enhance the electric conductivity of the moving carrier 40A. Specifically speaking, the metal layer 42 includes a top section 421 covering the top surface 411 of the metal plate 41, a bottom section 422 covering the bottom surface 412 of the metal plate 41, and a peripheral section 423 integrally connected between the top and bottom sections 421 and 422 and covering lateral sides of the metal plate 41. The top section 421 and the bottom section 422 provide the metal carrier 40A the top surface 43 and bottom surface 44, respectively. After the metal layer 42 is formed on the surfaces of the metal plate 41, a grinding or polishing process is performed to make the arithmetical mean roughness values (Ra) of the top surface 43 and the bottom surface 44 larger than or equal to $0.01\mu\text{m}$ (micrometers) and smaller than or equal to $0.4\mu\text{m}$. Each of the vacuum suction holes 45 penetrates through the top and bottom surfaces 411 and 412 of the metal plate 41 and the top and bottom sections 421 and 422 of the metal layer 42.

The wafer 10 is disposed on the top surface 43 of the moving carrier 40A directly. The moving carrier 40A carrying the wafer 10 is placed onto the supporting chuck 30 by the

aforementioned pick-and-place device. Specifically speaking, the bottom surface 44 of the moving carrier 40A is in contact with the top surface 31 of the supporting chuck 30 directly. At this stage, the vacuum suction holes 45 of the moving carrier 40A communicate with the chamber 35 of the supporting chuck 30. The chamber 35 and the vacuum suction holes 45 are provided with negative pressure by the aforementioned vacuum source, thereby generating vacuum suction effect to the wafer 10, so that the wafer 10 is evenly and tightly attached to the top surface 43 of the moving carrier 40A. It should be mentioned that when the wafer is disposed on the top surface of the moving carrier, the wafer can be fastened to the moving carrier by adhesive tape. Alternatively, the pick-and-place device may be provided with a vacuum source for communicating with the vacuum suction holes of the moving carrier to hold the wafer on the moving carrier. Alternatively, the wafer may be prevented from dropping during moving by other fastening manners. Such fastening manner is relatively less related to the technical features of the present invention, thereby not shown in the figures.

Because of the above-described characteristics of the moving carrier 40A, i.e. the metal carrier of the present invention, such as structure, material and surface roughness values, the moving carrier 40A has high electric conductivity and thermal conductivity. In the condition that the ground plane on the bottom surface of the wafer 10 should be electrically connected to the ground potential through the moving carrier 40A and the supporting chuck 30, the high electric conductivity of the moving carrier 40A can meet this electrical test requirement. Besides, the high thermal conductivity of the moving carrier 40A brings high heat transfer efficiency to meet specific temperature controlling requirement of cooling or heating in the test. As described above, the arithmetical mean roughness values (Ra) of the top surface 43 and bottom surface 44 of the moving carrier 40A are larger than or equal to $0.01\mu\text{m}$ and smaller than or equal to $0.4\mu\text{m}$. The reason of such design is that if the arithmetical mean roughness values (Ra) of the top surface 43 and bottom surface 44 are larger than $0.4\mu\text{m}$, they will bring too much thermal resistance and electric resistance between the wafer 10 and the supporting chuck 30, resulting in low electric conductivity

for grounding the wafer 10 and low heat transfer efficiency for heating the wafer or dissipating the heat of the wafer. In other words, the specific electrical and temperature requirements for testing the wafer cannot be met. If the arithmetical mean roughness values (Ra) of the top surface 43 and bottom surface 44 are set smaller than $0.01\mu\text{m}$, they will be difficultly attained by grinding or polishing, so the processing cost will be too high to meet the practical requirement.

For providing the moving carrier 40A a high heat transfer rate, the thickness T of the moving carrier 40A is preferably larger than or equal to 0.15mm (millimeters) and smaller than or equal to 1mm. If the thickness T of the moving carrier 40A is larger than 1mm, it is usually unable to bring the heat transfer rate required for heating the wafer or dissipating the heat of the wafer for the test. If the thickness T of the moving carrier 40A is smaller than 0.15mm, the moving carrier 40A usually has insufficient rigidity for supporting the wafer well, so that the wafer is possible to warp, and the carrier is uneasily processed. Because different metal materials have different thermal conductivity, for attaining the required heat transfer rate, the preferred thickness of the moving carrier 40A varies with the metal material thereof. For example, when the material of the metal plate 41 is molybdenum copper alloy and the material of the metal layer 42 is gold, the thickness T of the moving carrier 40A after it is processed by grinding or polishing is preferably larger than or equal to 0.4mm and smaller than or equal to 0.8mm. Compared with other kinds of copper alloy, the molybdenum copper alloy has relatively higher rigidity when being made into such a thin plate, thereby bringing good supporting effect. Another example is that when the material of the metal plate 41 is stainless steel and the material of the metal layer 42 is gold, the thickness T of the moving carrier 40A after it is processed by grinding or polishing is preferably larger than or equal to 0.15mm and smaller than or equal to 0.5mm.

Referring to FIG. 5, a wafer supporting device 22 according to a second preferred embodiment of the present invention includes a supporting chuck 30, a fixed carrier 40B, and a moving carrier 50. The supporting chuck 30 is the same with that described in the first preferred embodiment. The fixed carrier 40B is also the specially configured metal carrier provided by the

present invention, the characteristics thereof, such as structure, material, manufacturing manner and surface roughness values, are all the same with the aforementioned moving carrier 40A, but the fixed carrier 40B is fixed on the top surface 31 of the supporting chuck 30 detachably for replacement. Specifically speaking, the fixed carrier 40B in this embodiment is a little larger than the aforementioned moving carrier 40A in size, for covering the top surface 31 of the supporting chuck 30. The fixed carrier 40B is fixed to the supporting chuck 30 by screws or clamps (not shown), enabling the user to replace the fixed carrier 40B on the supporting chuck 30.

The moving carrier 50 in this embodiment is not configured as the above-described special configuration composed of the metal plate and the metal layer. In the condition that the bottom surface of the wafer 10 should be grounded, the moving carrier 50 may be a metal plate. In the condition that the bottom surface of the wafer 10 doesn't need to be grounded, the moving carrier 50 may be an insulating plate. The moving carrier 50 has a top surface 51, a bottom surface 52 opposite to the top surface 51, and a plurality of vacuum suction holes 54 penetrating through the top surface 51 and the bottom surface 52. The moving carrier 50 is similar to the aforementioned moving carrier 40A in function, for the wafer 10 to be disposed on the top surface 51 of the moving carrier 50 directly. The moving carrier 50 is moved by the pick-and-place device to be disposed on the supporting chuck 30 in the status of carrying the wafer 10, so that the chips of the wafer 10 can be tested by the tester. However, the moving carrier 50 in this embodiment is disposed on the top surface 43 of the fixed carrier 40B directly, thereby disposed on the supporting chuck 30 indirectly with the fixed carrier 40B located therebetween. At this stage, the vacuum suction holes 54 of the moving carrier 50 communicate with the vacuum suction holes 45 of the fixed carrier 40B respectively. The chamber 35 of the supporting chuck 30 and the vacuum suction holes 45 and 54 of the carriers 40B and 50 are provided with negative pressure by the aforementioned vacuum source, thereby generating vacuum suction effect to the wafer 10, so that the wafer 10 is evenly and tightly attached to the top surface 51 of the moving carrier 50.

As a result, the fixed carrier 40B has high electric conductivity and thermal conductivity

resulted from the characteristics thereof, such as the structure, material and surface roughness, so it can meet such requirements of grounding and temperature control as the aforementioned moving carrier 40A. Besides, after the test of the wafer 10 is accomplished, the moving carrier 50 will carry the wafer 10 to leave the fixed carrier 40B, and then another moving carrier 50 carrying another wafer 10 going to be tested is placed onto the fixed carrier 40B. Therefore, the top surface 43 of the fixed carrier 40B will be gradually worn. When it is worn to a certain extent, the user can remove the fixed carrier 40B, install a new fixed carrier 40B, and then continue to perform the test. In other words, the fixed carrier 40B can prevent the top surface 31 of the supporting chuck 30 from directly contacting the moving carrier 50 and being worn, so only the fixed carrier 40B needs replacement, but the supporting chuck 30 doesn't. In this way, it can maintain high test efficiency and accuracy, consumes low cost and not much time for the replacement of the fixed carrier 40B, and doesn't consume time for adjusting and calibrating the supporting chuck 30.

Referring to FIG. 6, a wafer supporting device 23 according to a third preferred embodiment of the present invention is similar to the wafer supporting device 22 as shown in FIG. 5, but this embodiment uses the moving carrier 40A illustrated in the first preferred embodiment, but not the moving carrier 50 illustrated in the second preferred embodiment. In other words, the moving carrier 40A and fixed carrier 40B used in this embodiment are both the specially configured metal carriers provided by the present invention, the characteristics thereof, such as structure, material, manufacturing manner and surface roughness and the function and effect thereof are the same with those of the aforementioned moving carrier 40A and fixed carrier 40B, thereby not repeatedly mentioned hereinunder. Compared with the wafer supporting device 22 as shown in FIG. 5, the two carriers 40A and 40B of the wafer supporting device 23 in this embodiment both have high electric conductivity, high heat transfer rate and low surface roughness values, thereby meeting high-level requirements of grounding and temperature control.

Referring to FIG. 7, a wafer supporting device 24 according to a fourth preferred embodiment of the present invention is similar to the wafer supporting device 22 as shown in FIG.

5, but the wafer supporting device 24 in this embodiment includes no moving carrier, for the wafer 10 to be disposed on the top surface 43 of the fixed carrier 40B directly. In this way, the chamber 35 of the supporting chuck 30 and the vacuum suction holes 45 of the fixed carrier 40B are still able to be provided with negative pressure by the aforementioned vacuum source for generating vacuum suction effect to the wafer 10, so that the wafer 10 is evenly and tightly attached to the top surface 43 of the fixed carrier 40B. The fixed carrier 40B also brings high electric conductivity and thermal conductivity between the wafer 10 and the supporting chuck 30, and the fixed carrier 40B is also replaceable when being worn to a certain extent by the contact with the wafer 10.

Summarizing the above-disclosed first to fourth preferred embodiments of the present invention, the wafer supporting device of the present invention primarily includes a supporting chuck 30, and at least one carrier. The aforementioned at least one carrier may include only a moving carrier 40A for directly supporting the wafer as shown in FIG. 4, or includes only a fixed carrier 40B detachably and replaceably fixed on the supporting chuck 30 as shown in FIG. 7, or includes a moving carrier 50 or 40A and a fixed carrier 40B as shown in FIGS. 5 and 6, wherein the moving carrier 40A and the fixed carrier 40B are the same in structural features, material and surface roughness for attaining the objective of the present invention.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

WHAT IS CLAIMED IS:

1. A metal carrier for being disposed on a supporting chuck in a way that a bottom surface of the metal carrier faces toward the supporting chuck and a wafer is disposed on a top surface of the metal carrier, the bottom surface of the metal carrier being opposite to the top surface of the metal carrier, the metal carrier comprising:

a metal plate comprising a top surface and a bottom surface opposite to the top surface of the metal plate;

a metal layer comprising a top section covering the top surface of the metal plate to form the top surface of the metal carrier, and a bottom section covering the bottom surface of the metal plate to form the bottom surface of the metal carrier, arithmetical mean roughness values of the top and bottom surfaces of the metal carrier being larger than or equal to 0.01 micrometers and smaller than or equal to 0.4 micrometers; and

a plurality of vacuum suction holes, each of the vacuum suction holes penetrating through the top and bottom surfaces of the metal plate and the top and bottom sections of the metal layer for communicating with a vacuum source for generating a vacuum suction to the wafer.

2. The metal carrier as claimed in claim 1, wherein the metal plate is made of one of stainless steel and molybdenum copper alloy.

3. The metal carrier as claimed in claim 1, wherein a thickness of the metal carrier is larger than or equal to 0.15 millimeters and smaller than or equal to 1 millimeter.

4. The metal carrier as claimed in claim 1, wherein the metal plate is made of stainless steel; the metal layer is made of gold; a thickness of the metal carrier is larger than or equal to 0.15 millimeters and smaller than or equal to 0.5 millimeters.

5. The metal carrier as claimed in claim 1, wherein the metal plate is made of molybdenum copper alloy; the metal layer is made of gold; a thickness of the metal carrier is larger than or equal to 0.4 millimeters and smaller than or equal to 0.8 millimeters.

6. A wafer supporting device comprising:

a supporting chuck comprising a chamber for communicating with a vacuum source;
and

at least one carrier disposed on a top surface of the supporting chuck for a wafer to be disposed on said at least one carrier directly;

wherein said at least one carrier comprises at least one metal carrier as claimed in claim 1; the vacuum suction holes of the at least one metal carrier communicate with the chamber of the supporting chuck.

7. The wafer supporting device as claimed in claim 6, wherein the at least one carrier comprises a moving carrier; the moving carrier is said metal carrier for the wafer to be disposed on the top surface of the moving carrier directly; the moving carrier is disposed on the top surface of the supporting chuck directly.

8. The wafer supporting device as claimed in claim 6, wherein the at least one carrier comprises a fixed carrier and a moving carrier; the fixed carrier is said metal carrier; the fixed carrier is detachably and replaceably fixed on the top surface of the supporting chuck; the moving carrier comprises a top surface, a bottom surface opposite to the top surface of the moving carrier, and a plurality of vacuum suction holes penetrating through the top and bottom surfaces of the moving carrier for the wafer to be disposed on the top surface of the moving carrier directly; the moving carrier is disposed on the top surface of the fixed carrier directly in a way that the vacuum suction holes of the moving carrier communicate with the vacuum suction holes of the fixed carrier

respectively.

9. The wafer supporting device as claimed in claim 6, wherein the at least one carrier comprises a fixed carrier and a moving carrier; the fixed carrier and the moving carrier are both said metal carriers; the fixed carrier is detachably and replaceably fixed on the top surface of the supporting chuck; the moving carrier is adapted for the wafer to be disposed on the top surface of the moving carrier directly; the moving carrier is disposed on the top surface of the fixed carrier directly in a way that the vacuum suction holes of the moving carrier communicate with the vacuum suction holes of the fixed carrier respectively.

10. The wafer supporting device as claimed in claim 6, wherein the at least one carrier comprises a fixed carrier; the fixed carrier is said metal carrier; the fixed carrier is detachably and replaceably fixed on the top surface of the supporting chuck and adapted for the wafer to be disposed on the top surface of the fixed carrier directly.