

CONTAINER FOR RETICLE

BACKGROUND OF INVENTION

1. FIELD OF INVENTION

The present invention relates to a container for a reticle and, more particularly, to a container including a cleansing element for absorbing, eliminating or absorbing hazardous substances that could otherwise damage a reticle disposed in the container.

2. RELATED PRIOR ART

The sizes of electronic products are getting smaller, the operative frequencies higher, and the performance better. Accordingly, the sizes of chips used in the electronic products are getting smaller, and the performance better. The wiring in the chips is getting finer to include more circuits and elements. The width of the wiring has been reduced to 90 to 45 nanometers from 0.25 micrometers. Photolithography is the key to the success in minimizing the width of the wiring and the making of wafers. In the photolithography, a scanner and reticles are used. The throughput would severely be affected should there be particles or moisture on the surfaces of the reticles or wafers. Therefore, the lithograph must be executed in a white room.

To further protect the reticles or wafers from the particles or moisture, there are used containers such as disclosed in US Patent Nos. 4532970 and 4534389.

It is however inevitable to use solvent during the washing, making, sputtering and/or photolithography of the reticles or wafers. The

1 containers also release hazardous substances. The reticles or wafers are
2 shun at by intensive light, spun or heated so that they are loaded with
3 static charges. Because of the static charges, the hazardous substances
4 are attracted to the reticle or wafers. The hazardous substances blur the
5 patterns on the reticles and cause poor exposure. The reticles must be
6 washed. In the worst case, the reticles must be replaced with new ones,
7 and this eventually cost a lot of money. The hazardous substances cause
8 short circuits in the wafers.

9 To avoid the static charges, the containers can be made of plastic
10 mixed with conductive additives. The resultant containers are
11 conductive and therefore proof of static charges. The conductive
12 additives include carbon black, metal fibers, permanent static charge
13 proof agents, nanometer metal powder and polyurethane-polyaniline.
14 The carbon black includes PP, PE, POM, PC/ABS, PPO. The resultant
15 containers are expensive and release hazardous materials such as sulfide
16 or ammonia. Sulfide such as SO_4^{2-} may be released from the containers.
17 NH_4^+ may be left after the lithograph or released from pattern materials of
18 the reticles and chemicals left after the washing of the reticles. When
19 the reticles are washed and stored for some time, there will be NH_4^+ and
20 SO_4^{2-} for example. When the reticles are later exposed to ultraviolet
21 light in the photolithography, the NH_4^+ will react with SO_4^{2-} , thus
22 producing $(\text{NH}_4)_2\text{SO}_4$.

23 To solve this problem, Taiwanese Patent TWM252140 discloses an
24 apparatus for protecting a container for a reticle from static charges.
25 The apparatus includes a base made of metal, supporting elements
26 attached to the metal base and positioning elements made of metal and

1 attached to the base by fasteners made of metal. The fasteners are
2 exposed from the container and connected to a workbench. Thus, static
3 charges can be conducted to the workbench from the reticle through the
4 base, the positioning elements and the fasteners. The engagement of the
5 base with the fasteners is however not reliable. The conducting of static
6 charges through the base, the positioning elements and the fasteners is not
7 reliable. Therefore, static charges might accumulate in the reticles.

8 The present invention is therefore intended to obviate or at least
9 alleviate the problems encountered in prior art.

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11 **SUMMARY OF INVENTION**

12 It is the primary objective of the present invention to provide a
13 container for containing a reticle and for removing static charges from the
14 reticle.

15 To achieve the primary objective of the present invention, a container
16 includes a base for supporting a flat object, a covering device for covering
17 the flat object on the base and at least one conductive unit in conductive
18 contact with at least one of the base and the covering device. The
19 conductive unit includes at least one conductive column exposed from the
20 container for conductive contact with an external object and at least one
21 spring for biasing the column into firm contact with the external object.

22 Other objectives, advantages and features of the present invention
23 will become apparent from the following description referring to the
24 attached drawings.

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1 **BRIEF DESCRIPTION OF DRAWINGS**

2 The present invention will be described via detailed illustration of the
3 preferred embodiment referring to the drawings.

4 Fig. 1 is a perspective view of a container according to the preferred
5 embodiment of the present invention.

6 Fig. 2 is an exploded view of the container shown in Fig. 1.

7 Fig. 3 is a perspective partial view of the container shown in Fig. 1.

8 Fig. 4 is a bottom view of the container shown in Fig. 3.

9 Fig. 5 is a cross-sectional view of the container shown in Fig. 1.

10 Fig. 6 is a cut-away view of the container shown in Fig. 1.

11 Fig. 7 is a cut-away view of the container in another position than
12 shown in Fig. 6.

13 Fig. 8 is an enlarged exploded view of a conductive column set used
14 in the container shown in Fig. 2.

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16 **DETAILED DESCRIPTION OF PREFERRED EMBODIMENT**

17 Referring to Figs. 1 through 4, a reticle 50 can be disposed in a
18 container according to the preferred embodiment of the present invention.

19 The container includes a base 10, a conductive plate 15, conductive units
20 30 and a covering device 2.

21 The base 10 includes two recesses 11 in an edge thereof and two
22 other recesses 11 in an opposite edge thereof, raised portions 12 formed
23 thereon and apertures 13 defined therein. Each of the raised portions 12
24 includes a screw hole defined therein. Two ridges 14 are formed on the
25 wall of each of the apertures 13. Each of the apertures 13 includes a
26 reduced lower end.

1 Referring to Figs. 2 and 8, each of the conductive units 30 includes a
2 first column 31, a second column 35 and a spring 34. The first column
3 31 includes a lower section 32, an upper section 38 and a middle section
4 33. The diameter of the middle section 33 is larger than that of the
5 sections 32 and 38. The lower section 32 is inserted through the reduced
6 lower open end of a related one of the apertures 13 while the middle
7 section 33 is restrained by the reduced lower open end of the aperture 13.
8 The second column 35 includes a lower section 36 and an upper section
9 40. The diameter of the upper section 40 is larger than that of the lower
10 section 36. The spring 34 is compressed between the middle section 33
11 of the first column 31 and the upper section 40 of the second column 35.
12 The spring 34 is restrained between the ridges 14. The conductive units
13 30 are made of metal.

14 The conductive plate 15 is made of metal, and includes apertures 16
15 defined therein. The conductive plate 15 is located on the base 10 while
16 the apertures 16 receive the raised portions 12 of the base 10 for precisely
17 positioning the conductive plate 15 on the base 10. Referring to Figs. 6
18 and 7, the conductive plate 15 is in contact with the upper section 40 of
19 the second column 35 of each of the conductive units 30.

20 Two lateral strips 17 are located on the conductive plate 15. Each of
21 the lateral strips 17 includes two apertures defined therein. A threaded
22 bolt 170 is inserted through each of the apertures of each of the lateral
23 strips 17 and driven in the screw hole of a related one of the raised
24 portions 12 of the base 10.

25 A middle strip 18 is located on the conductive plate 15. A threaded
26 bolt 180 is inserted through each of the apertures of the middle strip 18

1 and driven in the screw hole of a related one of the raised portions 12 of
2 the base 10.

3 Two conductive supporting elements 19 are attached to each of the
4 lateral strips 17. The conductive supporting elements 19 are in contact
5 with the conductive plate 15.

6 The covering device 2 includes an external cover 20 and an internal
7 cover 25 detachably attached to the external cover 20. The external
8 cover 20 is made of plastic for example, and includes four buckles 21
9 corresponding to the recesses 11. The buckles 21 can be disposed in the
10 recesses 11 to lock the external cover 20 to the base 10. A handle 22 is
11 attached to the external cover 20.

12 The internal cover 25 is made of metal for example and used as a
13 shield against static discharge.

14 Two pressing elements 26 and two pressing elements 27 are attached
15 to an internal side of the internal cover 30.

16 Referring to Fig. 5, the reticle 50 is located on the conductive
17 supporting elements 19. The reticle 50 is retained in position by the
18 supporting elements 14, the lateral strips 17, the middle strip 18 and the
19 pressing elements 26 and 27.

20 Referring to Figs. 5 and 6, the reticle 50 is in contact with the
21 conductive supporting elements 19. The supporting elements 19 are in
22 contact with the conductive plate 15. The conductive plate 15 is in
23 contact with the conductive units 30.

24 Referring to Figs. 5 and 7, the container is located on a workbench.
25 The reticle 50 is in contact with the conductive supporting elements 19.
26 The supporting elements 19 are in contact with the conductive plate 15.

1 The conductive plate 15 is in contact with the conductive units 30. The
2 conductive units 30 are in firm contact with the workbench because of the
3 springs 34. Thus, static charges can be transferred from the reticle 50 to
4 the workbench through the conductive supporting elements 19, the
5 conductive plate 15, the conductive plate 15 and the conductive units 30.

6 The present invention has been described via the detailed illustration
7 of the preferred embodiment. Those skilled in the art can derive
8 variations from the preferred embodiment without departing from the
9 scope of the present invention. Therefore, the preferred embodiment
10 shall not limit the scope of the present invention defined in the claims.

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1 **CLAIMS**

2 1. A container comprising:

3 a base for supporting a flat object;

4 a covering device for covering the flat object on the base; and

5 at least one conductive unit in conductive contact with at least one

6 of the base and the covering device, wherein the conductive unit

7 comprises:

8 at least one conductive column exposed from the container for

9 conductive contact with an external object; and

10 at lest one spring for biasing the column into firm contact with

11 the external object.

12 2. The container according to claim 1 comprising:

13 a conductive plate located on the base and in contact with the

14 conductive unit; and

15 conductive supporting elements located on the conductive plate for

16 supporting the flat object.

17 3. The container according to claim 2, wherein the base comprises at

18 least one aperture through which the conductive column is inserted.

19 4. The container according to claim 3, wherein the conductive unit

20 comprises:

21 a first conductive column inserted through the aperture of the base;

22 a second conductive column disposed in the aperture of the base

23 and in contact with the conductive plate; and

24 a conductive spring compressed between the first and second

25 conductive columns.

26 5. The container according to claim 4, wherein the first column

- 1 comprises:
- 2 a lower section inserted through the aperture of the base;
- 3 an enlarged middle section restrained in the aperture of the base
- 4 and abutted against the conductive spring; and
- 5 an upper section inserted in the conductive spring.
- 6 6. The container according to claim 4, wherein the second conductive
- 7 column comprises:
- 8 a lower section inserted in the conductive spring; and
- 9 an enlarged upper section abutted against the conductive spring and
- 10 in contact with the conductive plate.
- 11 7. The container according to claim 2, wherein the covering device
- 12 comprises:
- 13 an conductive internal cover for covering the flat object and
- 14 contacting the conductive plate; and
- 15 an external cover connected to the conductive internal cover.
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