

Improved Device for Drying Semiconductor Substrates

The object of the invention is a device for use in drying disc-shaped semiconductor substrates.

Background of the Invention

- 5 The invention relates to a device being used to treat semiconductor wafers, in which the latter are immersed for some time in a bath containing a liquid and are then taken therefrom so slowly that practically the whole quantity of liquid remains in the bath.

Prior Art / Problems

- A method of this kind may be used, for example, in the manufacture of electric circuits on all kinds of substrates, such as, for example, integrated circuits on semiconductor wafers (for example of silicon), drives for liquid crystal displays on transparent plates of glass or quartz or circuits on plates of synthetic material (circuit boards). The method may also be used in the manufacture of shadow masks for television picture tubes or in the manufacture of CD or VLP records. In all these cases, the substrates are immersed many times for some time in a bath containing a liquid, for example in galvanic baths for deposition of metals, in etching baths for etching patterns into metal layers or into semiconductor material, in development baths for developing exposed photo lacquer layers and in rinsing baths for cleaning the substrates. After treatment in the liquid baths, the substrates are taken from the liquid and are dried. The substrates can be taken from the liquid in that they are lifted or withdrawn from the liquid, but of course also in that the liquid is caused to flow out of the bath.

- While being taken from the bath the semiconductor wafer reside on a device is used to hold the semiconductor wafer in place. During this process, the problem can arise that residues of liquid remain at the edge of the substrate. This can lead to unwanted particles on the edge of the substrate, which are later on effecting the quality of the semiconductor wafer.

The physical effect utilized thereby are described in CN1045539 A (EP 03 855 36 A1), as is an apparatus which is to some extent suitable for conduction of the method.

A device and a method to improve the quality of cleaning in respect to remaining particles of the semiconductor wafer is given in DE 10 2014 207 266 A1. However, using this there are still particles left that reduce the quality of the semiconductor wafers.

- 5 It is an object of the present invention to improve said device, and more particularly to show how the number of particles, which are found on the dried substrates, can be reduced by using this device.

Description of the Invention

Figure 1 illustrates a device (disc holder) according to the present invention.

- 10 The device comprises an elongated body (1), which tapers upwards to form a wedge (A) having an angle α between two surfaces and an upper edge. The upper edge is suitable for the disc-shaped substrates to rest on. Preferably, the two surfaces of the wedge comprise more than one holes (2) each forming channels, which extend to a lower drainage part (B) of the elongated body. The holes are placed in that way that
15 the upper edge is not interrupted by the holes.

Preferably, the angle α between the two surfaces is larger than 30° and smaller than 90° . More preferably, it is smaller than 70° and larger than 50° .

Preferably, the material used for the device comprises ceramic filled polyetheretherketone (CFM PEEK).

- 20 Preferably, the upper edge has a curvature radius of more than 0.1mm and less than 1mm, more preferably more than 0.1mm and less than 0.4mm.

Preferably, the two surfaces are hydrophobic.

Preferably, the channels have a diameter more than 0.5mm and less than 3mm.

- 25 Preferably, the drainage part (B) comprises a channel having a diameter more than 3mm and less than 8mm.

Preferably, the drainage part (B) has a length (L2) of more than 20mm and less than 26mm.

Preferably, the wedge (A) has a height (L1) of more than 4mm and less than 10mm.

List of reference numerals employed

A	Wedge region of the elongated body
B	Drainage part of the elongated body
L1	Height of the wedge formed on top of the elongated body
L2	Height of the drainage part
1	Elongated body
2	Hole(s)
α	Opening angle of the wedge, angle between two surfaces and an upper edge

Claims

1. Device for drying disc-shaped substrates comprising
an elongated body (1),
which tapers upwards to form a wedge (A) having an angle α between two
surfaces and an upper edge
5 wherein the upper edge is suitable for holding the disc-shaped substrates,
characterized in that the two surfaces comprise more than one holes (2) each
forming channels, which extend to a lower drainage part (B) of the elongated body.
2. Device according to claim 1, characterized in that
10 the angle α is larger than 30° and smaller than 90°, preferably larger than 50° and
smaller than 70°.
3. Device according to claim 1 or claim 2, characterized in that
the material used for the device comprises ceramic filled polyetheretherketone
(CFM PEEK).
- 15 4. Device according to claim 1 to claim 3, characterized in that
the upper edge has a curvature radius of more than 0.1 mm and less than 1 mm.
5. Device according to claim 1 to claim 4, characterized in that
the channels have a diameter more than 0.5mm and less than 3mm.
6. Device according to claim 1 to claim 5, characterized in that
20 the drainage part (B) comprises a channel having a diameter more than 3mm and
less than 8mm.
7. Device according to claim 1 to claim 6, characterized in that
the drainage part (B) has a length (L2) of more than 20mm and less than 26mm.
8. Device according to claim 1 to claim 7, characterized in that
25 the wedge (A) has a height (L1) of more than 4mm and less than 10mm.