

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
10 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
15 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
20 substrates can be taken from the liquid in that they are lifted or withdrawn from the liquid, but of course also in that the liquid is caused to flow out of the bath.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
25 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 shows a device (disc holder) for the present invention.

- 10 The device comprises an elongated body (1) having a top surface, a bottom surface and a circumferential surface.
A hole in the top surface forms a channel (6) which extends to a lower drainage part (B) of the elongated body (1).
The hole in the top surface is chamfered having a chamfer depth (L1) and a chamfer
15 angle (α). The chamfer depth defines a funnel region of the device. An edge is formed between the chamfer and the top surface, which is preferably edge-rounded (5). This forms a conical recess suitable a disc shaped substrate to rest on.
The said chamfer angle is preferably not more than 60° and not less than 10° and that the chamfer depth (L1) is preferably not more than 15 mm and not less than 7
20 mm.

Preferably, the device is made from ceramic filled polyetheretherketone (CFM PEEK).

More preferably, the diameter of a channel is not less than 0.5 mm and not more than 3mm. Preferably the diameter is not less than 0.8mm and not more than 1.2mm.

- 25 More preferably, the length of the channel (L2) is not less than 5 mm and not more than 20 mm.

List of reference numerals employed

- A Funnel 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 Diameter of the elongated body.
- 3 Hole
- 4 Chamfering diameter of the elongated body.
- 5 Rounded edge formed between the chamfer and the top surface.
- 6 Channel extending a hole in the top surface to the lower surface.
- 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) having a top surface, a bottom surface and a circumferential
surface,
5 comprising a hole in the top surface forming a channel (6)
which extends to a lower drainage part (B) of the elongated body and
is chamfered having a chamfer depth (L1) and a chamfer angle (α) forming an
edge between chamfer and top surface and forming a conical recess suitable for
resting a disc shaped substrate,
10 characterized in that the chamfer angle is more than 10° and less than 30° and
that the chamfer depth (L1) is more than 6 mm and less than 12 mm.
2. Device according to claim 1 characterized in that
the material used for the device comprises ceramic filled polyetheretherketone
(CFM PEEK).
- 15 3. Device according to any of claim 1 or claim 2, characterized in that
the edge between chamfer and top surface is rounded with a radius not more than
0.1 mm and not less than 1 mm.
4. Device according to any of claims 1 to 3, characterized in that
the diameter of the channel is not less than 0.5mm and not more than 3mm,
20 preferably not less than 0.8mm and not more than 1.2mm.
5. Device according to any of claims 1 to 4, characterized in that
the length of the channel (L2) is not less than 30 mm.