CLAIMS

1. An apparatus, for applying pressure to press a semiconductor device against a substrate during a molding or sintering process, the apparatus comprising:

a first tool comprising:

a guide comprised in a plate having guide walls;

a spacer located within the guide walls and moveable in the guide, wherein a gap is defined between the spacer and the guide walls adjacent to the spacer and is operable to allow the spacer to tilt in relation to the guide walls; and

a pressure application component comprising a chamber and a diaphragm separating a pressure transmission medium in the chamber from the spacer, the diaphragm being in contact with and supported by both the plate and the spacer; and

a second tool including a holder which is configured to hold the substrate and the semiconductor device, wherein the first and second tools are moveable relative to each other between an uncoupled state and a coupled state;

wherein the spacer comprises:

a first portion at a first end next to the pressure application component, wherein in the coupled state, the pressure application component is operable to apply a force as a first pressure to the first portion; and

a second portion at a second end of a spacer opposite to the first end, the second portion being remote from the pressure application component, wherein in the coupled state, the second portion is proximate the semiconductor device and is operable to transmit the force from the pressure application component to the semiconductor device against the substrate as a second pressure.

2. The apparatus according to claim 1, wherein the gap is smaller at the first portion next to the pressure application component than at the second portion remote from the pressure application component.

3. The apparatus according to claim 1 or claim 2, wherein the width of the gap between the spacer and the guide is from about 0.001 mm to about 5 mm.

4. The apparatus according to any one of the preceding claims, wherein the width of the gap, at the first portion proximate the pressure application component is from about 0.001 mm to about 1 mm.

5. The apparatus according to any one of the preceding claims, wherein the width of the gap, at the second portion distal from the pressure application component is from about 0.01 mm to about 5 mm.

6. The apparatus according to any one of the preceding claims, wherein the first tool further comprises an o-ring to hold the diaphragm in place in the pressure chamber.

7. The apparatus according to claim 6, wherein the first tool further comprises a ring, with larger diameter than the o-ring operable to surround the o-ring for preventing extrusion of the o-ring.

8. The apparatus according to any one of the preceding claims, wherein the spacer further comprises a first surface and a second surface, wherein the first surface is a surface contactable to the pressure application component, and wherein an area of the first surface is larger than an area of the second surface, so that a pressure applicable by the spacer when fully utilizing the second surface is larger than a pressure applied by the pressure application component to the first surface.

9. The apparatus according to any one of the preceding claims, wherein the edges of the spacer are deburred with rounded edges of radius of or less than 0.2 mm.

10. The apparatus according to any one of the preceding claims, wherein the spacer further comprises an inner part and an outer part, wherein the inner part is movable relative to the outer part.

11. The apparatus according to claim 10, wherein a motion of the inner part relative to the outer part, in a direction away from the pressure application component, is restricted.

12. The apparatus according to any one of the preceding claims, wherein the holder comprises a spherical bearing operative to level the semiconductor device in relation to the spacer when changing from the uncoupled state to the coupled state.

13. The apparatus according to any one of the preceding claims, wherein the second tool is operable to receive a bottom protection film over a holder for the semiconductor device comprised in the second tool.

14. The apparatus according to any one of the preceding claims, further comprising a heating block, wherein a distance between the heating block and the holder is adjustable.

15. The apparatus according to any one of the preceding claims, further comprising:

a plurality of sets, each set comprising a spacer and a guide that are the same as the spacer and the guide; and

a plurality of holders, wherein each holder is associated with one or more of the plurality of sets.

16. The apparatus according to any one of the preceding claims, further comprising a resilient member located within the gap between the spacer and the guide for applying a force to the guide and spacer.

17. A method of applying pressure to press a semiconductor device against a substrate during a molding or a sintering process, comprising:

providing an apparatus with a first tool and a second tool moveable relative to each other, wherein:

the second tool comprises a holder that is configured to hold the substrate and the semiconductor device;

the first tool comprises a pressure chamber, a movable spacer located within guide walls of a guide comprised in a plate, the spacer being moveable in the guide, and a gap between the spacer and the guide walls adjacent to the spacer that is operable to allow the spacer to tilt in relation to the guide walls; and

a pressure application component comprising a chamber and a diaphragm separating a pressure transmission medium in the chamber from the spacer, the diaphragm being in contact with and supported by both the plate and the spacer,

the first tool and the second tool are in an uncoupled state;

arranging the semiconductor device and the substrate on the holder;

bringing the first tool and the second tool from the uncoupled state to a coupled state;

compressing the semiconductor device between the spacer and the holder, by applying pressure from the pressure chamber on the spacer to press the semiconductor device against the substrate;

waiting a pre-determined period of time;

bringing the first tool and the second tool from the coupled state to the uncoupled state.

18. A method of processing a semiconductor according to claim 17, further comprising:

providing a bottom protection film on the second tool covering the holder; and

wherein the step of arranging the semiconductor device on the holder comprises:

arranging the semiconductor device on the holder covered by the protection film, the semiconductor being arranged on the protection film.

19. A method of processing a semiconductor according to claim 17 or claim 18, further comprising:

providing a carrier on the holder; and

wherein the step of arranging the semiconductor device on the holder comprises arranging the semiconductor device on the carrier.