

rotational movement about their middle and the middle of the polishing plates by the inner drive gear or by the inner and outer drive gears. Furthermore, the polishing plates are usually also rotated in countersense about their axes, which results in kinematics characteristic of DSP, in which a point on a semiconductor wafer side to be polished follows a cycloid path on the corresponding polishing pad.

Before first use and after a certain degree of wear is reached, it is usual to dress the lower and upper polishing pads. During the dressing, the surface of the polishing pad is roughened and slight material abrasion is induced in order to impart a favourable working state to the polishing pad.

According to US 2012/0189777 A1, it is advantageous to subject the polishing plates to shaped dressing ("truing"), so that the gap between the polishing pads is as far as possible uniformly wide. Furthermore, it is described therein that, in order to dress the polishing pads, the carriers are replaced by dressing rings. The dressing is carried out in the presence of a cooling lubricant, the dressing rings being moved over the lower and upper polishing pads, in the absence of inserted semiconductor wafers, in a movement similar to the kinematics of the DSP.

~~It is an object~~ Embodiments of the invention seek to provide an approach which leads to an improvement in the planarity of the semiconductor wafers after DSP has been carried out.

According to a first aspect of the invention, there is provided a method of polishing at least one semiconductor wafer in a gap of a polishing device between a lower polishing plate, covered with a lower polishing pad, and an upper polishing plate, covered with an upper polishing pad, while supplying a polishing agent, the polishing plates and the polishing pads having an inner edge and an outer edge, the method comprising:

5 dressing a first of the upper and lower polishing pads using a
dressing tool, the dressing including rotating the respective
polishing plate covered with the first polishing pad, the
dressing tool being mounted in the gap in such a way that it
extends from the inner edge to the outer edge of the first
polishing pad, and a distance between the dressing tool and a
second of the upper and lower polishing pads at the inner edge
of the second polishing pad differing from a corresponding
distance at the outer edge of the second polishing pad; and
10 simultaneous double-side polishing the at least one
semiconductor wafer in the gap after the dressing.

15 According to a second aspect of the invention, there is
provided a method for a polishing semiconductor wafer via
simultaneous double-side polishing in a gap between a lower
polishing pad, disposed on a lower polishing plate, and an
upper polishing pad, disposed on an upper polishing plate, of a
polishing device while supplying a polishing agent, the
polishing plates and the polishing pads having an inner edge
20 and an outer edge, the method comprising: dressing, with a
dressing tool, the lower polishing pad while rotating the lower
polishing plate, the dressing tool being mounted in the gap in
such a way that the dressing tool extends from the inner edge
to the outer edge of the lower polishing pad; and, after the
25 dressing, double-side polishing the semiconductor wafer in the
gap, wherein, during the dressing, a distance of the dressing
tool from the upper polishing pad, at the inner edge of the
upper polishing pad, differs from a distance at the outer edge
of the upper polishing pad.

30 According to a third aspect of the invention, there is provided
a method for a polishing semiconductor wafer via simultaneous
double-side polishing in a gap between a lower polishing pad,
disposed on a lower polishing plate, and an upper polishing
35 pad, disposed on an upper polishing plate, of a polishing

device while supplying a polishing agent, the polishing plates and the polishing pads having an inner edge and an outer edge, the method comprising: dressing, with a dressing tool, the upper polishing pad while rotating the upper polishing plate, the dressing tool being mounted in the gap in such a way that the dressing tool extends from the inner edge to the outer edge of the upper polishing pad; and, after the dressing, double-side polishing the semiconductor wafer in the gap, wherein, during the dressing, a distance of the dressing tool from the lower polishing pad, at the inner edge of the lower polishing pad, differs from a distance at the outer edge of the lower polishing pad.

~~The object is achieved by~~According to an embodiment of the invention, there is provided a method for polishing semiconductor wafers by means of simultaneous double-side polishing in a gap between a lower and an upper polishing pad of a polishing device while supplying a polishing agent, the lower polishing pad covering a lower polishing plate and the upper polishing pad covering an upper polishing plate, and the polishing plates

Patent Claims

1. A method for polishing semiconductor wafers by means of simultaneous double-side polishing in a gap between a lower and an upper polishing pad of a polishing device while supplying a polishing agent, the lower polishing pad covering a lower polishing plate and the upper polishing pad covering an upper polishing plate, and the polishing plates and the polishing pads having an inner edge and an outer edge, comprising dressing of one, or first one and subsequently the other, polishing pad with a dressing tool, the polishing plate which is covered with the polishing pad to be dressed being rotated and the dressing tool being mounted in the gap in such a way that it extends from the inner edge to the outer edge of the polishing pad to be dressed; and polishing of semiconductor wafers in the gap after the dressing, wherein, during the dressing, the distance of the dressing tool from the polishing pad lying opposite the polishing pad to be dressed, at the inner edge of this polishing pad, differs from the corresponding distance at the outer edge of this polishing pad.

2. The method as claimed in claim 1, wherein one or more polishing methods are carried out before the dressing is carried out once more.

3. The method as claimed in claim 1 or claim 2, wherein a profile according to which the width of the gap at the inner edge of the polishing pads is greater than at the outer edge of the polishing pads is imparted to the gap during the dressing.

4. The method as claimed in one of claims 1 to 3, wherein the dressing tool comprises one or more rings, which are placed between an inner and an outer drive gear of the polishing device and are set in rotation about the middle of the ring by

the inner drive gear or by the outer drive gear or by the inner and outer drive gears.

Patent Claims

1. A method of polishing at least one semiconductor wafer in a gap of a polishing device between a lower polishing plate, covered with a lower polishing pad, and an upper polishing plate, covered with an upper polishing pad, while supplying a polishing agent, the polishing plates and the polishing pads having an inner edge and an outer edge, the method comprising:
- 5 dressing a first of the upper and lower polishing pads using a dressing tool, the dressing including rotating the respective polishing plate covered with the first polishing pad, the dressing tool being mounted in the gap in such a way that it extends from the inner edge to the outer edge of the first polishing pad, and a distance between the dressing tool and a second of the upper and lower polishing pads at the inner edge of the second polishing pad differing from a corresponding distance at the outer edge of the second polishing pad; and
- 10 simultaneous double-side polishing the at least one semiconductor wafer in the gap after the dressing.
- 20 2. The method as recited in claim 1 further comprising dressing the second polishing pad subsequent to the dressing of the first polishing pad.
- 25 3. The method as recited in claim 1, wherein one or more polishing methods are carried out before the at least one polishing pad undergoes subsequent dressing.
- 30 4. The method as recited in claim 1, wherein the dressing imparts a profile to the gap between the upper and lower polishing pads such that a width of the gap at the inner edge of the polishing pads is greater than the width of the gap at the outer edge of the polishing pads.

5. The method as recited in claim 1, wherein the dressing tool comprises one or more rings, which are placed between an inner and an outer drive gear of the polishing device and are set in rotation about the middle of the ring by one of the inner drive gear, the outer drive gear, or both the inner and outer drive gears.

6. The method as recited in claim 4, wherein the profile is thinner at the inner edge than at the outer edge.

7. The method as recited in claim 4, wherein an amount of difference in widths of the gap is in a range of from 10 to 250 μm .

8. The method as recited in claim 4, wherein an amount of difference in widths of the gap is in a range of from 30 to 150 μm .

9. A method for a polishing semiconductor wafer via simultaneous double-side polishing in a gap between a lower polishing pad, disposed on a lower polishing plate, and an upper polishing pad, disposed on an upper polishing plate, of a polishing device while supplying a polishing agent, the polishing plates and the polishing pads having an inner edge and an outer edge, the method comprising:
dressing, with a dressing tool, the lower polishing pad while rotating the lower polishing plate, the dressing tool being mounted in the gap in such a way that the dressing tool extends from the inner edge to the outer edge of the lower polishing pad; and, after the dressing, double-side polishing the semiconductor wafer in the gap, wherein, during the dressing, a distance of the dressing tool from the upper polishing pad, at the inner edge of the upper polishing pad, differs from a distance at the outer edge of the upper polishing pad.

10. The method as recited in claim 9, further comprising, before the double-sided polishing, but subsequent to the dressing of the lower polishing pad:
dressing the upper polishing pad.

11. The method as recited in claim 9, wherein one or more polishing methods are carried out before the at least one polishing pad undergoes subsequent dressing.

5 12. The method as recited in claim 9, wherein the dressing imparts a profile to the gap between the upper and lower polishing pads such that a width of the gap at the inner edge of the polishing pads is greater than the width of the gap at the outer edge of the polishing pads.

10 13. The method as recited in claim 9, wherein the dressing tool comprises one or more rings, which are placed between an inner and an outer drive gear of the polishing device and are set in rotation about the middle of the ring by one of the inner drive gear, the outer drive
15 gear, or both the inner and outer drive gears.

14. The method as recited in claim 12, wherein the profile is thinner at the inner edge than at the outer edge.

20 15. A method for a polishing semiconductor wafer via simultaneous double-side polishing in a gap between a lower polishing pad, disposed on a lower polishing plate, and an upper polishing pad, disposed on an upper polishing plate, of a polishing device while supplying a polishing agent, the polishing plates and the polishing pads having an
25 inner edge and an outer edge, the method comprising:

dressing, with a dressing tool, the upper polishing pad while rotating the upper polishing plate, the dressing tool being mounted in the gap in such a way that the dressing tool extends from the inner edge to the outer edge of the upper polishing pad; and, after the dressing,
30 double-side polishing the semiconductor wafer in the gap, wherein, during the dressing, a distance of the dressing tool from the lower polishing pad, at the inner edge of the lower polishing pad, differs from a distance at the outer edge of the lower polishing pad.

16. The method as recited in claim 15, further comprising, before the double-sided polishing, but subsequent to the dressing of the lower polishing pad:

dressing the upper polishing pad.

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17. The method as recited in claim 15, wherein one or more polishing methods are carried out before the at least one polishing pad undergoes subsequent dressing.

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18. The method as recited in claim 15, wherein the dressing imparts a profile to the gap between the upper and lower polishing pads such that a width of the gap at the inner edge of the polishing pads is greater than the width of the gap at the outer edge of the polishing pads.

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19. The method as recited in claim 15, wherein the dressing tool comprises one or more rings, which are placed between an inner and an outer drive gear of the polishing device and are set in rotation about the middle of the ring by one of the inner drive gear, the outer drive gear, or both the inner and outer drive gears.

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20. The method as recited in claim 18, wherein the profile is thinner at the inner edge than at the outer edge.