In the described cases, it would be desirable to eliminate these edge steps, the undesired coating in the edge region or the undesired thickness increase in the edge region.

This represents the object of the present invention.

According to an aspect of the invention, there is provided~~The object is achieved by~~ a method for locally polishing one side of a semiconductor wafer, in which the semiconductor wafer is pressed by means of a rotatable polishing head with its side surface to be polished against a polishing pad lying on a rotating polishing plate and containing firmly bound abrasive, wherein the polishing head is provided with a resilient membrane and radially subdivided into a plurality of chambers by means of gas or liquid cushions, and the exerted polishing pressure can be selected differently for each chamber, wherein the semiconductor wafer is held in position during this by a retainer ring which is likewise pressed against the polishing pad with an application pressure, wherein a polishing agent is introduced between the semiconductor wafer and the polishing pad, and the polishing pressure exerted on the semiconductor wafer in a chamber lying in the edge region of the semiconductor wafer of the polishing head, and the application pressure of the retainer ring, are selected so that the amount of the removed material is larger at the edge of the semiconductor wafer than at the other region of the semiconductor wafer, wherein pressure in an outer chamber is higher than the pressure in an inner chamber and wherein the retainer ring application pressure is 0.5-10 psi~~material is essentially removed only at the edge of the semiconductor wafer~~.

Basically, the semiconductor wafers are pressed with the aid of a "polishing head" with their side surface to be polished against the polishing pad lying on a polishing plate.

A polishing head also comprises a "retainer ring", which encloses the substrate laterally and prevents it from sliding off the polishing head during the polishing. Thus, in order to prevent the wafer from sliding out of the polishing head because of the transverse forces which occur during polishing,

Patent Claims:

1. A method for locally polishing one side of a semiconductor wafer, in which the semiconductor wafer is pressed by means of a rotatable polishing head with its side surface to be polished against a polishing pad lying on a rotating polishing plate and containing firmly bound abrasive, wherein the polishing head is provided with a resilient membrane and radially subdivided into a plurality of chambers by means of gas or liquid cushions, and the exerted polishing pressure can be selected differently for each chamber, wherein the semiconductor wafer is held in position during this by a retainer ring which is likewise pressed against the polishing pad with an application pressure, wherein a polishing agent is introduced between the semiconductor wafer and the polishing pad, and the polishing pressure exerted on the semiconductor wafer in a chamber lying in the edge region of the semiconductor wafer of the polishing head, and the application pressure of the retainer ring, are selected so that material is essentially removed only at the edge of the semiconductor wafer.

2. The method as claimed in claim 1, wherein the polishing agent is an aqueous solution of the compounds sodium carbonate (Na_2CO_3), potassium carbonate (K_2CO_3), sodium hydroxide (NaOH), potassium hydroxide (KOH), ammonium hydroxide (NH_4OH), tetramethylammonium hydroxide (TMAH) or any mixtures thereof.

3. The method as claimed in claim 2, wherein the pH of the polishing agent solution is from 11.0 to 12.5 and the proportion of said compounds in the polishing agent solution is from 0.01 to 10 wt.%.

4. The method as claimed in one of claims 1 to 3, wherein the polishing pad used contains abrasive substances selected from particles of oxides of the elements cerium, aluminum, silicon or zirconium, or particles of hard substances such as silicon carbide, boron nitride or diamond.

5. The method as claimed in one of claims 1 to 4, wherein the polishing pad contains abrasive with a particle size of 0.1-1.0 µm.

6. The method as claimed in claim 5, wherein the polishing pad contains abrasive with a particle size of 0.1-0.6 µm.

7. The method as claimed in claim 6, wherein the polishing pad contains abrasive with a particle size of 0.1-0.25 µm.

8. The method as claimed in one of claims 1 to 7, wherein retainer ring application pressure is 0.5-10 psi.

9. The method as claimed in one of claims 1 to 8, wherein pressure in the outer chamber is higher than the pressure in the inner chamber.

10. The method as claimed in one of claims 1 to 9, wherein the semiconductor wafer is a monocrystalline silicon wafer or a wafer comprising an SiGe layer, with a diameter of 300 mm or more.

PATENT CLAIMS

1. A method for locally polishing one side of a semiconductor wafer, in which the semiconductor wafer is pressed by means of a rotatable polishing head with its side surface to be polished against a polishing pad lying on a rotating polishing plate and containing fixedly bound abrasive, wherein the polishing head is provided with a resilient membrane and radially subdivided into a plurality of chambers by means of gas or liquid cushions, and the exerted polishing pressure can be selected differently for each chamber, wherein the semiconductor wafer is held in position during this by a retainer ring which is likewise pressed against the polishing pad with an application pressure, wherein a polishing agent is introduced between the semiconductor wafer and the polishing pad, and the polishing pressure exerted on the semiconductor wafer in a chamber lying in the edge region of the semiconductor wafer of the polishing head, and the application pressure of the retainer ring, are selected so that the amount of the removed material is larger at the edge of the semiconductor wafer than at the other region of the semiconductor wafer, wherein pressure in an outer chamber is higher than the pressure in an inner chamber and wherein the retainer ring application pressure is 0.5-10 psi.

2. The method as claimed in claim 1, wherein the polishing agent is an aqueous solution of the compounds sodium carbonate (Na_2CO_3), potassium carbonate (K_2CO_3), sodium hydroxide (NaOH), potassium hydroxide (KOH), ammonium hydroxide (NH_4OH), tetramethylammonium hydroxide (TMAH) or any mixtures thereof.

3. The method as claimed in claim 2, wherein the pH of the polishing agent solution is from 11.0 to 12.5 and the proportion of said compounds in the polishing agent solution is from 0.01 to 10 wt.%.

4. The method as claimed in one of claims 1 to 3, wherein the polishing pad used contains abrasive substances selected from particles of oxides of the elements cerium, aluminum, silicon or zirconium, or particles of hard substances including silicon carbide, boron nitride, or diamond.

5. The method as claimed in one of claims 1 to 3, wherein the polishing pad contains abrasive with a particle size of 0.1-1.0 µm.

6. The method as claimed in claim 5, wherein the polishing pad contains abrasive with a particle size of 0.1-0.6 µm.

7. The method as claimed in claim 6, wherein the polishing pad contains abrasive with a particle size of 0.1-0.25 µm.

8. The method as claimed in one of claims 1 to 3, wherein the semiconductor wafer is a monocrystalline silicon wafer or a wafer comprising an SiGe layer, with a diameter of 300 mm or more.