Claims

1. A method for producing semiconductor wafers and grading the semiconductor wafers with respect to suitability for device processing, comprising:

providing a single-crystal rod of silicon;

cutting the rod into crystal pieces;

removing a test wafer from a crystal piece;

subjecting the test wafer to a first thermal treatment method and thereafter a second thermal treatment method,

wherein the second thermal treatment method comprises a heating phase, a holding phase at a holding temperature T_h, and a cooling phase, and wherein during the holding phase, a radial temperature difference ΔT is established between a center and an edge on the test wafer;

cooling the test wafer and analyzing the test wafer with respect to stress fields using an SIRD measurement after cooling; and

utilizing the step of analyzing to decide whether semiconductor wafers obtained from a remainder of the crystal piece are to be used or not,

wherein the duration of the holding phase is from 10s to 10 min.

2. The method of claim 1, wherein the temperature of the holding phase Th, is between 900°C and 1100°C.

3. The method claim of claim 1, wherein the single-crystal rod is pulled by the Czochralski method.

4. The method of claim 1, wherein the single-crystal rod is pulled by the float zone method.

5. The method of claim 1, wherein the heating rate of the heating phase is less than 4 K/s and the cooling rate of the cooling phase is less than 5 K/s.

6. The method of claim 1, wherein the temperature difference between center and edge of the test wafer in the holding phase is between 1 K and 30 K.

7. The method of claim 1, wherein the temperature difference between center and edge of the test wafer in the holding phase is between 2 K and 5 K.

8. The method of claim 1, wherein the atmosphere of at least one thermal treatment step comprises at least one chemical substance selected from the group consisting of He, Ar, H_2, O_2, N_2, NH_3, CH_4, $SiHCl_3$, SiH_2Cl_2, SiH_4, $SiCl_4$, CH_4Cl_2Si, and H_2O.

9. The method of claim 1, wherein radial thermal gradients in both the heating phase and the cooling phase are less than the radial thermal gradient in the holding phase.

10. The method of claim 1, wherein the second thermal treatment step takes place using a susceptor whereon the semiconductor wafer lies over the whole of its area.

11. The method of claim 1, wherein the temperature of the holding phase T_h is between 700°C and 1410°C.

12. A method for producing semiconductor wafers and grading the semiconductor wafers with respect to suitability for device processing, comprising:

providing a single-crystal rod of silicon;

cutting the rod into crystal pieces;

removing a test wafer from a crystal piece;

subjecting the test wafer to a first thermal treatment method and thereafter a second thermal treatment method,

wherein the second thermal treatment method comprises a heating phase, a holding phase at a holding temperature T_h, and a cooling phase, and wherein during the holding phase, a radial temperature difference ΔT is established between a center and an edge on the test wafer;

cooling the test wafer and analyzing the test wafer with respect to stress fields using an SIRD measurement after cooling; and

utilizing the step of analyzing to decide whether semiconductor wafers obtained from a remainder of the crystal piece are to be used or not,

wherein the first thermal treatment method comprises heating the wafer at 780°C for 3 hours followed by heating at 1000°C for 16 hours.

13. The method of claim 1, wherein the first thermal treatment method has a thermal budget suitable for depositing a homoepitaxial layer or a heteroepitaxial layer of semiconductor material.

14. The method of claim 1, wherein the first thermal treatment method simulates a thermal budget for device processing on the wafer.