Claims

1. A process for producing semiconductor wafers comprising the following steps in the given sequence:

   1) Pulling of a single-crystal rod of a semiconductor material from a melt and optional cylindrical grinding of the rod,

   2) Removal of at least one wafer for analysis from the single-crystal rod,

   3) Performing a first thermal treatment step corresponding to the customer specification and performing a second thermal treatment step with the at least one wafer of semiconductor material, wherein in the second thermal treatment step a radial temperature gradient acts on at least one side of the semiconductor wafer from the inside outward or from the outside inward,

   4) Analysis of the wafer of semiconductor material treated in step 3 in respect of the possible formation/extent of stress fields, in the inner region of the wafer,

   5) Distinguishing of this wafer and the wafers separated from the rod section represented by this wafer into stress-optimized wafers conforming to the customer specification and rejected wafers not conforming to the customer specification.

2. The process for producing semiconductor wafers as claimed in claim 1, wherein the radial temperature gradient acts on all regions of the wafer excluding an edge region of the wafer at a distance of not more than 20 mm from the wafer edge.

3. The process as claimed in claim 2, wherein the radial temperature gradient acts on all regions of the wafer excluding an edge region of the wafer at a distance of not more than 10 mm from the wafer edge.

4. The process as claimed in any of claims 1 to 3, wherein the heat treatment step for generating a radial temperature gradient is effected by means of a plurality of radially arranged heat sources separately controllable in their radiation intensity.

5. The process for producing semiconductor wafers as claimed in any of claims 1 to 4, wherein the temperature gradient acting on the wafer extends over n adjacent radial zones, wherein n is an integer and is greater than 1.

6. The process for producing semiconductor wafers as claimed in claim 5, wherein the temperature gradient between two adjacent zones is 1 to 50 kelvin.

7. The process for producing semiconductor wafers as claimed in any of claims 1 to 6, wherein the thermal treatment comprises a heating phase, a holding phase and a cooling phase, wherein the holding phase corresponds to the heat treatment step for generating the radial temperature gradient acting on the wafer.

8. The process for producing semiconductor wafers as claimed in any of claims 1 to 7, wherein the thermal treatment step for generating a radial temperature gradient is carried out in a gas atmosphere comprising one or more gases selected from the group consisting of O_2, H_2, NH_3, He and Ar.

9. The process as claimed in any of claims 1 to 8, wherein the thermal treatment step in which a radial temperature gradient acts on the wafer is preceded by a thermal treatment of the wafer in which the wafer is subjected to a typical thermal budget encountered in customer processes.

10. The process as claimed in any of claims 1 to 9, wherein based on the determination of the stress fields in the at least one wafer the single-crystal rod from which this at least one wafer was removed is assigned a particular specification in respect of stress fields.