Claims

1. A semiconductor wafer made of single-crystal silicon with an oxygen concentration as per new ASTM of not less than 5.0 x 10^{17} atoms/ cm^3 and of not more than 6.5 x 10^{17} atoms/cm^3 and a nitrogen concentration as per new ASTM of not less than 1 x 10^{13} atoms/cm^3 and not more than 1.0 x 10^{14} atoms/cm^3,

wherein a front side of the semiconductor wafer is covered with an epitaxial layer made of silicon, wherein the semiconductor wafer comprises BMDs whose mean diagonal size is not more than 10 nm determined by transmission electron microscopy and whose mean density in a region adjacent to the epitaxial layer is not less than 1.0 x 10^{11} cm^{-3}, determined by reactive ion etching after having subjected the semiconductor wafer covered with the epitaxial layer to a heat treatment at a temperature of 780 °C for a period of 3 h and to a heat treatment at a temperature of 600 °C for a period of 10 h, and

wherein the semiconductor wafer is configured with a diameter of at least 200 mm, preferably at least 300 mm.

2. The semiconductor wafer according to claim 1, wherein the semiconductor wafer has a nickel getter efficiency of at least 95%, the nickel getter efficiency being defined as by the total intentional contamination of Ni minus the amount of Ni on both wafer surface regions compared to the total intentional contamination of Ni.

3. The semiconductor wafer according to any one of claims 1 and 2, wherein the mean density of BMDs decreases in the region adjacent to the epitaxial layer in depth direction.

4. The semiconductor wafer according to any one of claims 1 to 3, wherein dislocation loops are present in a region of the semiconductor wafer that is spaced apart from the interface between the epitaxial layer and the front side of the semiconductor wafer by not less than 2 µm and not more than 7 µm and that has a depth of at least 35 µm.

5. The semiconductor wafer according to any one of claims 1 to 4, wherein the oxygen concentration is not less than 5.7 x 10^{17} atoms/cm^3 and not more than 6.2 x 10^{17} atoms/cm^3.

6. A process for producing a semiconductor wafer made of single-crystal silicon, comprising:

pulling a single crystal from a melt containing nitrogen according to the CZ method in an atmosphere comprising hydrogen, the partial pressure of hydrogen in the atmosphere being not less than 5 Pa and not more than 30 Pa, such that in a section of the single crystal having a uniform diameter the oxygen concentration is not less than 5.0 x 10^{17} atoms/ cm^3 and not more than 6.5 x 10^{17} atoms/cm^3, the nitrogen concentration is not less than 1.0 x 10^{13} atoms/cm^3 and not more than 1.0 x 10^{14} atoms/$cm^{3;}$

controlling a pulling velocity V such that the single crystal in the section having a uniform diameter grows in a Pv region;

separating the semiconductor wafer from the section of the single crystal having a uniform diameter;

heat treating the semiconductor wafer from a temperature of 600 °C to a target temperature of at least 850 °C but not more than 900 °C at a rate of not less than 0.5 °C/min and not more than 2°C/min;

cooling the semiconductor wafer from the target temperature to a temperature of 600 °C at a rate of not less than 0.5 °C/min and not more than 2°C/min; and

depositing an epitaxial layer of silicon on a front side of the heat treated semiconductor wafer to form an epitaxial semiconductor wafer,

wherein the semiconductor wafer is configured with a diameter of at least 200 mm, preferably at least 300 mm.

7. The process according to claim 6, comprising

keeping the semiconductor wafer at the target temperature for a period of no longer than 180 min.