Claims

1. A semiconductor wafer made of single-crystal silicon with an interstitial oxygen concentration as per new ASTM of not less than 4,9 x 10^{17} atoms/ cm^3 and of not more than 6,5 x 10^{17} atoms/cm^3 and a nitrogen concentration of not less than 8 x 10^{12} atoms/cm^3 and not more than 5 x 10^{13} atoms/cm^3, wherein both oxygen and nitrogen concentrations are determined by infrared spectroscopy and calibration, wherein a frontside of the semiconductor wafer is covered with an epitaxial layer made of silicon, wherein the semiconductor wafer comprises BMDs of octahedral shape whose mean size is 13 to 35 nm and whose mean density is not less than 3 x 10^8 cm^{-3} and not more than 4 x 10^9 cm^{-3}, determined by IR tomography.

2. The wafer according to claim 1, wherein the wafer has a nickel getter efficiency of at least 80%.

3. The wafer according to any one of claims 1 and 2, wherein the TIS (total inner surface) of BMDs, defined as TIS = $4 * \pi * r^2 * D$, where r = mean radius of BMD and D is the mean BMD density, is from 4,0 x 10^{11} nm^2/cm^3 to 7,0 x 10^{12} nm^2/cm^3.

4. The wafer according to any one of claims 1 to 3, wherein the nitrogen concentration is not less than 9 x 10^{12} atoms/cm^3 and not more than 3,5 x 10^{13} atoms/cm^3.

5. The wafer according to any one of claims 1 to 4, wherein the interstitial oxygen concentration is not less than 5,15 x 10^{17} atoms/cm^3 and not more than 5,75 x 10^{17} atoms/cm^3.

6. The wafer according to any one of claims 1 to 5, wherein the BMDs of octahedral shape have a mean size of 20 to 27 nm.

7. The wafer according to any one of claims 1 to 6, wherein the mean density of the octahedral BMDs is not less than 1,0 x 10^9 cm^{-3} and not more than 3,0 x 10^9 cm^{-3}, determined by IR tomography.

8. The wafer according to any one of claims 1 to 7, wherein the octahedral BMD shape is stable after thermal treatments at 1000°C for 5 hours in a depth of at least 100 µm.

9. A process for producing a semiconductor wafer made of single-crystal silicon, comprising pulling a single crystal from a melt according to the CZ method in an atmosphere comprising hydrogen, wherein nitrogen has been added to the melt, so that in a section of the single crystal having a uniform diameter the interstitial oxygen concentration is not less than 4.9 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 8 x 10^{12} atoms/cm^3 and not more than 5 x 10^{13} atoms/cm^3, wherein both oxygen and nitrogen concentrations are determined by infrared spectroscopy and calibration; and the hydrogen concentration is not less than 3 x 10^{13} atoms/cm^3 and not more than 8 x 10^{13} atoms/cm^3;
controlling a pulling velocity V such that it is within a span ΔV within which the single crystal in the section having a uniform diameter grows in a Pv region, wherein the pulling velocity V is in a subrange of the span which comprises 39% of the span and a lowest pulling velocity of the span is 26% greater than a pulling velocity at the transition from the Pv region to a Pi region;
and separating the semiconductor wafer from the section of the single crystal having a uniform diameter;
depositing an epitaxial layer of silicon on a frontside of the separated semiconductor wafer to form an epitaxial wafer;
heat treating the epitaxial wafer at a temperature of 1015-1035 °C for 1 to 1,75 hours in an ambient comprising Ar, N_2, O_2 or mixtures thereof.

10. The process according to claim 9, wherein the epitaxial wafer is heat treated at a temperature of 770-790 °C for 20 to 200 minutes in a first step and at a temperature of 1015-1035 °C for 1 to 1,75 hours in a second and final step.