CLAIMS

1. A method of inspecting a silicon single crystal, which comprises:

decorating with copper a surface of a sample cut out of a silicon single crystal ingot with an interstitial oxygen concentration, according to old American Society for Testing and Materials (old ASTM), of less than 12E17 atoms/cm^3 that has been grown by the Czochralski process;

subjecting the decorated sample to a heating and cooling treatment comprising heating the sample for equal to or more than five minutes at a temperature region of equal to or higher than 700°C but less than 800°C followed by rapidly cooling the sample from the temperature region at a cooling rate exceeding 2.5°C/minute;

selectively etching the surface of the sample following the heating and cooling treatment; and

specifying an L/D region based on a localized state of pits on the surface of the sample following the selective etching.

2. A method of inspecting a silicon single crystal, which comprises:

subjecting one of two samples, that have been cut out of a silicon single crystal ingot with an interstitial oxygen concentration, according to old American Society for Testing and Materials (old ASTM), of less than 12E17 atoms/cm^3 that has been grown by the Czochralski process as well as have approximately the same crystal region distribution each other, to a pretreatment comprising heating within a temperature region of 750°C to 900°C and then heating within a temperature region of 1,000°C to 1,150°C;

decorating surfaces of the two samples with copper;

subjecting the decorated samples to a heating and cooling treatment comprising heating the samples for equal to or more than five minutes at a temperature region of equal to or higher than 700°C but less than 800°C followed by rapidly cooling the samples from the temperature region at a cooling rate exceeding 2.5°C/minute;

selectively etching the surfaces of the samples following the heating and cooling treatment; and

specifying a B-band region based on a result of comparing a localized state of pits on the surface of the sample subjected to the pretreatment and that of the sample not subjected to the pretreatment following the selective etching.

3. The method of inspecting a silicon single crystal according to claim 1 or

2, wherein the selective etching is carried out by Wright etching.

4. The method of inspecting a silicon single crystal according to any of claims 1 to 3, wherein the copper decoration is carried out by immersing the sample in a copper-containing solution with a copper concentration of equal to or greater than 3E20 atoms/cm^3.

5. A method of manufacturing a silicon single crystal, which comprises:

growing a silicon single crystal to be inspected by the Czochralski process;

inspecting the silicon single crystal to be inspected by the method of inspecting according to any of claims 1 to 4;

determining a condition of pulling a silicon single crystal based on a result of the inspection; and

growing a silicon single crystal by the Czochralski process under the determined pulling condition to obtain a silicon single crystal that contains neither an L/D region nor a B-band region.

CLAIMS

1. A method of inspecting a silicon single crystal, which comprises:

decorating with copper a surface of a sample cut out of a silicon single crystal ingot with an interstitial oxygen concentration, according to old American Society for Testing and Materials (old ASTM) of less than 12E17 atoms/cm^3 that has been grown by the Czochralski process;

subjecting the decorated sample to a heating and cooling treatment comprising heating the sample for equal to or more than five minutes at a temperature region of equal to or higher than 700°C but less than 800°C followed by rapidly cooling the sample from the temperature region at a cooling rate exceeding 2.5°C/minute so that copper does not diffuse beyond an L/D region;

selectively etching the surface of the sample following the heating and cooling treatment; and

specifying the L/D region based on a localized state of pits on the surface of the sample following the selective etching.

2. A method of inspecting a silicon single crystal, which comprises:

subjecting one of two samples, that have been cut out of a silicon single crystal ingot with an interstitial oxygen concentration, according to old American Society for Testing and Materials (old ASTM), of less than 12E17 atoms/cm^3 that has been grown by the Czochralski process as well as have the same crystal region distribution each other, to a pretreatment comprising heating within a temperature region of 750°C to 900°C and then heating within a temperature region of 1000°C to 1150°C;

decorating surfaces of the two samples with copper;

subjecting the decorated samples to a heating and cooling treatment comprising heating the samples for equal to or more than five minutes at a temperature region of equal to or higher than 700°C but less than 800°C followed by rapidly cooling the samples from the temperature region at a cooling rate exceeding 2.5°C/minute;

selectively etching the surfaces of the samples following the heating and cooling treatment; and

specifying a B-band region based on a result of comparing a localized state of pits on the surface of the sample subjected to the pretreatment and that of the sample not subjected to the pretreatment following the selective etching.

3. The method of inspecting a silicon single crystal according to claim 1 or 2, wherein the selective etching is carried out by Wright etching.

4. The method of inspecting a silicon single crystal according to claim 1 or 2, wherein the copper decoration is carried out by immersing the sample in a copper-containing solution with a copper concentration of equal to or greater than 3E20 atoms/cm^3.

5. A method of manufacturing a silicon single crystal, which comprises:

growing a silicon single crystal to be inspected by the Czochralski process;

inspecting the silicon single crystal to be inspected by the method of inspecting according to claim 1 or 2;

determining a condition of pulling a silicon single crystal based on a result of the inspection; and

growing a silicon single crystal by the Czochralski process under the determined pulling condition to obtain a silicon single crystal that contains neither an L/D region nor a B-band region.