CLAIMS:

1. A method of controlling resistivity of a single crystal silicon ingot grown by the Czochralski method, the method comprising:

contacting a silicon seed crystal with a silicon melt, wherein the silicon melt is contained within a crucible and comprises molten silicon;

withdrawing the silicon seed crystal from the silicon melt to form a sample rod comprising single crystal silicon, the sample rod having a generally cylindrical main body and comprising a central axis; a circumferential edge; and a relatively constant diameter;

slicing a slab from the sample rod, the slab comprising a longitudinal plane encompassing at least a portion of the central axis of the sample rod and having a thickness;

annealing the slab to annihilate thermal donors, wherein the slab is annealed at a temperature of at least 500°C for no more than 60 minutes;

after annealing the slab, lapping the slab;

after lapping the slab, irradiating the slab with infrared light for between 10 minutes and two hours to enhance a resistivity relaxation rate of the slab; and

after irradiating the slab, measuring a resistivity of the slab after the slab has a temperature less than 30°C.

2. The method of claim 1 wherein the central axis of the sample rod is between 100 millimeters and 500 millimeters in length, such as between 150 millimeters and 300 millimeters in length.

3. The method of claim 1 wherein the diameter of the sample rod is less than 150 mm or less than 100 mm, less than 50 mm, less than 25 mm, or less than 20 mm (e.g., from 5 mm to 150 mm, from 5 mm to 100 mm, from 5 mm to 50 mm, from 5 mm to 25 mm or from 10 mm to 25 mm).

4. The method of claim 1 wherein the thickness of the slab is between 1 millimeter and 3 millimeter.

5. The method of claim 1 further comprising growing a single crystal silicon ingot from the silicon melt.

6. The method of claim 5 wherein the single crystal silicon ingot has a resistivity of at least 500 Ω-cm, at least 1,000 Ω-cm, at least 1,500 Ω-cm, at least 2,000 Ω-cm, at least 4,000 Ω-cm, at least 6,000 Ω-cm, at least 8,000 Ω-cm, or at least 10,000 Ω-cm, or from 500 Ω-cm to 50,000 ohm-cm, from 1,000 Ω-cm to 50,000 ohm-cm, from 1,500 Ω-cm to 50,000 ohm-cm, or from 8,000 Ω-cm to 50,000 Ω-cm.

7. The method of any one of claims 1 through 6 further comprising, after measuring the resistivity of the slab:

adding a dopant to the silicon melt; and

growing a single crystal silicon ingot from the silicon melt having a resistivity different from the resistivity of the sample rod.

8. The method of claim 7 wherein the single crystal silicon ingot has a resistivity of at least 500 Ω-cm, at least 1,000 Ω-cm, at least 1,500 Ω-cm, at least 2,000 Ω-cm, at least 4,000 Ω-cm, at least 6,000 Ω-cm, at least 8,000 Ω-cm, or at least 10,000 Ω-cm, or from 500 Ω-cm to 50,000 ohm-cm, from 1,000 Ω-cm to 50,000 ohm-cm, from 1,500 Ω-cm to 50,000 ohm-cm, or from 8,000 Ω-cm to 50,000 Ω-cm.

9. The method of claim 7 wherein the single crystal silicon ingot is a p-type single crystal silicon ingot and the added dopant is selected from the group consisting of phosphorus, arsenic, and antimony and wherein the dopant is added to increase the resistivity of the p-type single crystal silicon ingot.

10. The method of claim 9 wherein the single crystal silicon ingot has a resistivity of at least 500 Ω-cm, at least 1,000 Ω-cm, at least 1,500 Ω-cm, at least 2,000 Ω-cm, at least 4,000 Ω-cm, at least 6,000 Ω-cm, at least 8,000 Ω-cm, or at least 10,000 Ω-cm, or from 500 Ω-cm to 50,000 ohm-cm, from 1,000 Ω-cm to 50,000 ohm-cm, from 1,500 Ω-cm to 50,000 ohm-cm, or from 8,000 Ω-cm to 50,000 Ω-cm.

11. The method of claim 7 wherein the single crystal silicon ingot is a p-type single crystal silicon ingot and the added dopant is selected from the group consisting of

boron, gallium, and aluminum and wherein the dopant is added to decrease the resistivity of the p-type single crystal silicon ingot.

12. The method of claim 11 wherein the single crystal silicon ingot has a resistivity of at least 500 Ω-cm, at least 1,000 Ω-cm, at least 1,500 Ω-cm, at least 2,000 Ω-cm, at least 4,000 Ω-cm, at least 6,000 Ω-cm, at least 8,000 Ω-cm, or at least 10,000 Ω-cm, or from 500 Ω-cm to 50,000 ohm-cm, from 1,000 Ω-cm to 50,000 ohm-cm, from 1,500 Ω-cm to 50,000 ohm-cm, or from 8,000 Ω-cm to 50,000 Ω-cm.

13. The method of claim 7 wherein the single crystal silicon ingot is a n-type single crystal silicon ingot and the added dopant is selected from the group consisting of boron, gallium, and aluminum and wherein the dopant is added to increase the resistivity of the n-type single crystal silicon ingot.

14. The method of claim 13 wherein the single crystal silicon ingot has a resistivity of at least 500 Ω-cm, at least 1,000 Ω-cm, at least 1,500 Ω-cm, at least 2,000 Ω-cm, at least 4,000 Ω-cm, at least 6,000 Ω-cm, at least 8,000 Ω-cm, or at least 10,000 Ω-cm, or from 500 Ω-cm to 50,000 ohm-cm, from 1,000 Ω-cm to 50,000 ohm-cm, from 1,500 Ω-cm to 50,000 ohm-cm, or from 8,000 Ω-cm to 50,000 Ω-cm.

15. The method of claim 7 wherein the single crystal silicon ingot is a n-type single crystal silicon ingot and the added dopant is selected from the group consisting of phosphorus, arsenic, and antimony and wherein the dopant is added to decrease the resistivity of the n-type single crystal silicon ingot.

16. The method of claim 15 wherein the single crystal silicon ingot has a resistivity of at least 500 Ω-cm, at least 1,000 Ω-cm, at least 1,500 Ω-cm, at least 2,000 Ω-cm, at least 4,000 Ω-cm, at least 6,000 Ω-cm, at least 8,000 Ω-cm, or at least 10,000 Ω-cm, or from 500 Ω-cm to 50,000 ohm-cm, from 1,000 Ω-cm to 50,000 ohm-cm, from 1,500 Ω-cm to 50,000 ohm-cm, or from 8,000 Ω-cm to 50,000 Ω-cm.

17. The method of any one of claims 1 through 16 wherein the anneal to annihilate thermal donors comprises annealing the slab at a temperature greater than 600°C for no more than 60 minutes, or 30 minutes.

18. The method of any one of claims 1 through 16 wherein the anneal to annihilate thermal donors comprises annealing the slab to a temperature of 720°C for two minutes.

19. The method of any one of claims 1 through 18 wherein the slab is irradiated with light having a wavelength between 0.75 micrometers and 1000 micrometers.

20. The method of any one of claims 1 through 18 wherein the slab is irradiated with light having a wavelength between 400 nanometers and 4.5 micrometers.

21. The method of any one of claims 1 through 18 wherein the slab is irradiated with light at an intensity sufficient to increase the temperature of the slab to a temperature of at least 50°C.

22. The method of claim 21 wherein the slab is irradiated at the temperature of at least 50°C for at least 10 minutes.

23. The method of claim 21 wherein the slab is irradiated at the temperature of at least 50°C for between 10 minutes and about two hours.

24. The method of claim 21 wherein the slab is irradiated at the temperature of at least 50°C for between 10 minutes and about one hour.

25. The method of any one of claims 1 through 24 wherein the resistivity of the slab is measured at a plurality of points along the central axis.