CLAIMS:

1. A method of treating a single crystal silicon wafer, the method comprising:

heat treating the single crystal silicon wafer in a first ambient atmosphere comprising a nitrogen-containing gas at a temperature of at least about 1100°C to increase a density of crystal lattice vacancies in a bulk region of the single crystal silicon wafer and to form a silicon nitride layer on a front surface of the single crystal silicon wafer, wherein the single crystal silicon wafer comprises two major, parallel surfaces, one of which is the front surface and one of which is a back surface, a central plane between the front surface and the back surface, a circumferential edge joining the front surface and the back surface, a front surface layer having a depth, D, measured from the front surface and toward the central plane, and wherein the bulk region is between the front surface layer and the central plane;

removing the silicon nitride layer from the front surface of the single crystal silicon wafer;

heat treating the single crystal silicon wafer in a second ambient atmosphere comprising oxygen and a temperature between about 900°C and about 1100 °C for a duration greater than 30 minutes to form a silicon oxide layer on the front surface of the single crystal silicon wafer having a minimum thickness of at least about 50 Ångströms; and

removing the silicon oxide layer from the front surface of the single crystal silicon wafer;

wherein the single crystal silicon wafer is heated treated in the first ambient atmosphere comprising the nitrogen-containing gas at a temperature of between about 1100°C and about 1200 °C for a duration between about 1 second and about 60 seconds, and then heat treated in the first ambient atmosphere comprising the nitrogen-containing gas at a temperature of between about 1200°C and about 1300°C for a duration between about 1 second and about 60 seconds; and

wherein the front surface layer comprises oxygen precipitates at a density of less than about $1\times10^{7}\ cm^{-3}$ after heat treating in the second ambient atmosphere comprising

oxygen, and further wherein the depth, D, of the front surface layer is less than about 5 micrometers.

2. The process of claim 1 wherein the first ambient atmosphere comprising the nitrogen-containing gas comprises nitrogen, ammonia, or a combination of nitrogen and ammonia.

3. The process of claim 1 wherein the single crystal silicon wafer is heated treated in the first ambient atmosphere comprising the nitrogen-containing gas at a temperature of at least about 1100°C for a duration between about 1 second and about 120 seconds.

4. The process of claim 1 wherein the single crystal silicon wafer is heated treated in the first ambient atmosphere comprising the nitrogen-containing gas at a temperature of at least about 1100°C for a duration between about 1 second and about 60 seconds.

5. The process of claims1 wherein the silicon nitride layer is removed by polishing, chemical etching, or plasma etching.

6. The process of claim 1 wherein the second ambient atmosphere comprising the oxygen-containing gas comprises oxygen, steam, or a combination of oxygen and steam.

7. The process of claim 1 wherein the single crystal silicon wafer is heated treated in the second ambient atmosphere comprising the oxygen-containing gas at a temperature of between about 900°C and about 1100°C for a duration greater than 120 minutes.

8. The process of claim 1 wherein the single crystal silicon wafer is heated treated in the second ambient atmosphere comprising the oxygen-containing gas at a temperature of between about 950°C and about 1100°C for a duration greater than 60 minutes.

9. The process of any claim 1 wherein the single crystal silicon wafer is heated treated in the second ambient atmosphere comprising the oxygen-containing gas

at a temperature of between about 1000°C and about 1100°C for a duration greater than 30 minutes.

10. The process of claim 1 wherein the bulk region comprises oxygen precipitates at a density of at least about $1\times10^{8}\ cm^{-3}$ after heat treating in the second ambient atmosphere comprising oxygen.

11. The process of claim 1 wherein the bulk region comprises oxygen precipitates at a density of at least about $1\times10^{9}\ cm^{-3}$ after heat treating in the second ambient atmosphere comprising oxygen.

12. The process of claim 1 wherein the bulk region comprises oxygen precipitates at a peak density of at least about $5\times10^{9}\ cm^{-3}$ after heat treating in the second ambient atmosphere comprising oxygen.

13. The process of claim 1 wherein the front surface layer comprises oxygen precipitates at a density of less than about $1\times10^{6}\ cm^{-3}$ after heat treating in the second ambient atmosphere comprising oxygen, and further wherein the depth, D, of the front surface layer is less than about 40 micrometers.

14. The process of claim 13 wherein the depth, D, of the front surface layer is at least about 5 micrometers.

15. The process of claim 1 wherein the silicon oxide layer is removed by polishing, chemical etching, or plasma etching.