CLAIMS

1. A semiconductor device inspection method, comprising:

a step of supplying power to a semiconductor device and measuring electrical characteristics of the semiconductor device according to the supply of the power;

a step of scanning the semiconductor device with light intensity-modulated with a first frequency and light intensity-modulated with a second frequency higher than the first frequency and acquiring a characteristic signal indicating the electrical characteristics of the first frequency component and the second frequency component according to the scanning;

a step of correcting a phase component of the characteristic signal at an arbitrary scanning position with a phase component of the characteristic signal at a first scanning position reflecting the electrical characteristics of a first position in an optical axis direction of the light in the semiconductor device as a reference;

a step of specifying a phase component of the characteristic signal at a second scanning position reflecting the electrical characteristics of a second position different from the first position in the optical axis direction of the light in the semiconductor device and normalizing the phase component of the characteristic signal at the arbitrary scanning position by using the phase component; and

a step of outputting a result based on the normalized phase component of the characteristic signal at the arbitrary scanning position,

wherein the arbitrary scanning position encompasses the first scanning position and the second scanning position.

2. The semiconductor device inspection method according to claim 1,

wherein, in the step of correcting, the phase component of the characteristic signal at the arbitrary scanning position is corrected so as to cancel out the phase component of the characteristic signal at the first scanning position.

3. The semiconductor device inspection method according to claim 1 or 2,

wherein, in the step of normalizing, the phase component of the characteristic signal at the second scanning position is specified based on a change in the corrected phase component of the characteristic signal between the first frequency and the second frequency.

4. The semiconductor device inspection method according to claim 3,

wherein the first position is closer to an emission source of the light than the second position, and

in the step of normalizing, a scanning position where the change in the corrected phase component of the characteristic signal between the first frequency and the second frequency is relatively large is set as the second scanning position.

5. The semiconductor device inspection method according to any one of claims 1 to 4,

wherein, in the step of normalizing, a change in the phase component of the characteristic signal at the arbitrary scanning position between the first frequency and the second frequency is normalized with a change in the phase component of the characteristic signal at the second

scanning position between the first frequency and the second frequency as a reference.

6. The semiconductor device inspection method according to claim 3,

wherein, in the step of acquiring, the semiconductor device is further scanned with light intensity-modulated with a frequency other than the first and second frequencies and a characteristic signal is acquired, and

in the step of normalizing, a scanning position where a change of the corrected phase component of the characteristic signal with respect to a square root of a frequency is linear is set as the second scanning position.

7. The semiconductor device inspection method according to claim 6,

wherein, in the step of normalizing, a rate of change of the phase component of the characteristic signal at the arbitrary scanning position with respect to the square root of the frequency is normalized by using a rate of change of the phase component of the characteristic signal at the second scanning position with respect to the square root of the frequency.

8. The semiconductor device inspection method according to any one of claims 1 to 7,

wherein, in the step of outputting, an image showing a change of the phase component of the characteristic signal at the arbitrary scanning position with respect to a frequency is output.

9. The semiconductor device inspection method according to any one of claims 1 to 7,

wherein, in the step of outputting, at least an image showing the electrical characteristics of the first position at the arbitrary scanning position and an image showing the electrical characteristics of the second position at the arbitrary scanning position are output based on a change of the phase component of the characteristic signal at the arbitrary scanning position with respect to a frequency.

10. A semiconductor device inspection device, comprising:

a measuring device configured to supply power to a semiconductor device and measure electrical characteristics of the semiconductor device according to the supply of the power;

an optical scanning device configured to scan the semiconductor device with light intensity-modulated with a first frequency and light intensity-modulated with a second frequency higher than the first frequency;

a signal acquisition device configured to acquire a characteristic signal indicating the electrical characteristics of the first frequency component and the second frequency component according to the scanning of the light; and

a processor configured to process the characteristic signal,

wherein the processor corrects a phase component of the characteristic signal at an arbitrary scanning position with a phase component of the characteristic signal at a first scanning position reflecting the electrical characteristics of a first position in an optical axis direction of the light in the semiconductor device as a reference, specifies a phase component of the characteristic signal at a second scanning position reflecting the electrical characteristics of a second position

different from the first position in the optical axis direction of the light in the semiconductor device, normalizes the phase component of the characteristic signal at the arbitrary scanning position by using the phase component, and outputs a result based on the normalized phase component of the characteristic signal at the arbitrary scanning position,

wherein the arbitrary scanning position encompasses the first scanning position and the second scanning position.

11. The semiconductor device inspection device according to claim 10,

wherein the processor corrects the phase component of the characteristic signal at the arbitrary scanning position so as to cancel out the phase component of the characteristic signal at the first scanning position.

12. The semiconductor device inspection device according to claim 10 or 11,

wherein the processor specifies the phase component of the characteristic signal at the second scanning position based on a change in the corrected phase component of the characteristic signal between the first frequency and the second frequency.

13. The semiconductor device inspection device according to claim 12,

wherein the first position is closer to an emission source of the light than the second position, and

the processor sets, as the second scanning position, a scanning position where the change in the corrected phase component of the characteristic signal between the first frequency and the second frequency

is relatively large.

14. The semiconductor device inspection device according to any one of claims 10 to 13,

wherein the processor normalizes a change in the phase component of the characteristic signal at the arbitrary scanning position between the first frequency and the second frequency with a change in the phase component of the characteristic signal at the second scanning position between the first frequency and the second frequency as a reference.

15. The semiconductor device inspection device according to claim 12,

wherein the processor further scans the semiconductor device with light intensity-modulated with a frequency other than the first and second frequencies and acquires a characteristic signal, and

a scanning position where a change of the corrected phase component of the characteristic signal with respect to a square root of a frequency is linear is set as the second scanning position.

16. The semiconductor device inspection device according to claim 15,

wherein the processor normalizes a rate of change of the phase component of the characteristic signal at the arbitrary scanning position with respect to the square root of the frequency by using a rate of change of the phase component of the characteristic signal at the second scanning position with respect to the square root of the frequency.

17. The semiconductor device inspection device according to any one of claims 10 to 16,

wherein the processor outputs an image showing a change of the phase component of the characteristic signal at the arbitrary scanning position with respect to a frequency.

18. The semiconductor device inspection device according to any one of claims 10 to 16,

wherein the processor outputs at least an image showing the electrical characteristics of the first position at the arbitrary scanning position and an image showing the electrical characteristics of the second position at the arbitrary scanning position based on a change of the phase component of the characteristic signal at the arbitrary scanning position with respect to a frequency.