

CLAIMS

[Claim 1]

A semiconductor fault analysis device comprising:

5 a first analysis part comprising a first optical detection part, a first optical system and a first drive part, wherein the first optical detection part is configured to receive light emitted by a semiconductor device via the first optical system, and the first optical system is configured to be moved relative to the semiconductor device by the first drive part;

10 a second analysis part comprising a second optical detection part, a second optical system, and a second drive part, wherein the second optical detection part is configured to receive light emitted by the semiconductor device via the second optical system, and the second optical system is configured to be moved relative to the semiconductor device by the second drive part;

15 a device arrangement part having a third drive part and a chuck, the chuck being disposed between the first analysis part and the second analysis part to hold the semiconductor device and provided with a target that aligns an optical axis of the first optical system with an optical axis of the second optical system, the chuck being configured to be moved
20 relative to the first analysis part and the second analysis part by the third drive part;

a stimulus signal application part configured to apply a stimulus signal to the semiconductor device; and

25 a control part configured to output a command to the first analysis part, the second analysis part, the device arrangement part, and the stimulus signal application part,

wherein the target is detectable by the first analysis part from one side of the target and is detectable by the second analysis part from the other side of the target, and

the control part is configured to output an alignment command that moves the chuck to a position at which the target is detectable by the first optical detection part and then aligns the optical axis of the second optical system with the optical axis of the first optical system with the target as a reference to the second analysis part and the device arrangement part by the first and second drive parts, and output an analysis command that applies a stimulus signal to the semiconductor device and receives light from the semiconductor device emitted according to the stimulus signal with at least one of the first optical detection part and the second optical detection part in a state in which a positional relationship between the optical axis of the first optical system and the optical axis of the second optical system is maintained to the first analysis part, the second analysis part, the stimulus signal application part, and the device arrangement part.

[Claim 2]

The semiconductor fault analysis device according to claim 1, wherein the alignment command is configured to cause the first optical detection part to acquire a first image of the target from one side, cause the second optical detection part to acquire a second image of the target from the other side, and move the second optical system based on the first image and the second image so that the optical axis of the second optical system is aligned with the optical axis of the first optical system.

[Claim 3]

The semiconductor fault analysis device according to claim 1 or 2, wherein the analysis command is configured to cause the chuck to be moved by the third drive part so that the semiconductor device overlaps the optical axis of the first optical system and the optical axis of the second optical system and then causes the semiconductor device to be analyzed.

[Claim 4]

The semiconductor fault analysis device according to any one of claims 1 to 3, wherein the target is provided at a position different from a device holding part in which the semiconductor device is held in the chuck.

[Claim 5]

The semiconductor fault analysis device according to any one of claims 1 to 4, wherein the first optical detection part is configured to acquire a first image of the target seen from one side, and

the second optical detection part is configured to acquire a second image of the target seen from the other side.

[Claim 6]

The semiconductor fault analysis device according to any one of claims 1 to 5, wherein the target includes a light transmission part which transmits light that is detectable by the first optical detection part and the second optical detection part.

[Claim 7]

A semiconductor fault analysis device comprising:

a first analysis part comprising a first light source, and a first optical system, wherein the first analysis part is configured to irradiate a

semiconductor device with light generated by the first light source via the first optical system having a first optical scanning part;

a second analysis part comprising a second light source and a second optical system, wherein the second analysis part is configured to irradiate the semiconductor device with light generated by the second light source via the second optical system having a second optical scanning part;

a device arrangement part having a third drive part and a chuck, the chuck being disposed between the first analysis part and the second analysis part to hold the semiconductor device and provided with a target that aligns a center of an optical scanning region of the first optical system with a center of an optical scanning region of the second optical system, the chuck being configured to be moved relative to the first analysis part and the second analysis part by the third drive part;

an electrical signal acquisition part configured to receive an electrical signal output by the semiconductor device; and

a control part configured to output a command to the first analysis part, the second analysis part, the device arrangement part, and the electrical signal acquisition part,

wherein the target is detectable by the first analysis part from one side of the target and is detectable by the second analysis part from the other side of the target, and

the control part is configured to output an alignment command that moves the chuck to a position at which the target is detectable by the first analysis part and then aligns the center of the optical scanning region of the second optical system with the center of the optical scanning region

of the first optical system with the target as a reference to the second analysis part and the device arrangement part by the first and second drive parts, and output an analysis command that irradiates the semiconductor device with light from at least one of the first analysis part and the second analysis part and receives an electrical signal from the semiconductor device by the electrical signal acquisition part in a state in which a positional relationship between the center of the optical scanning region of the first optical system and the center of the optical scanning region of the second optical system is maintained to the first analysis part, the second analysis part, the electrical signal acquisition part, and the device arrangement part.

[Claim 8]

The semiconductor fault analysis device according to claim 7, wherein the first analysis part includes a first optical detection part that is configured to receive light from one side of the semiconductor device,

the second analysis part includes a second optical detection part that is configured to receive light from the other side of the semiconductor device, and

the alignment command is configured to align the center of the scanning region of the first optical system with the center of the scanning region of the second optical system by causing the first optical detection part to acquire a first image of the target from one side, causing the second optical detection part to acquire a second image of the target from the other side, and aligning the optical axis of the second optical system with the optical axis of the first optical system based on the first image and the second image.

[Claim 9]

The semiconductor fault analysis device according to claim 7 or 8, wherein the analysis command is configured to cause the chuck to be moved by the third drive part so that the semiconductor device overlaps the optical scanning region of the first optical system and the optical scanning region of the second optical system and then cause the semiconductor device to be analyzed.

[Claim 10]

The semiconductor fault analysis device according to any one of claims 7 to 9, wherein the target is provided at a position different from a device holding part in which the semiconductor device is held in the chuck.

[Claim 11]

The semiconductor fault analysis device according to any one of claims 8 to 10, wherein the first analysis part includes a first optical detection part that is configured to receive light from one side of the semiconductor device,

the second analysis part includes a second optical detection part that is configured to receive light from the other side of the semiconductor device,

the first optical detection part is configured to acquire a first image of the target seen from one side, and

the second optical detection part is configured to acquire a second image of the target seen from the other side.

[Claim 12]

The semiconductor fault analysis device according to any one of claims 8 to 11, wherein the first analysis part includes a first optical detection part that is configured to receive light from one side of the semiconductor device,

5 the second analysis part includes a second optical detection part that is configured to receive light from the other side of the semiconductor device, and

 the target includes a light transmission part which is configured to transmit light that is detectable by the first optical detection part and
10 the second optical detection part.

[Claim 13]

A semiconductor fault analysis device comprising:

 a first analysis part comprising a first light source, a first optical system, and a first optical detection part, wherein a semiconductor device
15 is irradiated with light generated by the first light source via the first optical system having a first optical scanning part, and the first optical detection part is configured to receive first response light from the semiconductor device generated according to the light of the first light source;

20 a second analysis part comprising a second light source, a second optical system, and a second optical detection part, wherein the semiconductor device is irradiated with light generated by the second light source via the second optical system having a second optical scanning part, and the second optical detection part is configured to
25 receive second response light from the semiconductor device generated according to the light of the second light source;

a device arrangement part having a third drive part and a chuck, the chuck being disposed between the first analysis part and the second analysis part to hold the semiconductor device and provided with a target that aligns a center of an optical scanning region of the first optical system with a center of an optical scanning region of the second optical system, the chuck being configured to be moved relative to the first analysis part and the second analysis part by the third drive part;

a stimulus signal application part configured to apply a stimulus signal to the semiconductor device; and

a control part configured to output a command to the first analysis part, the second analysis part, the device arrangement part, and the stimulus signal application part,

wherein the target is detectable by the first analysis part from one side of the target and is detectable by the second analysis part from the other side of the target, and

the control part is configured to output an alignment command that moves the chuck to a position at which the target is detectable by the first optical detection part and then aligns the center of the optical scanning region of the second optical system with the center of the optical scanning region of the first optical system with the target as a reference to the second analysis part and the device arrangement part by the first and second drive parts, and output an analysis command that irradiates the semiconductor device with light from at least one of the first analysis part and the second analysis part and receives at least one of the first response light and the second response light from the semiconductor device with at least one of the first optical detection part and the second

optical detection part in a state in which a positional relationship between the center of the optical scanning region of the first optical system and the center of the optical scanning region of the second optical system is maintained and the stimulus signal is applied to the semiconductor device to the first analysis part, the second analysis part, the stimulus signal application part, and the device arrangement part.

[Claim 14]

The semiconductor fault analysis device according to claim 13, wherein the alignment command is configured to align the center of the scanning region of the first optical system with the center of the scanning region of the second optical system by causing the first optical detection part to acquire a first image of the target from one side, causing the second optical detection part to acquire a second image of the target from the other side, and aligning the optical axis of the second optical system with the optical axis of the first optical system based on the first image and the second image.

[Claim 15]

The semiconductor fault analysis device according to claim 12 or 13, wherein the analysis command is configured to cause the chuck to be moved by a third drive part included in the device arrangement part so that the semiconductor device overlaps the optical scanning region of the first optical system and the optical scanning region of the second optical system and then causes the semiconductor device to be analyzed.

[Claim 16]

The semiconductor fault analysis device according to any one of claims 12 to 14, wherein the target is provided at a position different from

a device holding part in which the semiconductor device is held in the chuck.

[Claim 17]

The semiconductor fault analysis device according to any one of
5 claims 12 to 15, wherein the first optical detection part is configured to acquire a first image of the target seen from one side, and

the second optical detection part is configured to acquire a second image of the target seen from the other side.

[Claim 18]

10 The semiconductor fault analysis device according to any one of claims 12 to 16, wherein the target includes a light transmission part which transmits light that is detectable by the first optical detection part and the second optical detection part.

[Claim 19]

15 A semiconductor fault analysis method which analyzes a semiconductor device using a semiconductor fault analysis device,

wherein the semiconductor fault analysis device includes:

a first analysis part in which a first optical detection part receives light emitted by a semiconductor device via a first optical system, and the
20 first optical system is moved relative to the semiconductor device by a first drive part;

a second analysis part in which a second optical detection part receives light emitted by the semiconductor device via a second optical system, and the second optical system is moved relative to the
25 semiconductor device by a second drive part;

a device arrangement part having a chuck disposed between the first analysis part and the second analysis part to hold the semiconductor device and provided with a target that aligns an optical axis of the first optical system with an optical axis of the second optical system, the chuck being moved relative to the first analysis part and the second analysis part;

a stimulus signal application part configured to apply a stimulus signal to the semiconductor device; and

a control part configured to output a command to the first analysis part, the second analysis part, the device arrangement part, and the stimulus signal application part,

wherein the target is detectable by the first analysis part from one side of the target and is detectable by the second analysis part from the other side of the target,

the method includes:

an alignment step of moving the chuck by a third drive part included in the device arrangement part to a position at which the target is detectable by the first optical detection part and then aligning the optical axis of the second optical system with the optical axis of the first optical system with the target as a reference by the first and second drive parts; and

an analysis step of applying a stimulus signal to the semiconductor device and receiving light from the semiconductor device emitted according to the stimulus signal with at least one of the first optical detection part and the second optical detection part in a state in

which a positional relationship between the optical axis of the first optical system and the optical axis of the second optical system is maintained.

[Claim 20]

The semiconductor fault analysis method according to claim 19 further comprising a marking step of putting a mark indicating a failure place in the semiconductor device obtained by the first analysis part and the second analysis part on the semiconductor device, after the analysis step.

[Claim 21]

A semiconductor fault analysis method which analyzes a semiconductor device using a semiconductor fault analysis device,

wherein the semiconductor fault analysis device includes:

a first analysis part configured to irradiate a semiconductor device with light generated by a first light source via a first optical system having a first optical scanning part;

a second analysis part configured to irradiate the semiconductor device with light generated by a second light source via a second optical system having a second optical scanning part;

a device arrangement part having a chuck disposed between the first analysis part and the second analysis part to hold the semiconductor device and provided with a target that aligns a center of an optical scanning region of the first optical system with a center of an optical scanning region of the second optical system, the chuck being moved relative to the first analysis part and the second analysis part;

an electrical signal acquisition part configured to receive an electrical signal output by the semiconductor device; and

a control part configured to output a command to the first analysis part, the second analysis part, the device arrangement part, and the electrical signal acquisition part,

wherein the target is detectable by the first analysis part from one side of the target and is detectable by the second analysis part from the other side of the target,

the method includes:

an alignment step of moving the chuck by a third drive part included in the device arrangement part to a position at which the target is detectable by the first analysis part and then aligning the center of the optical scanning region of the second optical system with the center of the optical scanning region of the first optical system with the target as a reference by a first drive part comprised in the first analysis part and a second drive part comprised in the second analysis part; and

an analysis step of irradiating the semiconductor device with light from at least one of the first analysis part and the second analysis part and receiving an electrical signal from the semiconductor device by the electrical signal acquisition part in a state in which a positional relationship between the center of the optical scanning region of the first optical system and the center of the optical scanning region of the second optical system is maintained.

[Claim 22]

The semiconductor fault analysis method according to claim 21 further comprising a marking step of putting a mark indicating a failure place in the semiconductor device obtained by the first analysis part and

the second analysis part on the semiconductor device, after the analysis step.

[Claim 23]

A semiconductor fault analysis method which analyzes a semiconductor device using a semiconductor fault analysis device,

wherein the semiconductor fault analysis device includes:

a first analysis part in which a semiconductor device is irradiated with light generated by a first light source via a first optical system having a first optical scanning part, and a first optical detection part receives first response light from the semiconductor device generated according to the light of the first light source;

a second analysis part in which the semiconductor device is irradiated with light generated by a second light source via a second optical system having a second optical scanning part, and a second optical detection part receives second response light from the semiconductor device generated according to the light of the second light source;

a device arrangement part having a chuck disposed between the first analysis part and the second analysis part to hold the semiconductor device and provided with a target that aligns a center of an optical scanning region of the first optical system with a center of an optical scanning region of the second optical system, the chuck being moved relative to the first analysis part and the second analysis part;

a stimulus signal application part configured to apply a stimulus signal to the semiconductor device; and

a control part configured to output a command to the first analysis part, the second analysis part, the device arrangement part, and the stimulus signal application part,

wherein the target is detectable by the first analysis part from one side of the target and is detectable by the second analysis part from the other side of the target,

the method comprising:

an alignment step of moving the chuck by a third drive part included in the device arrangement part to a position at which the target is detectable by the first optical detection part and then aligning the center of the optical scanning region of the second optical system with the center of the optical scanning region of the first optical system with the target as a reference by a first drive part comprised in the first analysis part and a second drive part comprised in the second analysis part; and

an analysis step of irradiating the semiconductor device with light from at least one of the first analysis part and the second analysis part and receiving at least one of the first response light and the second response light from the semiconductor device with at least one of the first optical detection part and the second optical detection part in a state in which a positional relationship between the center of the optical scanning region of the first optical system and the center of the optical scanning region of the second optical system is maintained and the stimulus signal is applied to the semiconductor device.

[Claim 24]

The semiconductor fault analysis method according to claim 23 further comprising a marking step of putting a mark indicating a failure

place in the semiconductor device obtained by the first analysis part and the second analysis part on the semiconductor device, after the analysis step.