CLAIMS

[Claim 1] A semiconductor failure analysis device comprising:

a first analysis unit configured to emit first irradiation light along a first path set on a first main surface of a semiconductor device;

a second analysis unit configured to emit second irradiation light along a second path set on a second main surface that is a back side of the first main surface;

an electric signal acquisition unit configured to receive an electric signal output by the semiconductor device irradiated with the first irradiation light and the second irradiation light; and

a control unit configured to control at least one of the first analysis unit and the second analysis unit, wherein

a size of a second irradiation region formed on the second main surface by the second irradiation light is smaller than a size of a first irradiation region formed on the first main surface by the first irradiation light, and

the control unit is configured to output, to the second analysis unit, a control signal for emitting the first irradiation light and the second irradiation light while a state where an entire of the second irradiation region overlaps the first irradiation region is maintained.

[Claim 2] The semiconductor failure analysis device according to claim 1, wherein

the first analysis unit includes a first optical scanning unit configured to reflect the first irradiation light such that the first irradiation region moves along the first path,

the second analysis unit includes a second optical scanning unit

configured to reflect the second irradiation light such that the second irradiation region moves along the second path, and

the control unit controls the first optical scanning unit and the second optical scanning unit by using a ratio based on the size of the first irradiation region and the size of the second irradiation region.

[Claim 3] The semiconductor failure analysis device according to claim 1 or 2, wherein

the first analysis unit includes

a first light source configured to generate the first irradiation light, and

a first optical member configured to guide the first irradiation light from the first light source to the first main surface,

the second analysis unit includes

a second light source configured to generate the second irradiation light, and

a second optical member configured to guide the second irradiation light from the second light source to the second main surface, and

a difference between the size of the first irradiation region and the size of the second irradiation region is caused by a difference between an optical characteristic of the first optical member and an optical characteristic of the second optical member.

[Claim 4] The semiconductor failure analysis device according to claim 1 or 2, wherein

the first analysis unit includes a first optical scanning unit configured to reflect the first irradiation light such that the first irradiation

region moves along the first path,

the second analysis unit includes a second optical scanning unit configured to reflect the second irradiation light such that the second irradiation region moves along the second path, and

a difference between the size of the first irradiation region and the size of the second irradiation region is caused by a difference between the first path and the second path.

[Claim 5] A semiconductor failure analysis device comprising:

a first analysis unit configured to emit first irradiation light along a first path set on a first main surface of a semiconductor device;

a second analysis unit configured to emit second irradiation light along a second path set on a second main surface that is a back side of the first main surface;

an electric signal acquisition unit configured to receive an electric signal output by the semiconductor device irradiated with the first irradiation light and the second irradiation light; and

a control unit configured to control at least one of the first analysis unit and the second analysis unit, wherein

a size of a first irradiation region formed on the first main surface by the first irradiation light is different from a size of a second irradiation region formed on the second main surface by the second irradiation light,

the control unit is configured to output a control signal for emitting the first irradiation light and the second irradiation light while a state where an entire one region of the first irradiation region and the second irradiation region overlaps the other region of the first irradiation region and the second irradiation region is maintained,

the first analysis unit includes a first lens configured to condense the first irradiation light on the first main surface such that the size of the first irradiation region becomes a predetermined size,

the second analysis unit includes a second lens configured to condense the second irradiation light on the second main surface such that the size of the second irradiation region becomes a size different from the size of the first irradiation region, and

a magnification of the first lens is different from a magnification of the second lens.

[Claim 6] A semiconductor failure analysis device comprising:

a first analysis unit configured to emit first irradiation light along a first path set on a first main surface of a semiconductor device;

a second analysis unit configured to emit second irradiation light along a second path set on a second main surface that is a back side of the first main surface;

an electric signal acquisition unit configured to receive an electric signal output by the semiconductor device irradiated with the first irradiation light and the second irradiation light; and

a control unit configured to control at least one of the first analysis unit and the second analysis unit, wherein

a size of a first irradiation region formed on the first main surface by the first irradiation light is different from a size of a second irradiation region formed on the second main surface by the second irradiation light,

the control unit is configured to output a control signal for emitting the first irradiation light and the second irradiation light while a state where an entire one region of the first irradiation region and the second

irradiation region overlaps the other region of the first irradiation region and the second irradiation region is maintained, and

the first analysis unit includes

a first light source configured to generate the first irradiation light, and

a first optical member configured to guide the first irradiation light from the first light source to the first main surface,

the second analysis unit includes

a second light source configured to generate the second irradiation light, and

a second optical member configured to guide the second irradiation light from the second light source to the second main surface, and

a difference between a size of the first irradiation region and a size of the second irradiation region is caused by a difference between disposition of the first optical member and disposition of the second optical member.

[Claim 7] The semiconductor failure analysis device according to claim 5 or 6, wherein

the first analysis unit includes a first optical scanning unit configured to reflect the first irradiation light such that the first irradiation region moves along the first path,

the second analysis unit includes a second optical scanning unit configured to reflect the second irradiation light such that the second irradiation region moves along the second path, and

the control unit controls the first optical scanning unit and the

second optical scanning unit by using a ratio based on the size of the first irradiation region and the size of the second irradiation region.

[Claim 8] A semiconductor failure analysis method for analyzing a semiconductor device, the semiconductor failure analysis method comprising:

a setting step of preparing a first irradiation condition for a first analysis unit generating first irradiation light emitted along a first path set on a first main surface of the semiconductor device and a second irradiation condition for a second analysis unit generating second irradiation light emitted along a second path set on a second main surface that is a back side of the first main surface; and

an analysis step of acquiring an electric signal output from the semiconductor device while the semiconductor device is irradiated with the first irradiation light and the second irradiation light in response to a control signal output to the second analysis unit, the control signal according to the first irradiation condition and the second irradiation condition set in the setting step, wherein

in the setting step, the first irradiation condition and the second irradiation condition are set such that a size of a second irradiation region formed on the second main surface with the second irradiation light is smaller than a size of a first irradiation region formed on the first main surface with the first irradiation light, and

in the analysis step, the first irradiation light and the second irradiation light are emitted while a state where an entire of the second irradiation region overlaps the first irradiation region is maintained.

[Claim 9] The semiconductor failure analysis method for analyzing

a semiconductor device according to claim 8 wherein

in the setting step, the first analysis unit and the second analysis unit are controlled by using a ratio based on the size of the first irradiation region and the size of the second irradiation region,

in the analysis step, the first irradiation light is emitted while a first optical scanning unit of the first analysis unit reflects the first irradiation light such that the first irradiation region moves along the first path, and the second irradiation light is emitted while a second optical scanning unit of the second analysis unit reflects the second irradiation light such that the second irradiation region moves along the second path.

[Claim 10] A semiconductor failure analysis method according to claim 8 or 9, wherein

the first analysis unit includes

a first light source configured to generate the first irradiation light, and

a first optical member configured to guide the first irradiation light from the first light source to the first main surface,

the second analysis unit includes

a second light source configured to generate the second irradiation light, and

a second optical member configured to guide the second irradiation light from the second light source to the second main surface, and

in the analysis step, a state in which the size of the second irradiation region is smaller than the size of the first irradiation region is caused by a difference between an optical characteristic of the first optical

member and an optical characteristic of the second optical member.

[Claim 11] A semiconductor failure analysis method according to claim 8 or 9, wherein

a state in which the size of the second irradiation region is smaller than the size of the first irradiation region is caused by a difference between the first path and the second path.

[Claim 12] A semiconductor failure analysis method for analyzing a semiconductor device, the semiconductor failure analysis method comprising:

a setting step of preparing a first irradiation condition for a first analysis unit generating first irradiation light emitted along a first path set on a first main surface of the semiconductor device and a second irradiation condition for a second analysis unit generating second irradiation light emitted along a second path set on a second main surface that is a back side of the first main surface; and

an analysis step of acquiring an electric signal output from the semiconductor device while the semiconductor device is irradiated with the first irradiation light and the second irradiation light according to the first irradiation condition and the second irradiation condition set in the setting step, wherein

the first analysis unit includes a first lens configured to condense the first irradiation light on the first main surface,

the second analysis unit includes a second lens configured to condense the second irradiation light on the second main surface,

a size of a first irradiation region formed on the first main surface by the first irradiation light differs from the size of a second irradiation

region formed on the second main surface by the second irradiation light due to a difference in magnification of the first lens with respect to a magnification of the second lens, and

in the analysis step, the first irradiation light and the second irradiation light are emitted while a state where an entire one region of the first irradiation region and the second irradiation region overlaps the other region of the first irradiation region and the second irradiation region is maintained.

[Claim 13] A semiconductor failure analysis method for analyzing a semiconductor device, the semiconductor failure analysis method comprising:

a setting step of preparing a first irradiation condition for a first analysis unit generating first irradiation light emitted along a first path set on a first main surface of the semiconductor device and a second irradiation condition for a second analysis unit generating second irradiation light emitted along a second path set on a second main surface that is a back side of the first main surface; and

an analysis step of acquiring an electric signal output from the semiconductor device while the semiconductor device is irradiated with the first irradiation light and the second irradiation light according to the first irradiation condition and the second irradiation condition set in the setting step, wherein

the first analysis unit includes

a first light source configured to generate the first irradiation light, and

a first optical member configured to guide the first

irradiation light from the first light source to the first main surface, the second analysis unit includes

a second light source configured to generate the second irradiation light, and

a second optical member configured to guide the second irradiation light from the second light source to the second main surface,

a size of a first irradiation region formed on the first main surface by the first irradiation light differs from a size of a second irradiation region formed on the second surface by the second irradiation light due to a difference between disposition of the first optical member and disposition of the second optical member, and

in the analysis step, the first irradiation light and the second irradiation light are emitted while a state where an entire one region of the first irradiation region and the second irradiation region overlaps the other region of the first irradiation region and the second irradiation region is maintained.

[Claim 14] A semiconductor failure analysis method for analyzing a semiconductor device according to claim 12 or 13, wherein

in the setting step, the second analysis unit is controlled by using a ratio based on the size of the first irradiation region and the size of the second irradiation region, and

in the analysis step, the first irradiation light is irradiated while the first scanning unit of the first analysis unit reflects the first irradiation light such that the first irradiation region moves along the first path, and the second irradiation light is irradiated while the second scanning unit of the

second analysis unit reflects the second irradiation light such that the second irradiation region moves along the second path.