

CLAIMS

1. A semiconductor inspection device comprising:
a photodetector configured to detect light from a semiconductor device and output a detection signal;

5 an optical system configured to guide the light to the photodetector;

an image generation unit configured to generate a first optical image which is an optical image of the semiconductor device based on the detection signal;

10 a reception unit configured to receive an input of a first CAD image;

an image conversion unit configured to ~~learn a conversion process of the first CAD image by machine learning using the optical image as training data, and~~ convert the first CAD image into a second CAD image resembling the first optical image ~~by the conversion process based on a result of the learning~~ using a learning model, wherein the learning model is obtained by machine learning using a plurality of first training CAD images and a plurality of first training optical images as training data, wherein the plurality of first training optical images are acquired for a plurality of types of semiconductor devices and correspond to the plurality of first training CAD images;
and

an alignment unit configured to perform alignment based on the first optical image and the second CAD image,

25 wherein the image conversion unit performs conversion into the second CAD image by extracting a dummy pattern from the first CAD

image.

2. ~~The semiconductor inspection device according to claim 1, wherein the image conversion unit performs conversion into the second CAD image by extracting a specific pattern from the first CAD image by the conversion process.~~

3. ~~The semiconductor inspection device according to claim 2, wherein the specific pattern is a dummy pattern.~~

4. ~~A semiconductor inspection device comprising:~~

~~—— a photodetector configured to detect light from a semiconductor device and output a detection signal;~~

~~—— an optical system configured to guide the light to the photodetector;~~

~~—— an image generation unit configured to generate a first optical image which is an optical image of the semiconductor device based on the detection signal;~~

~~—— a reception unit configured to receive an input of a first CAD image;~~

~~—— an image conversion unit configured to learn a reconstruction process of the first optical image by machine learning using the first CAD image as training data, and reconstruct the first optical image into a second optical image resembling the first CAD image by the reconstruction process based on a result of the learning; and~~

~~—— an alignment unit configured to perform alignment based on the second optical image and the first CAD image.~~

52. The semiconductor inspection device according to ~~any one of claims 1 to 4~~ claim 1, wherein the machine learning is deep learning.

63. The semiconductor inspection device according to any one of claims 1 to 52, wherein the image conversion unit learns using the first optical image and the first CAD image at positions corresponding to each other on the semiconductor device.

74. The semiconductor inspection device according to any one of claims 1 to 63, further comprising

an output unit configured to superimpose and output an image obtained corresponding to the first optical image and the first CAD image based on a result of the alignment.

85. A semiconductor inspection method comprising:

a step of detecting light from a semiconductor device via an optical system and outputting a detection signal;

a step of generating a first optical image which is an optical image of the semiconductor device based on the detection signal;

a step of receiving an input of a first CAD image;

~~a step of learning a conversion process of the first CAD image by machine learning using the optical image as training data, and~~
converting the first CAD image into a second CAD image resembling the first optical image ~~by the conversion process based on a result of the learning~~using a learning model, wherein the learning model is obtained by machine learning using a plurality of first training CAD images and a plurality of first training optical images as training data, wherein the plurality of first training optical images are acquired for a plurality of types of semiconductor devices and correspond to the plurality of first training CAD images; and

a step of performing alignment based on the first optical image

and the second CAD image,

wherein the conversion into the second CAD image is performed by extracting a dummy pattern from the first CAD image.

~~9. The semiconductor inspection method according to claim 8, wherein conversion into the second CAD image is performed by extracting a specific pattern from the first CAD image by the conversion process.~~

~~10. The semiconductor inspection method according to claim 9, wherein the specific pattern is a dummy pattern.~~

~~11. A semiconductor inspection method comprising:~~

~~—— a step of detecting light from a semiconductor device via an optical system and outputting a detection signal;~~

~~—— a step of generating a first optical image which is an optical image of the semiconductor device based on the detection signal;~~

~~—— a step of receiving an input of a first CAD image;~~

~~—— a step of learning a reconstruction process of the first optical image by machine learning using the first CAD image as training data, and reconstructing the first optical image into a second optical image resembling the first CAD image by the reconstruction process based on a result of the learning; and~~

~~—— a step of performing alignment based on the second optical image and the first CAD image.~~

~~126. The semiconductor inspection method according to any one of claims 8 to 11 claim 5, wherein the machine learning is deep learning.~~

~~137. The semiconductor inspection method according to any one of claims 8 to 126, wherein learning is performed using the first optical~~

image and the first CAD image at positions corresponding to each other on the semiconductor device.

148. The semiconductor inspection method according to any one of claims ~~8-5~~ to ~~137~~, further comprising

5 a step of superimposing and outputting an image obtained corresponding to the first optical image and the first CAD image based on a result of the alignment.