Claims

~~1.~~

1. A data-driven misregistration parameter configuration and measurement method comprising:

simulating a plurality of measurement simulations of at least one multilayered semiconductor device, selected from a batch of multilayered semiconductor devices intended to be identical, using a plurality of sets of measurement parameter configurations, thereby generating simulation data for said at least one multilayered semiconductor device;

identifying at least one set of recommended measurement parameter configurations, which is selected from said plurality of sets of measurement parameter configurations;

providing a multilayered semiconductor device selected from said batch of multilayered semiconductor devices;

providing said at least one recommended set of measurement parameter configurations to a misregistration metrology tool having multiple possible sets of measurement parameter configurations;

measuring at least one multilayered semiconductor device, selected from said batch of multilayered semiconductor devices intended to be identical, using said at least one recommended set of measurement parameter configurations, thereby generating measurement data for said at least one multilayered semiconductor device;

thereafter identifying a final recommended set of measurement parameter configurations; and

measuring misregistration of at least one multilayered semiconductor device, selected from ~~measuring misregistration of at least one multilayered semiconductor device, selected from~~ said batch of multilayered semiconductor devices intended to be identical, using said final recommended set of measurement parameter configurations.

~~2. A~~

2. The data-driven misregistration parameter configuration and measurement method ~~according to~~of claim 1 ~~and~~ wherein said final recommended set of measurement parameter configurations is identified based on best results of said measurement data for said at least one multilayered semiconductor device.

~~3. A~~

3. The data-driven misregistration parameter configuration and measurement method ~~according to~~of claim ~~1 or claim 2 and~~1, wherein said plurality of measurement simulations ~~ate~~are metrology target design simulations.

~~4. A~~

4. The data-driven misregistration parameter configuration and measurement method of according to claim 3 ~~and~~, wherein said at ~~feast erne~~least one recommended set of measurement parameter configurations is identified based on at least one of:

inacc
urac
y;

Qme
rit;

focus sensitivity;

throughput;

~~and~~or

contrast precision.

~~5. A~~

5. The data-driven misregistration parameter configuration and measurement method ~~according to any~~ of ~~claims~~claim 1 ~~– 4 and~~, wherein said sets of measurement parameter configurations comprise at least one of:

an axis along which misregistration is measured;

a region of interest of a metrology target;

a numerical aperture used in misregistration measurement;

a polarization of light used in misregistration measurement;

wavelengths of light used in misregistration measurement;

bandwidth of wavelengths of light used in misregistration measurement;

an intensity of light used in misregistration measurement;

a focal depth used in misregistration measurement;

~~and an apodizer used in misregistration measurement~~or

~~6. A~~an apodizer used in misregistration measurement.

6. The data-driven misregistration parameter configuration and measurement method ~~according to any~~ of ~~claims~~claim 1~~ – 5 and~~, wherein said misregistration metrology tool is an imaging misregistration metrology tool.

~~7. A~~

7. The data-driven misregistration parameter configuration and measurement method ~~according to any~~ of ~~claims~~claim 1~~ – 5 and~~, wherein said misregistration metrology tool is a scatterometry misregistration metrology tool.

~~8. A~~

8. The data-driven misregistration parameter configuration and measurement method ~~according to any~~ of ~~claims~~claim 1~~ – 7 and also~~, further comprising:

generating simulation signal data; and

comparing said simulation signal data to said measurement data for said at least one multilayered semiconductor device.

~~9. A~~

9. The data-driven misregistration parameter configuration and measurement method ~~according~~of to claim 8~~ and~~, wherein said simulation signal data includes at least one of:

contrast;

sensitivity; ~~and~~or

pupil image.

~~10. A~~

10. The data-driven misregistration parameter configuration and measurement method ~~according to~~of claim 8~~ or claim 9 and also~~, further comprising:

indicating for which of said sets of measurement parameter configurations and for which portions of said multilayered semiconductor device a mismatch between said simulation signal data and said measurement data occurs; and~~ indicating possible root causes of said mismatch.~~

indicating possible root causes of said mismatch.~~11.~~

11. A data-driven misregistration parameter configuration and measurement system comprising:

a semiconductor device measurement simulator, operative ~~t~~pto simulate a plurality of

measurement simulations of at ~~leas tone~~least one multilayered semiconductor device, selected from a batch of multilayered semiconductor devices intended to be identical, using a plurality of sets of measurement parameter configurations, thereby generating simulation data for said at least one multilayered semiconductor device;

a simulation data analyzer, operative to identify at least one recommended set of measurement parameter configurations, which is selected from said plurality of sets of measurement parameter configurations; and

a misregistration metrology tool having multiple possible sets of measurement parameter configurations, operative to receive said at least one recommended set of measurement

parameter configurations and to measure misregistration of at least one multilayered semiconductor device, selected from said batch of multilayered semiconductor devices intended to be identical, using said at least one recommended set of measurement parameter configurations, thereby generating measurement data for said at least one multilayered semiconductor device.

~~12. A~~

12. The data-driven misregistration parameter configuration and measurement system ~~according to~~of claim 11 ~~and~~, wherein said semiconductor device measurement simulator is a metrology target design simulator.

~~13. A~~

13. The data-driven misregistration parameter configuration and measurement system ~~according to~~of claim 12 ~~and~~, wherein said at least one recommended set of measurement parameter configurations is identified based on at least one of:

inacc
uracy
;

Qme
rit;

focus sensitivity;

throughput or

~~throughput; and~~

contrast precision.

~~14. A~~

14. The data-driven misregistration parameter configuration and measurement system

~~according to any~~ of ~~claims~~claim 11~~ – 13 and~~, wherein said sets of measurement parameter configurations comprise at least one of:

an axis along which misregistration is measured;

a region of interest of a metrology target;

a numerical aperture used in misregistration measurement;

a polarization of light used in misregistration measurement;

wavelengths of light used in misregistration measurement;

bandwidth of wavelengths of light used in misregistration measurement;

an intensity of light used in misregistration measurement;

a focal depth used in misregistration measurement; ~~and~~

or~~an apodizer used in misregistration measurement.~~

an apodizer used in misregistration measurement.~~15. A~~

15. The data-driven misregistration parameter configuration and measurement system ~~according to any~~ of ~~claims~~claim 11~~ – 14 and~~, wherein said misregistration metrology tool is an imaging misregistration metrology tool.

~~16. A~~

16. The data-driven misregistration parameter configuration and measurement system ~~according to any~~ of ~~claims~~claim 11~~ – 14 and~~, wherein said misregistration metrology tool is a scatterometry misregistration metrology tool.

~~17. A~~

17. The data-driven misregistration parameter configuration and measurement system ~~according to any~~ of ~~claims~~claim 11~~ – 16 and~~, wherein said simulation data analyzer is further operative to compare said simulation data to said measurement data.

~~18 A~~

18. The data-driven misregistration parameter configuration and measurement system ~~according to~~of claim 17~~ and~~, wherein said simulation signal data includes at least one of:

contrast;

sensitivity; ~~and~~or

pupil image.

~~19. A~~

19. The data-driven misregistration parameter configuration and measurement system ~~according to~~of claim 17 ~~or claim 18 and~~, wherein said simulation data analyzer is further operative to:

indicate for which of said sets of measurement parameter configurations and for which portions of said multilayered semiconductor device a mismatch between said simulation signal data and said measurement data occurs; and ~~indicate possible root causes of said mismatch.~~

indicate possible root causes of said mismatch.