Claims

1. 1. A metrology measurement method comprising: measuring a metrology target, wherein the metrology target comprises at least: a first layer including a first two periodic structure along a structures in at least one measurement direction, a second layer including a second the metrology target further comprising a third periodic structure alongorthogonal to the respective measurement direction, and a third layer including a third periodic structure along a second direction orthogonal to the measurement direction, wherein the first layer overlaps the second layer and the third layer, wherein the third layer overlaps the second layer, wherein the third layer is between the first layer and the second layer; and.

2. The metrology measurement method of claim 1, further comprising reducing noise in a signal derived by the measuring by identifying and removing a signal component related to the third periodic structure to reduce noise in a signal derived by the metrology target measurement.

2. .

3. The metrology measurement method of claim 1, further comprising deriving multiple slices from thea signal derived by the metrology target measurementmeasuring, the slices corresponding to properties of the third periodic structure.

4. The metrology measurement method of claim 3. The metrology measurement method of claim 2, further comprising averaging the multiple slices to yield a metrology signal.

4.

5. The metrology measurement method of claim 23, further comprising selecting an optimal slice signal by comparing the multiple slices with respect to at least one accuracy parameter.

5.

6. The metrology measurement method of claim 4~~5~~, further comprising reiterating the selection for at least one of consecutive targets, wafers, or batches.

6.

7. The metrology measurement method of claim 4~~5~~, further comprising improving a metrology robustness by tracking a spatial behavior thereof and the optimal slice.

7.

8. The metrology measurement method of claim 1, further comprising calibrating measurement coordinates using the third periodic structure by comparing camera and beam axes.

8.

9. The metrology measurement method of claim 1, further comprising deriving at least one of focus information or harmonic components of a signal measured from the third periodic structure.

9.

10. The metrology measurement method of claim 1, further comprising applying one or more machine learning algorithms to analyze a signal measured from the third periodic structure and deriving information from data associated with the second direction orthogonal to the measurement direction.

10.

~~11.~~ The metrology measurement method of claim 1, wherein the metrology target comprises at least one of an imaging metrology target or a scatterometry metrology target.

~~12.~~

11. The metrology measurement method of claim 10~~11~~, wherein the imaging target has at least two pairs of periodic structures, at least one pair thereof along each of two measurement directions.

12.

~~13.~~ The metrology measurement method of claim 1, wherein the metrology target comprises a pupil plane scatterometry metrology target, wherein the method~~measuring the metrology target~~ comprises measuring the metrology target in a plurality of locations within the metrology target and extracting a metrology metric with enhanced accuracy from a~~the~~ plurality of measurements.

13.

~~14.~~ The metrology measurement method of claim 1, wherein the third periodic structure comprises at least one of a uniform critical dimension, a monotonic changing critical dimension, a periodically monotonic changing critical dimension, or two or more periodic sub-structures.

14.

~~15.~~ The metrology measurement method of claim 1, wherein the method is carried out at least partially by at least one computer processor.

15.

~~16.~~ A system comprising:

a~~ controller, the~~ controller including one or more processors and memory, the memory storing program instructions configured to cause the one or more processors to:

receive one or more measurements of a metrology target, wherein the metrology target comprises: a first layer including a first ~~at least two~~ periodic structure along a ~~structures in at least one~~ measurement direction, a second layer including a second ~~the metrology target further comprising a third~~ periodic structure along~~orthogonal to~~ the ~~respective~~ measurement direction,~~;~~ and a third layer including a third periodic structure along a second direction orthogonal to the measurement direction, wherein the first layer overlaps the second layer and the third layer, wherein the third layer overlaps the second layer, wherein the third layer is between the first layer and the second layer; identify and remove a signal component related to the third periodic structure to reduce noise in a signal derived from the one or more measurements; and

determine one or more metrology metrics based on the received one or more measurements.

16.

~~17.~~ The system of claim 15~~16, wherein the one or more processors are further configured to reduce noise in a signal derived from the one or more measurements by identifying and removing a signal component related to the third periodic structure.~~

~~18. The system of claim 16~~, wherein the one or more processors are further configured to derive a plurality of slices from a signal derived from the one or more measurements, the slices corresponding to properties of the third periodic structure.

17.

~~19.~~ The system of claim 16~~18~~, wherein the one or more processors are further configured to average the plurality of slices to yield a metrology signal.

18.

~~20.~~ The system of claim 15~~16~~, wherein the one or more processors are further configured to calibrate one or more measurement coordinates using the third periodic structure by comparing camera and beam axes.

~~21.~~

19. The system of claim 15~~16~~, wherein the one or more processors are further configured to derive at least one of focus information or harmonic components of a signal measured from the third periodic structure.

20.

~~22.~~ The system of claim 15~~16~~, wherein the one or more processors are further configured to apply one or more machine learning algorithms to analyze a signal measured from the third periodic structure and deriving information from data associated with the second direction orthogonal to the measurement direction.

21.

~~23.~~ The system of claim 15~~16~~, wherein the metrology target comprises at least one of an imaging metrology target or a scatterometry metrology target.

22.

~~24.~~ The system of claim 21~~23~~, wherein the imaging target has at least two pairs of periodic structures, at least one pair thereof along each of two measurement directions.

23.

~~25.~~ The system of claim 15~~16~~, wherein the metrology target comprises a pupil plane scatterometry metrology target, wherein the one or more measurements are acquired in a plurality of locations within the metrology target, wherein the one or more processors are further configured to extract a metrology metric with enhanced accuracy from a~~the~~ plurality of measurements.

24.

~~26.~~ The system of claim 15~~16~~, wherein the third periodic structure comprises at least one of a uniform critical dimension, a monotonic changing critical dimension, a periodically monotonic changing critical dimension, or two or more periodic sub-structures.

25.

~~27. A metrology target comprising at least two periodic structures in at least one measurement direction, the metrology target further comprising a third periodic structure orthogonal to the respective measurement direction.~~

~~28.~~ The metrology target of claim 15~~27~~, wherein the metrology target is configured as at least one of an imaging target or a scatterometry target.

26.

~~29.~~ The metrology target of claim 25~~28~~, wherein the metrology target is configured as the~~an~~ imaging target having at least two pairs of periodic structures, at least one pair thereof along each of two measurement directions.

27.

~~30.~~ The metrology target claim 15~~27~~, wherein the third periodic structure comprises at least one of a uniform critical dimension, a monotonic changing critical dimension, a periodically monotonic changing critical dimension, or two or more periodic sub-structures.

28. ~~substructures.~~

~~31.~~ The metrology target of claim 15~~27~~, wherein the third periodic structure is process compatible.

29.

~~32.~~ The metrology target of claim 28~~31~~, wherein the process compatibility comprises at least one of segmentation of elements of the third periodic structure, uniform critical dimension of segments of elements of the third periodic structure, or an application of a cut mask with uniform or variable critical dimension.