Claims

1. A metrology target comprising:

a first set of pattern elements, wherein the first set of pattern elements are compatible with a first metrology mode of a first metrology sub-system along one or more directions; and

a second set of pattern elements, wherein the second set of pattern elements is compatible with a second metrology mode of a second metrology sub-system along one or more directions, wherein the second set of pattern elements includes a first portion of the first set of pattern elements, and wherein the second set of pattern elements is surrounded by a second portion of the first set of pattern elements not included in the second set of pattern elements.

2. The metrology target of Claim 1, wherein at least some of the first set of pattern elements are segmented.

3. The metrology target of Claim 1, wherein at least some of the second set of pattern elements are segmented.

4. The metrology target of Claim 1, wherein at least some of the second set of pattern elements are divided into two or more sets of segmented portions.

5. The metrology target of Claim 1, wherein the first metrology mode comprises an optical metrology mode.

6. The metrology target of Claim 1, wherein the first metrology mode comprises at least one of advanced imaging metrology (AIM) or triple advanced imaging metrology (Triple AIM).

7. The metrology target of Claim 1, wherein the second metrology mode comprises at least one of an optical metrology mode or a particle-beam based metrology mode.

8. The metrology target of Claim 7, wherein the second metrology mode comprises advanced imaging metrology in-die (AIMid) metrology.

9. The metrology target of Claim 7, wherein the second metrology mode comprises electron-beam metrology.

10. The metrology target of Claim 1, further comprising a third set of pattern elements compatible with a third metrology mode of a third metrology sub-system along one or more directions, wherein the third set of pattern elements surrounds at least a portion of the first set of pattern elements.

11. The metrology target of Claim 10, wherein the third metrology mode comprises scatterometry-based overlay (SCOL) metrology.

12. A system comprising:

two or more metrology sub-systems, wherein the one or more metrology sub-systems are configured to acquire metrology signals from one or more metrology targets of a sample, wherein each of the two or more metrology sub-systems comprises:

an illumination source;

one or more illumination elements configured to direct an illumination beam from the illumination source onto the sample;

one or more detectors; and

one or more projection elements configured to collect illumination emanating from the sample and direct the illumination to the one or more detectors; and

one or more controllers having one or more processors communicatively coupled to the one or more detectors, wherein the one or more processors are configured to execute a set of program instructions maintained in memory, wherein

the set of program instructions is configured to cause the one or more processors to:

receive, from a first metrology sub-system operating in a first metrology mode, one or more signals indicative of the illumination emanating from a first set of pattern elements of one or more metrology targets of the sample,

receive, from a second metrology sub-system operating in a second metrology mode, one or more signals indicative of illumination emanating from a second set of pattern elements of the one or more metrology targets, wherein the one or more metrology targets of the sample comprise: the first set of pattern elements, wherein the first set of pattern elements is compatible with the first metrology mode of the first metrology sub-system along one or more directions; and the second set of pattern elements, wherein the second set of pattern elements is compatible with the second metrology mode of the second metrology sub-system along one or more directions, wherein the second set of pattern elements includes a first portion of the first set of pattern elements, and wherein the second set of pattern elements is surrounded by a second portion of the first set of pattern elements not included in the second set of pattern elements;

determine one or more overlay parameters of the first set of pattern elements based on one or more signals acquired from the first set of pattern elements in the first metrology mode; and

determine one or more overlay parameters of the second set of pattern elements based on one or more signals acquired from the second set of pattern elements in the second metrology mode.

13. The system of Claim 12, wherein at least some of the first set of pattern elements are segmented.

14. The system of Claim 12, wherein at least some of the second set of pattern elements are segmented.

15. The system of Claim 12, wherein at least some of the second set of pattern elements are divided into two or more sets of segmented portions.

16. The system of Claim 12, wherein at least one of the two or more metrology sub-systems comprise:

an optical metrology tool.

17. The system of Claim 12, wherein the two or more metrology sub-systems comprise:

an optical metrology tool; and

a particle-based metrology tool.

18. The system of Claim 12, wherein the two or more metrology sub-systems comprise:

an optical metrology tool;

a particle-based metrology tool; and

a scatterometry-based overlay (SCOL) metrology tool.

19. The system of Claim 16, wherein the first metrology mode comprises an optical metrology mode.

20. The system of Claim 16, wherein the first metrology mode comprises at least one of advanced imaging metrology (AIM) or triple advanced imaging metrology (Triple AIM).

21. The system of Claim 17, wherein the second metrology mode comprises at least one of an optical metrology mode or a particle-beam based metrology mode.

22. The system of Claim 17, wherein the second metrology mode comprises advanced imaging metrology in-die (AIMid) metrology.

23. The system of Claim 17, wherein the second metrology mode comprises electron-beam metrology.

24. The system of Claim 12, wherein the one or more metrology targets further comprise a third set of pattern elements compatible with a third metrology mode of a third metrology sub-system along one or more directions, wherein the third set of pattern elements surrounds at least a portion of the first set of pattern elements.

25. The system of Claim 24, wherein the third metrology mode comprises: scatterometry-based overlay (SCOL) metrology.

26. The system of Claim 25, wherein the one or more controllers are configured to determine one or more overlay parameters of the third set of pattern elements using the third metrology mode based on one or more signals from the two or more metrology sub-systems.

27. The system of Claim 12, wherein the one or more processors are configured to execute program instructions to cause the one or more processors to provide one or more overlay correctables based on the one or more overlay parameters.

28. A method of measuring overlay comprising:

illuminating a sample having one or more metrology targets;

detecting, in a first metrology mode a first metrology sub-system, illumination emanating from a first set of pattern elements of the one or more metrology targets of the sample;

detecting, in a second metrology mode of a second metrology tool, illumination emanating from a second set of pattern elements of the one or more metrology targets of the sample;

determining one or more overlay parameters of the first set of pattern elements based on the illumination emanating from the first set of pattern elements; and

determining one or more overlay parameters of the second set of pattern elements based on the illumination emanating from the second set of pattern elements.

29. The method of measuring overlay of Claim 28, wherein at least some of the first set of pattern elements are segmented.

30. The method of measuring overlay of Claim 28, wherein at least some of the second pattern elements are segmented.

31. The method of measuring overlay of Claim 28, wherein at least some of the second pattern elements are divided into two or more sets of segmented portions.

32. The method of measuring overlay of Claim 28, wherein the first metrology mode comprises an optical metrology mode.

33. The method of measuring overlay of Claim 28, wherein the first metrology mode comprises at least one of advanced imaging metrology (AIM) or triple advanced imaging metrology (Triple AIM).

34. The method of measuring overlay of Claim 28, wherein the second metrology mode comprises at least one of an optical metrology mode or a particle-beam based metrology mode.

35. The method of measuring overlay of Claim 28, wherein the second metrology mode comprises advanced imaging metrology in-die (AIMid) metrology.

36. The method of measuring overlay of Claim 28, wherein the second metrology mode comprises electron-beam metrology.

37. The method of measuring overlay of Claim 28, further comprising detecting, in a third metrology mode of a third metrology sub-system, illumination emanating from a third set of pattern elements of the one or more metrology targets of the sample, and determining one or more overlay parameters of the third set of pattern elements of the one or more metrology targets of the sample based on the illumination emanating from the third set of pattern elements.

38. The method of measuring overlay of Claim 37, wherein the third metrology mode comprises: scatterometry-based overlay (SCOL) metrology.

39. A method of forming a metrology target comprising:

forming a first set of pattern elements, wherein the first set of pattern elements are compatible with a first metrology mode of a first metrology sub-system along one or more directions; and

forming a second set of pattern elements, wherein the second set of pattern elements is compatible with a second metrology mode of a second metrology sub-system along one or more directions, wherein the second set of pattern elements includes a first portion of the first set of pattern elements, and wherein the second set of pattern elements is surrounded by a second portion of the first set of pattern elements not included in the second set of pattern elements.

40. The method of forming a metrology target of Claim 39, wherein at least some of the first set of pattern elements are segmented.

41. The method of forming a metrology target of Claim 39, wherein at least some of the second pattern elements are segmented.

42. The method of forming a metrology target of Claim 39, wherein at least some of the second pattern elements are divided into two or more sets of segmented portions.

43. The method of forming a metrology target of Claim 39, wherein the first metrology mode comprises an optical mode of measurement.

44. The method of forming a metrology target of Claim 39, wherein the first metrology mode comprises at least one of advanced imaging metrology (AIM) or triple advanced imaging metrology (Triple AIM).

45. The method of forming a metrology target of Claim 39, wherein the second metrology mode comprises at least one of an optical metrology mode or a particle-beam based metrology mode.

46. The method of forming a metrology target of Claim 45, wherein the second metrology mode comprises advanced imaging metrology in-die (AIMid) metrology.

47. The method of forming a metrology target of Claim 45, wherein the second metrology mode comprises electron-beam metrology.

48. The method of forming a metrology target of Claim 39, further comprising forming a third set of pattern elements compatible with a third metrology mode of a third metrology sub-system along one or more directions, wherein the third set of pattern elements surrounds at least a portion of the first set of pattern elements.

49. The method of forming a metrology target of Claim 48, wherein the third metrology mode comprises scatterometry-based overlay (SCOL) metrology.