

What is claimed:

1. A system, comprising:
 - a controller, wherein the controller includes one or more processors and memory configured to store one or more sets of program instructions, wherein the one or more processors are configured to execute an auto-correlation module embodied in the one or more sets of program instructions, wherein the auto-correlation module is configured to cause the one or more processors to:
 - receive one or more patterned wafer geometry metrics;
 - receive wafer characterization data from one or more characterization tools;
 - determine a correlation between the one or more patterned wafer geometry metrics and the wafer characterization data;
 - generate a ranking of the one or more patterned wafer geometry metrics based on the determined correlation;
 - construct a composite metric model from a subset of the one or more patterned wafer geometry metrics based on the ranking of the one or more patterned wafer geometry metrics;
 - generate one or more composite wafer metrics from the composite metric model; and
 - generate a statistical process control output based on the one or more composite wafer metrics.
2. The system of Claim 1, wherein the auto-correlation module is further configured to cause the one or more processors to:
 - generate one or more correctables based on the one or more composite wafer metrics.
3. The system of Claim 2, wherein the auto-correlation module is further configured to cause the one or more processors to:
 - provide the one or more correctables to one or more process tools to improve one or more fabrication processes.

4. The system of Claim 3, wherein the one or more correctables are provided to the one or more process tools via a feedback loop.
5. The system of Claim 3, wherein the one or more correctables are provided to the one or more process tools via a feed forward loop.
6. The system of Claim 1, wherein the one or more patterned wafer geometry metrics includes one or more nanotopography (NT) metrics.
7. The system of Claim 1, wherein the one or more patterned wafer geometry metrics includes one or more local shape curvature (LSC) metrics.
8. The system of Claim 1, wherein the wafer characterization data includes wafer inspection data.
9. The system of Claim 1, wherein the wafer characterization data includes wafer metrology data.
10. The system of Claim 9, wherein the wafer metrology data includes inline wafer metrology data.
11. The system of Claim 1, wherein the wafer characterization data includes electrical probe data.
12. The system of Claim 1, wherein the correlation between the one or more patterned wafer geometry metrics and the wafer characterization data includes a correlation coefficient.
13. The system of Claim 12, wherein the correlation coefficient is an R^2 – value.

14. The system of Claim 12, wherein the auto-correlation module is further configured to cause the one or more processors to:

determine the correlation coefficient between the one or more patterned wafer geometry metrics and the wafer characterization data via at least one machine learning algorithm.

15. The system of Claim 14, wherein the machine learning algorithm includes a classification algorithm.

16. The system of Claim 15, wherein the classification algorithm includes logistic regression.

17. The system of Claim 15, wherein the classification algorithm includes a decision tree.

18. The system of Claim 1, wherein the auto-correlation module is further configured to cause the one or more processors to:

display the statistical process control output on a user interface coupled to the controller.

19. A system, comprising:

one or more characterization tools; and

a controller, wherein the controller includes one or more processors and memory configured to store one or more sets of program instructions, wherein the one or more processors are configured to execute an auto-correlation module embodied in the one or more sets of program instructions, wherein the auto-correlation module is configured to cause the one or more processors to:

receive one or more patterned wafer geometry metrics;

receive wafer characterization data from the one or more characterization tools;

determine a correlation between the one or more patterned wafer geometry metrics and the wafer characterization data;

generate a ranking of the one or more patterned wafer geometry metrics based on the determined correlation;

construct a composite metric model from a subset of the one or more patterned wafer geometry metrics based on the ranking of the one or more patterned wafer geometry metrics;

generate one or more composite wafer metrics from the composite metric model; and

generate a statistical process control output based on the one or more composite wafer metrics.

20. A method comprising:

receiving one or more patterned wafer geometry metrics;

receiving wafer characterization data from one or more wafer characterization tools;

determining a correlation between the one or more patterned wafer geometry metrics and the wafer characterization data;

generating a ranking of the one or more patterned wafer geometry metrics based on the determined correlation;

constructing a composite metric model from a subset of the one or more patterned wafer geometry metrics based on the ranking of the one or more patterned wafer geometry metrics;

generating one or more composite wafer metrics from the composite metric model; and

generating a statistical process control output based on the one or more composite wafer metrics.

21. The method of Claim 20, further comprising:

generating one or more correctables based on the one or more composite wafer metrics.

22. The method of Claim 21, further comprising:
providing the one or more correctables to one or more process tools to improve one or more fabrication processes
23. The method of Claim 22, wherein the one or more correctables are provided to the one or more process tools via a feedback loop.
24. The method of Claim 22, wherein the one or more correctables are provided to the one or more process tools via a feed forward loop.
25. The method of Claim 20, wherein the one or more patterned wafer geometry metrics includes one or more nanotopography (NT) metrics.
26. The method of Claim 20, wherein the one or more patterned wafer geometry metrics includes one or more local shape curvature (LSC) metrics.
27. The method of Claim 20, wherein the wafer characterization data includes wafer inspection data.
28. The method of Claim 20, wherein the wafer characterization data includes wafer metrology data.
29. The method of Claim 28, wherein the wafer metrology data includes inline wafer metrology data.
30. The method of Claim 20, wherein the wafer characterization data includes electrical probe data.

31. The method of Claim 20, wherein the correlation between the one or more patterned wafer geometry metrics and the wafer characterization data includes a correlation coefficient.
32. The method of Claim 31, wherein the correlation coefficient is an R^2 – value.
33. The method of Claim 31, further comprising:
determining the correlation coefficient between the one or more patterned wafer geometry metrics and the wafer characterization data via at least one machine learning algorithm.
34. The method of Claim 33, wherein the machine learning algorithm includes a classification algorithm.
35. The method of Claim 34, wherein the machine learning algorithm includes logistic regression.
36. The method of Claim 34, wherein the machine learning algorithm includes a decision tree.
37. The method of Claim 20, further comprising:
displaying the statistical process control output on a user interface.