

CLAIMS

1. A method comprising:
receiving plasma process conditions at a processor;
determining, using the processor, plasma parameters at a surface of a wafer based on the plasma process conditions with a plasma hypermodel;
inputting the plasma parameters into a feature-scale profile model;
predicting, using the processor, a post-processing profile for the surface of the wafer with the feature-scale profile model; and
comparing, using the processor, the post-processing profile with an experimental reference.
2. The method of claim 1, wherein the plasma process conditions include one or more of pressure, gas chemistry, temperature, flow rate, source power, bias power, or a pulse condition.
3. The method of claim 1, further comprising recalibrating correlations in the plasma hypermodel using the processor, wherein the post-processing profile is outside a convergence criterion of the experimental reference.
4. The method of claim 1, wherein the experimental reference is a TEM image or an XSEM image.
5. The method of claim 1, wherein the plasma hypermodel includes a matrix that is multiplied by the plasma process conditions.
6. The method of claim 1, wherein the plasma process conditions are for an etch process, a deposition process, or an ion implant process.
7. The method of claim 1, further comprising exposing the wafer to a plasma with the plasma process conditions in a plasma processing tool.
8. A non-transitory computer readable medium storing a program configured to instruct the processor to execute the method of claim 1.
9. A system comprising:
a plasma processing tool including:

a plasma chamber;
a stage disposed in the plasma chamber configured to hold a wafer; and
a plasma generation system; and
a processor in electronic communication with the plasma processing tool, wherein
the processor is configured to:

receive plasma process conditions;
determine plasma parameters at a surface of the wafer based on the
plasma process conditions with a plasma hypermodel;
input the plasma parameters into a feature-scale profile model;
predict a post-processing profile for the surface of the wafer with the
feature-scale profile model; and
compare the post-processing profile with an experimental reference.

10. The system of claim 9, wherein the plasma processing tool is an etch tool,
a deposition tool, or an ion implant tool.

11. The system of claim 9, wherein the plasma process conditions include one
or more of pressure, gas chemistry, temperature, flow rate, source power, bias power, or a
pulse condition.

12. The system of claim 9, wherein the processor is further configured to
recalibrate correlations in the plasma hypermodel, wherein the post-processing profile is
outside a convergence criterion of the experimental reference.

13. The system of claim 9, wherein the experimental reference is a TEM image
or an XSEM image.

14. The system of claim 9, wherein the plasma hypermodel includes a matrix
that is multiplied by the plasma process conditions.

15. The system of claim 9, wherein the processor is further configured to send
instructions to the plasma processing tool to generate a plasma with the plasma process
conditions.