CLAIMS

1. A method, comprising:

receiving, by a processing device, (i) current optical sensor data from one or more optical sensors of a processing chamber, wherein the current optical sensor data is indicative of a first thickness of a coating of the processing chamber processing a substrate subsequent to a chamber recovery procedure performed on the processing chamber and (ii) substrate process data indicating a set of process parameter values associated with performing a substrate processing procedure by the processing chamber having a second thickness of the coating prior to the chamber recovery procedure;

processing the current optical sensor data and the substrate process data using one or more machine learning models (MLMs) to determine one or more outputs, the one or more outputs comprising a first update to at least one of the set of process parameter values, wherein the first update is associated with performing the substrate processing procedure by the processing chamber having the first thickness of the coating;

performing, by the processing device, at least one of a) preparing a notification indicating the first update for presentation on a graphical user interface (GUI) or b) causing the processing chamber to perform a selection of the substrate processing procedure based on the first update.

2. The method of claim 1, further comprising:

determining a first end point detection condition corresponding to the first update, wherein the end point is indicative of an end to a processing chamber tuning procedure; and

causing the processing chamber to perform the selection of the substrate processing procedure using the first end point detection condition.

3. The method of claim 2, wherein the first end point detection condition corresponds to an optical sensor measurement of the coating of the processing chamber.

4. The method of claim 2, wherein determining the first end point detection condition comprises:

applying a deterministic model to the first update to generate the first end point detection condition, wherein the deterministic model is generated using one or more historical

process parameters and one or more historical end point detection conditions associated with the one or more historical process parameters.

5. The method of claim 4, wherein the deterministic model comprises a mechanistic model generated by performing at least a linear exponential regression using the one or more historical process parameters and the one or more historical end point detection conditions.

6. The method of claim 1, wherein:

the substrate processing procedure comprises a plurality of process operations;

a first value of the set of process parameter values corresponds to a first process operation of the plurality of process operations;

the first update corresponds to the first value;

a second value of the set of process parameter values corresponds to a second process operation of the plurality of process operations; and

the one or more outputs further comprises a second update corresponding to the second value.

7. The method of claim 6, the method further comprising:

determining a first end point detection condition corresponding to the first process operation and the processing chamber based on the first update;

determining a second end point detection condition corresponding to the second process operation and the processing chamber based on the second update; and

causing the processing chamber to perform the selection of the substrate processing procedure using the first end point detection condition and the second end point detection condition.

8. The method of claim 1, wherein processing the current optical sensor data and the substrate process data further comprises:

processing, using a first MLM of the one or more MLMs, the current optical sensor data and the substrate process data to obtain a first model output;

processing, using a second MLM of the one or more MLMs, the first model output to obtain a second model output; and

determining the first update based on a combination of at least the first model output with the second model output.

9. The method of claim 1, wherein at least one of the one or more MLMs is trained using at least one of least absolute shrinkage and selection operator (LASSO) regression or Ridge regression.

10. The method of claim 1, wherein the chamber recovery procedure comprises a chamber seasoning procedure performed subsequent to a preventive maintenance (PM) procedure.

11. The method of claim 1, wherein the set of process parameter values comprises one or more values indicating at least one of process temperature, process pressure, or process duration.

12. A method, comprising:

receiving, by a processing device, training data comprising (i) first current optical sensor data from one or more optical sensors of a processing chamber, wherein the first current optical sensor data is indicative of a first thickness of a coating of a first processing chamber processing a substrate subsequent to a chamber recovery procedure performed on the first processing chamber, (ii) first substrate process data indicating a first set of process parameter values associated with performing a first substrate processing procedure by the first processing chamber having a second thickness of the coating prior to the chamber recovery procedure, and (iii) second substrate process data indicating a first update to at least one of the first set of process parameter values, wherein the first update is associated with performing the first substrate processing procedure by the first processing chamber having the first thickness of the coating; and

training, by the processing device, one or more machine learning models (MLMs) with (i) input data comprising the first current optical sensor data and the first substrate process data and (ii) target output comprising the second substrate process data, wherein the one or more trained MLMs are to receive a new input having new current optical sensor data indicating a third thickness of the coating of a new processing chamber processing a new substrate subsequent to the chamber recovery procedure and third substrate process data indicating a second set of process parameter values associated with performing the first

substrate processing procedure by the new processing chamber having a fourth thickness of the coating prior to the chamber recovery procedure to produce a new output based on the new input, the new output indicating a second update to at least one of the second set of process parameter values, wherein the second update is associated with performing the first substrate processing procedure by the new processing chamber having the third thickness of the coating.

13. The method of claim 12, further comprising:

causing a first regression to be performed using a first subset of training data to generate a first MLM;

causing a second regression to be performed using a second subset of training data to generate a second MLM; and

determining that a first accuracy of the first MLM is greater than a second accuracy of the second MLM based on a comparison of the first MLM, the second MLM, and the training data, wherein the trained one or more MLMs comprise the first MLM.

14. The method of claim 12, wherein training the one or more MLMs further comprises performing a gradient boosting regression (GBR) using the training data.

15. The method of claim 12, wherein:

the first substrate processing procedure comprises a series of process operations, wherein each of the second set of process parameter values is associated with one of the series of process operations;

the second update indicates an update to a first process parameter value of the second set of process parameter values, the first process parameter value corresponding to a first process operation of the series of process operations; and

the new output further indicates a third update to a second process parameter value of the second set of process parameter values, the second process parameter value corresponding to a second process operation of the series of process operations.