

Claims

1. A substrate processing system comprising:

a sensor installed in a substrate processing apparatus and configured to detect a target physical quantity during processing of a target substrate; and

a prediction unit configured to output a polishing end point timing, which is timing of ending polishing, by inputting, to a learned machine learning model, time-series data of the physical quantity detected by the sensor or time-series data obtained by differentiating the time-series data of the physical quantity with respect to time, wherein

the machine learning model is obtained by machine learning using, as a learning data set, past time-series data of the physical quantity or time-series data obtained by differentiating the past time-series data of the physical quantity with respect to time as input and the past polishing end point timing as output,

wherein

the target physical quantity is a current value of a table rotating motor of the substrate processing apparatus, a current value of a top ring rotating motor of the substrate processing apparatus, or torque of a table of the substrate processing apparatus, and

the substrate processing system further comprises:

a selection unit configured to select time-series data of a current value detected by the sensor based on time-series data obtained by differentiating the time-series data of the current value with respect to time; and

a learning unit configured to generate the learned machine learning model by performing machine learning using, as the learning data set, the time-series data of the current value selected by the selection unit as input and the polishing end point timing as output.

2. The substrate processing system according to claim 1, further comprising:

a decision unit configured to compare the time-series data of the physical quantity detected by the sensor with the past time-series data and judge whether an abnormality is present in a time-series change in the physical quantity;

a determination unit configured to determine a processing condition again when the decision unit judges that the abnormality is present; and

an update control unit configured to perform control to perform an update with the processing condition determined by the determination unit.

~~3. The substrate processing system according to claim 1 or 2, wherein~~

~~the target physical quantity is a current value of a~~

~~table rotating motor of the substrate processing apparatus,
a current value of a top ring rotating motor of the
substrate processing apparatus, or torque of a table of the
substrate processing apparatus, and~~

~~—— the substrate processing system further comprises:~~

~~—— a selection unit configured to select time-series
data of a current value detected by the sensor based on
time-series data obtained by differentiating the time-
series data of the current value with respect to time; and~~

~~—— a learning unit configured to generate the learned
machine learning model by performing machine learning
using, as the learning data set, the time-series data of
the current value selected by the selection unit as input
and the polishing end point timing as output.~~

43. The substrate processing system according to claim
31, wherein when a minimum point or a maximum point that
satisfies a setting criterion is not detected in the time-
series data differentiated with respect to time, the
selection unit selects the time-series data of the current
value by excluding the time-series data of the current
value before the differentiation.

5. ~~A substrate processing system comprising:~~

~~—— a sensor installed in a substrate processing
apparatus and configured to detect a target physical
quantity during processing of a target substrate;~~

~~— storage in which at least one piece of past time-series data of the physical quantity during the processing of the substrate is stored in association with a lot of substrate;~~

~~— an extraction unit configured to refer to the storage and extract the past time-series data of the physical quantity that corresponds to the lot of the target substrate to be processed; and~~

~~— a decision unit configured to compare the time-series data of the physical quantity detected by the sensor with the past time-series data extracted by the extraction unit and judge whether an abnormality is present in a time-series change in the physical quantity.~~

~~6. The substrate processing system according to claim 5, further comprising:~~

~~— a determination unit configured to determine a processing condition again when the decision unit judges that the abnormality is present; and~~

~~— an update control unit configured to perform control to perform an update with the processing condition determined by the determination unit.~~

74. A substrate processing system comprising:

at least one sensor installed in a substrate processing apparatus and configured to detect a target physical quantity during processing of a target substrate;

first storage in which at least one piece of past time-series data of the physical quantity during the processing of the substrate is stored in association with a lot of the substrate;

an extraction unit configured to refer to the first storage and extract the past time-series data of the physical quantity that corresponds to the lot of the target substrate to be processed; and

a maintenance necessity decision unit configured to compare the time-series data of the physical quantity detected by the sensor at the time of occurrence of an abnormality with the past time-series data of the physical quantity extracted by the extraction unit to judge whether maintenance needs to be performed;

second storage in which a combination of presence or absence of an abnormality in at least one or more physical quantities and a factor of the abnormality and/or a solution to the abnormality are stored in association with each other; and

a factor analysis unit configured to refer to the second storage and output the factor of the abnormality and/or the solution to the abnormality according to the combination of presence or absence of the abnormality in the one or more physical quantities when the maintenance necessity decision unit judges that the maintenance needs

to be performed.

~~8. A substrate processing system comprising:~~

~~—— an information processing apparatus connected to a plurality of substrate processing apparatuses via a communication line; and~~

~~—— a fog computer or a terminal connected to the information processing apparatus via a communication line, wherein~~

~~—— the information processing apparatus collects data from the plurality of substrate processing apparatuses, processes the collected data, and transmits a result of the processing to the fog computer or the terminal, and~~

~~—— the fog computer or the terminal performs control to output the result of the processing upon receiving the result of the processing.~~

~~9. The substrate processing system according to claim 8, wherein,~~

~~—— the information processing apparatus includes:~~

~~—— means for extracting, from the collected data, a parameter having a correlation of a standard or higher with a substrate processing condition, a substrate processing table state, and/or dressing uniformity; and~~

~~—— means for comparing the extracted parameters between the substrate processing apparatuses and updating at least one parameter of the data according to a result of the~~

~~comparison.~~