What is claimed is:

1. A method of determining an optimum operation recipe for an optical film-thickness measuring device configured to measure a film thickness of a substrate during polishing of the substrate, comprising:

storing in a memory a plurality of parameter sets each including a plurality of recipe parameters constituting an operation recipe;

performing simulation of change in film thickness with polishing time with use of the plurality of parameter sets and data of reference spectra of reflected light from a polished substrate, the reference spectra being stored in a data server;

inputting at least one index value for evaluating a manner of the change in film thickness into an evaluation calculation formula to calculate a plurality of comprehensive evaluation values for the plurality of parameter sets; and

selecting an optimum one of the plurality of parameter sets based on the plurality of comprehensive evaluation values,

wherein the plurality of recipe parameters includes at least two of:

time width for calculating a moving average of spectra obtained during polishing of a substrate;

the number of data points for use in calculating a spatial average of spectra obtained during polishing of a substrate;

parameters of a filter applied to spectra obtained during polishing of a substrate;

normalization parameter for normalizing spectra obtained during polishing of a substrate;

wavelength range of spectrum for use in film thickness determination; and

the number of a spectrum group that contains reference spectra for use in film thickness determination.

2. The method according to claim 1, wherein the evaluation calculation formula includes the at least one index value, at least one target value for the at least one index value, and at least one weighting factor multiplied by a difference between the at least one target value and the at least one index value.

~~3. The method according to claim 1, wherein the plurality of recipe parameters includes at least two of:~~

~~time width for calculating a moving average of spectra obtained during polishing of a substrate;~~

~~the number of data points for use in calculating a spatial average of spectra obtained during polishing of a substrate;~~

~~parameters of a filter applied to spectra obtained during polishing of a substrate;~~

~~normalization parameter for normalizing spectra obtained during polishing of a substrate;~~

~~wavelength range of spectrum for use in film thickness determination; and~~

~~the number of a spectrum group that contains reference spectra for use in film thickness determination.~~

~~4~~3. The method according to claim 1, wherein the at least one index value comprises at least one of:

a first index value indicating evaluation for invariance of a shape of a film-thickness profile with respect to polishing time;

a second index value indicating evaluation for smallness of a difference between an actually-measured value of a film thickness measured by a film-thickness measuring module and a film thickness obtained by the simulation;

a third index value indicating evaluation for goodness of fit in shape between a spectrum produced in the simulation and a reference spectrum stored in the data server;

a fourth index value indicating evaluation for a quality factor of a film thickness determined based on a spectrum produced in the simulation; and

a fifth index value indicating evaluation for a linearity of the change in film thickness along polishing time.

~~5~~4. The method according to claim 1, wherein the reference spectra stored in the data server are spectra of reflected light that have been obtained when a plurality of substrates are actually polished.

~~6~~5. The method according to claim ~~5~~4, further comprising:

repeating the simulation and calculation of the comprehensive evaluation value for the plurality of substrates to obtain a plurality of comprehensive evaluation values for each parameter set; and

calculating a variation in the plurality of comprehensive evaluation values for each parameter set,

wherein said selecting the optimum one of the plurality of parameter sets comprises selecting, from the plurality of parameter sets, an optimum parameter set with a smallest variation in the plurality of comprehensive evaluation values.

~~7~~6. The method according to claim ~~5~~4, further comprising:

repeating the simulation and calculation of the comprehensive evaluation value for the plurality of substrates to obtain a plurality of comprehensive evaluation values for each parameter set; and

calculating a sum of the plurality of comprehensive evaluation values for each parameter set,

wherein said selecting the optimum one of the plurality of parameter sets comprises selecting, from the plurality of parameter sets, an optimum parameter set with a largest or smallest sum of the plurality of comprehensive evaluation values

wherein the plurality of recipe parameters includes at least two of:

time width for calculating a moving average of spectra obtained during polishing of a substrate;

the number of data points for use in calculating a spatial average of spectra obtained during polishing of a substrate;

parameters of a filter applied to spectra obtained during polishing of a substrate;

normalization parameter for normalizing spectra obtained during polishing of a substrate;

wavelength range of spectrum for use in film thickness determination; and

the number of a spectrum group that contains reference spectra for use in film thickness determination.

~~8~~7. A system for determining an optimum operation recipe for an optical film-thickness measuring device configured to measure a film thickness of a substrate during polishing of the substrate, comprising:

a recipe evaluation device including a memory storing a program therein and a processor configured to perform an arithmetic operation according to an instruction contained in the program, the memory storing therein a plurality of parameter sets each including a plurality of recipe parameters constituting an operation recipe; and

a data server storing therein data of reference spectra of reflected light from a polished substrate,

wherein the recipe evaluation device is configured to

perform simulation of change in film thickness with polishing time with use of the plurality of parameter sets and the data of the reference spectra obtained from the data server,

input at least one index value for evaluating a manner of the change in film thickness into an evaluation calculation formula to calculate a plurality of comprehensive

evaluation values for the plurality of parameter sets, and

select an optimum one of the plurality of parameter sets based on the plurality of comprehensive evaluation values.

~~8~~9. The system according to claim ~~8~~7, wherein the evaluation calculation formula includes the at least one index value, at least one target value for the at least one index value, and at least one weighting factor multiplied by a difference between the at least one target value and the at least one index value.

~~10. The system according to claim 8, wherein the plurality of recipe parameters includes at least two of:~~

~~time width for calculating a moving average of spectra obtained during polishing of a substrate;~~

~~the number of data points for use in calculating a spatial average of spectra obtained during polishing of a substrate;~~

~~parameters of a filter applied to spectra obtained during polishing of a substrate;~~

~~normalization parameter for normalizing spectra obtained during polishing of a substrate;~~

~~wavelength range of spectrum for use in film thickness determination; and~~

~~the number of a spectrum group that contains reference spectra for use in film thickness determination.~~

~~11~~9. The system according to claim ~~8~~7, wherein the at least one index value comprises at least one of:

a first index value indicating evaluation for invariance of a shape of a film-thickness profile with respect to polishing time;

a second index value indicating evaluation for smallness of a difference between an actually-measured value of a film thickness measured by a film-thickness measuring module

and a film thickness obtained by the simulation;

a third index value indicating evaluation for goodness of fit in shape between a spectrum produced in the simulation and a reference spectrum stored in the data server;

a fourth index value indicating evaluation for a quality factor of a film thickness determined based on a spectrum produced in the simulation; and

a fifth index value indicating evaluation for a linearity of the change in film thickness along polishing time.

10~~2~~. The system according to claim 7~~8~~, wherein the reference spectra stored in the data server are spectra of reflected light that have been obtained when a plurality of substrates are actually polished.

11~~3~~. The system according to claim 10~~2~~, wherein the recipe evaluation device is configured to

repeat the simulation and calculation of the comprehensive evaluation value for the plurality of substrates to obtain a plurality of comprehensive evaluation values for each parameter set,

calculate a variation in the plurality of comprehensive evaluation values for each parameter set, and

select, from the plurality of parameter sets, an optimum parameter set with a smallest variation in the plurality of comprehensive evaluation values.

12~~4~~. The system according to claim 10~~2~~, wherein the recipe evaluation device is configured to

repeat the simulation and calculation of the comprehensive evaluation value for the plurality of substrates to obtain a plurality of comprehensive evaluation values for each parameter set,

calculate a sum of the plurality of comprehensive evaluation values for each

parameter set, and

select, from the plurality of parameter sets, an optimum parameter set with a smallest sum of the plurality of comprehensive evaluation values.

~~15~~13. A recipe evaluation device for determining an optimum operation recipe for an optical film-thickness measuring device configured to measure a film thickness of a substrate during polishing of the substrate, comprising:

a memory storing therein a program and a plurality of parameter sets each including a plurality of recipe parameters constituting an operation recipe; and

a processor configured to perform an arithmetic operation according to an instruction contained in the program,

wherein the processor is configured to

perform simulation of change in film thickness with polishing time with use of the plurality of parameter sets and data of reference spectra of reflected light from a polished substrate, the data being obtained from a data server storing the data therein,

input at least one index value for evaluating a manner of the change in film thickness into an evaluation calculation formula to calculate a plurality of comprehensive evaluation values for the plurality of parameter sets, and

select an optimum one of the plurality of parameter sets based on the plurality of comprehensive evaluation values

wherein the plurality of recipe parameters includes at least two of:

time width for calculating a moving average of spectra obtained during polishing of a substrate;

the number of data points for use in calculating a spatial average of spectra obtained during polishing of a substrate;

parameters of a filter applied to spectra obtained during polishing of a substrate;

normalization parameter for normalizing spectra obtained during polishing

of a substrate;

wavelength range of spectrum for use in film thickness determination; and

the number of a spectrum group that contains reference spectra for use in film thickness determination.

~~16~~14. The recipe evaluation device according to claim 1~~3~~5, wherein the evaluation calculation formula includes the at least one index value, at least one target value for the at least one index value, and at least one weighting factor multiplied by a difference between the at least one target value and the at least one index value.