What is claimed is:

1. A polishing method comprising:

polishing a surface of a substrate by pressing the substrate against a polishing pad on a rotating polishing table;

producing a spectrum of reflected light from the surface of the substrate each time the polishing table makes one rotation;

creating a three-dimensional data containing a plurality of spectra arranged along polishing time; and

determining a film thickness of the substrate based on the three-dimensional data, wherein the said determination comprises:

comparing the three-dimensional data with a reference data containing a plurality of reference spectra arranged along polishing time;

determining a position of a data area in the reference data that best matches the three-dimensional data; and

determining the film thickness associated with the determined position.

2. The polishing method according to claim 1, wherein:

comparing the three-dimensional data with the reference data comprises calculating a difference between the plurality of spectra contained in the three-dimensional data and the plurality of reference spectra contained in the reference data; and

determining the position of the data area in the reference data that best matches the three-dimensional data comprises determining the position of the data area at which the difference is minimized.

3. The polishing method according to claim 1 or 2, further comprising:

selecting, from a plurality of reference data, the reference data including a data area that best matches an initial three-dimensional data created at an initial stage of polishing of

the substrate, each of the plurality of reference data including a plurality of reference spectra produced when one of a plurality of prepared reference substrates is polished.

4. The polishing method according to claim 1, wherein determining the film thickness of the substrate further comprises:

converting the reference data and the three-dimensional data into a reference image and a two-dimensional image, respectively;

determining a position of an image area in the reference image that best matches the two-dimensional image; and

determining the film thickness associated with the determined position.

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

converting a plurality of reference data into a plurality of reference images, the plurality of reference data including a plurality of reference spectra produced when a plurality of prepared reference substrates are polished;

converting an initial three-dimensional data into an initial two-dimensional image, the initial three-dimensional data being created at an initial stage of polishing of the substrate; and

selecting, from the plurality of reference images, the reference image including an image area that best matches the initial two-dimensional image.

6. The polishing method according to claim 1, wherein determining the film thickness of the substrate further comprises:

inputting the three-dimensional data into a film-thickness calculation model that has been constructed according to an artificial intelligence algorithm; and

outputting the film thickness from the film-thickness calculation model.

7. The polishing method according to claim 6, wherein the film-thickness

calculation model is a trained model that has been constructed with use of a training data set containing a combination of a plurality of training three-dimensional data and a plurality of film thicknesses associated with the plurality of training three-dimensional data, respectively, and each of the plurality of training three-dimensional data includes a plurality of reference spectra arranged along polishing time.

8. The polishing method according to claim 7, wherein the film-thickness calculation model is the trained model obtained by:

creating the plurality of training three-dimensional data each containing a plurality of reference spectra produced when a plurality of reference substrates are polished;

dividing the plurality of training three-dimensional data into a plurality of groups according to a clustering algorithm;

creating test three-dimensional data by arranging a plurality of spectra along polishing time, the plurality of spectra of the test three-dimensional data being produced when a test substrate is polished;

selecting, from the plurality of groups, one group including a training three-dimensional data that best matches the test three-dimensional data; and

constructing the film-thickness calculation model with use of the training data set containing the combination of the plurality of training three-dimensional data belonging to the selected group and the plurality of film thicknesses associated with the plurality of training three-dimensional data, respectively.

9. A polishing apparatus comprising:

a polishing table for supporting a polishing pad, the polishing table being rotatable;

a polishing head configured to press a substrate against the polishing pad to polish a surface of the substrate;

a sensor head located in the polishing table, the sensor head being configured to direct light to the surface of the substrate and receive reflected light from the surface of the

substrate; and

a processing system having a memory storing therein a program configured to cause the processing system to produce a spectrum of the reflected light, create a three-dimensional data containing a plurality of spectra arranged along polishing time, and determine a film thickness of the substrate based on the three-dimensional data, wherein the processing system is configured to:

compare the three-dimensional data with a reference data containing a plurality of reference spectra arranged along polishing time;

determine a position of a data area in the reference data that best matches the three-dimensional data; and

determine the film thickness associated with the determined position.

10. The polishing apparatus according to claim 9, wherein the processing system is configured to:

calculate a difference between the plurality of spectra contained in the three-dimensional data and the plurality of reference spectra contained in the reference data; and

determine the position of the data area at which the difference is minimized.

11. The polishing apparatus according to claim 9 or 10, wherein the processing system is configured to select, from a plurality of reference data, the reference data including a data area that best matches an initial three-dimensional data created at an initial stage of polishing of the substrate, each of the plurality of reference data including a plurality of reference spectra produced when one of a plurality of prepared reference substrates is polished.

12. The polishing apparatus according to claim 9, wherein the processing system is configured to:

convert the reference data and the three-dimensional data into a reference image

and a two-dimensional image, respectively;

determine a position of an image area in the reference image that best matches the two-dimensional image; and

determine the film thickness associated with the determined position.

13. The polishing apparatus according to claim 9, wherein the processing system is configured to:

convert a plurality of reference data into a plurality of reference images, the plurality of reference data including a plurality of reference spectra produced when a plurality of prepared reference substrates are polished;

convert an initial three-dimensional data into an initial two-dimensional image, the initial three-dimensional data being created at an initial stage of polishing of the substrate; and

select, from the plurality of reference images, the reference image including an image area that best matches the initial two-dimensional image.

14. The polishing apparatus according to claim 9, wherein the memory stores therein a film-thickness calculation model that has been constructed according to an artificial intelligence algorithm, and

the processing system is configured to input the three-dimensional data into the film-thickness calculation model, and output the film thickness from the film-thickness calculation model.

15. The polishing apparatus according to claim 14, wherein the film-thickness calculation model is a trained model that has been constructed with use of a training data set containing a combination of a plurality of training three-dimensional data and a plurality of film thicknesses associated with the plurality of training three-dimensional data, respectively, and each of the plurality of training three-dimensional data includes a plurality of reference

spectra arranged along polishing time.

16. The polishing apparatus according to claim 14, wherein the film-thickness calculation model is the trained model obtained by:

creating the plurality of training three-dimensional data each containing a plurality of reference spectra produced when a plurality of reference substrates are polished;

dividing the plurality of training three-dimensional data into a plurality of groups according to a clustering algorithm;

creating test three-dimensional data by arranging a plurality of spectra along polishing time, the plurality of spectra of the test three-dimensional data being produced when a test substrate is polished;

selecting, from the plurality of groups, one group including a training three-dimensional data that best matches the test three-dimensional data; and

constructing the film-thickness calculation model with use of the training data set containing the combination of the plurality of training three-dimensional data belonging to the selected group and the plurality of film thicknesses associated with the plurality of training three-dimensional data, respectively.