What is claimed is:

1. A polishing method for polishing a polishing-target layer of a workpiece, comprising:

rotating a polishing table supporting a polishing pad;

polishing the polishing-target layer by pressing the workpiece against the polishing pad;

irradiating the workpiece with light;

receiving reflected light from the workpiece;

measuring an intensity of the reflected light at each of wavelengths;

generating a spectral waveform showing a relationship between the intensity and wavelength of the reflected light;

performing a Fourier transform process on the spectral waveform to generate a frequency spectrum;

moving a peak search range for the frequency spectrum according to a polishing time to thereby cause the peak search range to follow a change in thickness of the polishing-target layer;

determining a peak of the frequency spectrum within the peak search range; and

determining a thickness of the polishing-target layer corresponding to the determined peak.

2. The polishing method according to claim 1, wherein the peak search range is a range that includes a value calculated based on a thickness of the polishing-target layer determined last time and a polishing rate of the workpiece.

3. The polishing method according to claim 2, wherein the polishing rate is a preset polishing rate.

4. The polishing method according to claim 2, wherein the polishing rate is a polishing rate calculated during polishing of the workpiece.

5. A polishing method for polishing a polishing-target layer of a workpiece, comprising:

rotating a polishing table supporting a polishing pad;

polishing the polishing-target layer by pressing the workpiece against the polishing pad;

irradiating the workpiece with light;

receiving reflected light from the workpiece;

measuring an intensity of the reflected light at each of wavelengths;

generating a spectral waveform showing a relationship between the intensity and wavelength of the reflected light;

removing a noise from the spectral waveform by a filter;

performing a Fourier transform process on the spectral waveform, from which the noise is removed, to generate a frequency spectrum;

determining a thickness of the polishing-target layer based on a peak of the frequency spectrum; and

complementing, by extrapolation, a thickness of the polishing-target layer corresponding to a peak of the frequency spectrum disappeared as a result of the removal of the noise, the extrapolation using a plurality of values of the thickness of the polishing-target layer obtained during polishing of the workpiece.

6. The polishing method according to claim 5, wherein the filter is configured to remove, from the spectral waveform, the noise having a frequency of a peak of the frequency spectrum that does not move with a polishing time of the workpiece.

7. The polishing method according to claim 5 or 6, wherein the noise is a noise

caused by light reflected from a lower layer lying under the polishing-target layer.

8. The polishing method according to any one of claims 5 to 7, wherein the filter is a band stop filter.

9. The polishing method according to any one of claims 5 to 8, further comprising:

polishing other workpiece before polishing of the workpiece, the other workpiece having the same pattern as the workpiece; and

producing the filter for removing a noise contained in a spectral waveform of reflected light from the other workpiece.

10. The polishing method according to any one of claims 5 to 8, further comprising producing the filter for removing the noise contained in the spectral waveform of reflected light from the workpiece during polishing of the workpiece.