WHAT IS CLAIMED IS:

1. A film thickness measurement apparatus of a polishing apparatus configured to measure the film thickness of a film having a plurality of wiring patterns of a substrate during polishing of the film, wherein

the polishing apparatus includes a polishing table for holding a polishing pad on which the film is pressed,

the film thickness measurement apparatus comprises:

a light emitter configured to project an emitted light during polishing of the film by the polishing apparatus;

an optical condenser configured to condense the emitted light projected from the light emitter to provide a predetermined spot size and project the emitted light onto the film; and

a light receiver configured to receive a reflected light reflected from the film, and

assuming that the predetermined spot size of the emitted light is D (μm), a spot area of the emitted light is S (μm^2), a peripheral velocity of the light emitter or the optical condenser during polishing of the film is ω (μm/sec), a minimum area as a minimum value of areas of respective wiring patterns constituting the plurality of wiring patterns is Smin (μm^2), and an exposure time, which is a time during which the emitted light is projected to the film, of the emitted light is t (sec), the exposure time (t) of the emitted light is set so as to satisfy a following Formula (1):

$$(S + D \times \omega \times t) \leq (\alpha \times Smin) \cdots \cdots (1),$$

(where α is a value selected from a range of $0 < \alpha \leq 2$).

2. The polishing apparatus for polishing the film of the substrate, the film including the plurality of wiring patterns, the polishing apparatus comprising

the film thickness measurement apparatus according to claim 1.

3. A film thickness measurement method comprising

measuring the film thickness of a film of the substrate by using the film thickness measurement apparatus according to claim 1 during polishing of the film by the polishing apparatus for polishing the film, the film including the plurality of wiring patterns.

4. The film thickness measurement apparatus according to claim 1, wherein

the film includes at least one of an organic compound and an inorganic compound.

5. The film thickness measurement apparatus according to claim 1, wherein the light emitter, the optical condenser, and the light receiver are arranged in the polishing table, and

a transparent window through which the emitted light and the reflected light are transmittable is arranged in a part of the polishing pad.

6. The film thickness measurement apparatus according to claim 5, further comprising

a tubular jig for installing a sensor head including the light emitter, the optical condenser, and the light receiver to the polishing table, wherein

the tubular jig is connected to the polishing table such that the emitted light and the reflected light pass through the inside of the tubular jig.

7. The film thickness measurement apparatus according to claim 1, wherein the optical condenser includes a lens.

8. The film thickness measurement apparatus according to claim 1, wherein the emitted light has an infrared range wavelength and is a laser light.