WHAT IS CLAIMED IS:

1. A plate-like object processing method for processing a plate-like object including a substrate and a laminate formed on a front surface of the substrate, the plate-like object processing method comprising:

a substrate exposing step of exposing the substrate by removing the laminate by irradiating a region in which the laminate of the plate-like object is desired to be removed with a laser beam set at an energy density that destroys the laminate but does not destroy the substrate.

2. The plate-like object processing method according to claim 1, wherein

the laser beam applied in the substrate exposing step is applied, as a focused spot whose focal point is positioned above an upper surface of the laminate, to the upper surface of the laminate forming the plate-like object.

3. The plate-like object processing method according to claim 1, wherein

the plate-like object is a wafer including the laminate in which a plurality of devices are formed in a state of being partitioned by a plurality of division lines on the front surface of the substrate, and

the plate-like object processing method further comprises

a cutting step of cutting the exposed substrate

along the division lines after removing the laminate along the division lines in the substrate exposing step.

CLAIMS

What is claimed is:

1. A plate-like object processing method for processing a plate-like object including a substrate and a laminate formed on a front surface of the substrate, the plate-like object processing method comprising:
a substrate exposing step of exposing the substrate by removing the laminate by irradiating a region in which the laminate of the plate-like object is desired to be removed with a single laser beam set at an energy density that destroys the laminate but does not destroy the substrate, wherein the single laser beam comprises a single beam spot of a predetermining diameter that is irradiated upon an upper surface of the laminate,

wherein the wavelength of the single laser beam is either 355 nm or 532 nm.

2. The plate-like object processing method according to claim 1, wherein:
the laser beam applied in the substrate exposing step is applied, as the single beam spot whose focal point is positioned above an upper surface of the laminate, to the upper surface of the laminate forming the plate-like object.

3. The plate-like object processing method according to claim 1, wherein:
the plate-like object is a wafer including the laminate in which a plurality of devices are formed in a state of being partitioned by a plurality of division lines on the front surface of the substrate, and

the plate-like object processing method further comprises:

a cutting step of cutting the exposed substrate along the division lines after removing the laminate along the division lines in the substrate exposing step.

4. A plate-like object processing method for processing a plate-like object including a substrate and a laminate formed on a front surface of the substrate, the plate-like object processing method comprising:
guiding a single laser beam from a pulsed laser beam oscillating means to a focusing means, wherein said focusing means directs said laser beam from a mirror directly to an objective lens; and

a substrate exposing step of exposing the substrate by removing the laminate by irradiating a region in which the laminate of the plate-like object is desired to be removed with the laser beam being set at an energy density that destroys the laminate but does not destroy the substrate,

wherein the wavelength of the single laser beam is either 355 nm or 532 nm.

5. The plate-like object processing method according to claim 4, wherein:
the laser beam applied in the substrate exposing step is applied, as a focused spot whose focal point is positioned above an upper surface of the laminate, to the upper surface of the laminate forming the plate-like object.

6. The plate-like object processing method according to claim 4, wherein:

the plate-like object is a wafer including the laminate in which a plurality of devices are formed in a state of being partitioned by a plurality of division lines on the front surface of the substrate, and

the plate-like object processing method further comprises:

a cutting step of cutting the exposed substrate along the division lines after removing the laminate along the division lines in the substrate exposing step.

7. The plate-like object processing method according to claim 1, wherein the predetermined diameter of the single beam spot is between 40 and 50 μm.

8. The plate-like object processing method according to claim 1, wherein the single laser beam has a conical shape in the area above the upper surface of the laminate.

9. The plate-like object processing method according to claim 4, wherein the laser beam has a conical shape in the area between the objective lens and the laminate.

10. The plate-like object processing method according to claim 1, wherein:
the wavelength of the single laser beam is 355 nm; and

the energy density of the single laser beam is within the range of 0.6 to 1.5 J/cm^2.

11. The plate-like object processing method according to claim 4, wherein:
the wavelength of the single laser beam is 355 nm; and

the energy density of the single laser beam is within the range of 0.6 to 1.5 J/cm^2.

12. The plate-like object processing method according to claim 1, wherein:
the wavelength of the single laser beam is 532 nm; and

the energy density of the single laser beam is within the range of 0.13 to 0.2 J/cm^2.

13. The plate-like object processing method according to claim 4, wherein:
the wavelength of the single laser beam is 532 nm; and

the energy density of the single laser beam is within the range of 0.13 to 0.2 J/cm^2.

14. The plate-like object processing method according to claim 1, wherein the substrate is formed of silicon.

15. The plate-like object processing method according to claim 4, wherein the substrate is formed of silicon.