What is claimed is:

1. A photomask blank in which a laminated body comprising at least one kind of functional transparent film is formed on a substrate that is transparent to exposure light, wherein:

a heat treatment within a temperature range of 260°C to 320°C for four hours or more is performed on the laminated body at least one time after any one of: a step of depositing the functional transparent film; a step of performing a flash irradiation treatment at least one time after deposition of the functional transparent film; and a step of forming a layer of a functional film that is different to the functional transparent film thereon to form the laminated body, wherein

in the step of performing the flash irradiation treatment, a time period of a single irradiation is one second or less.

2. The photomask blank according to claim 1, wherein, in the photomask blank, an amount of warpage change in the functional transparent film after a photomask manufacturing process ends is within ±0.05 μm.

3. The photomask blank according to claim 2, wherein the amount of warpage change is a measurement value within a rectangular region in which one side is 132 mm that is centered on a middle of a principal surface of the photomask blank.

4. The photomask blank according to any one of claims 1 to 3, wherein the functional transparent film comprises a halftone phase shift film.

5. A method of manufacturing a photomask blank in which a laminated body comprising at least one kind of functional transparent film is formed on a substrate that is transparent to exposure light, comprising:

a step of depositing at least one kind of functional transparent film on the substrate;

a step of performing a flash irradiation treatment in a case where an absolute value of a warpage amount on the substrate of the functional transparent film is 0.1 μm or more; and

a step of forming a layer of a functional film that is different to the functional transparent film thereon to form the laminated body;

the method further comprising a step of performing a heat treatment within a temperature range of 260°C to 320°C for four hours or more at least one time after any one of the three steps~~.~~, , wherein

in the step of performing the flash irradiation treatment, a time period of a single irradiation is one second or less.

~~6. The method of manufacturing a photomask blank according to claim 5, wherein the heat treatment is performed within a temperature range of 260°C to 320°C for four hours or more.~~

~~7. The method of manufacturing a photomask blank according to claim 5 or 6, wherein in the step of performing the flash irradiation treatment, a time period of a single irradiation is one second or less.~~

~~8.~~6. The method of manufacturing a photomask blank according to ~~any one of~~ claim~~s~~ 5 ~~to 7~~, wherein the heat treatment and the flash irradiation treatment are performed under conditions such that a warpage amount on the substrate of the functional transparent film after the step of performing the heat treatment and the step of performing the flash irradiation treatment is within ±0.05 μm.

~~9.~~7. The method of manufacturing a photomask blank according to ~~any one of~~ claim~~s~~ 5 ~~to 8~~or 6, wherein a warpage amount on the substrate of the laminated

body comprising the functional transparent film is a measurement value within a rectangular region in which one side is 132 mm that is centered on a middle of a principal surface of the photomask blank.

~~10.~~8. The method of manufacturing a photomask blank according to any one of claims 5 ~~to~~ - ~~9~~7, wherein the functional transparent film comprises a halftone ~~p~~hase shift film.