CLAIMS

WHAT IS CLAIMED IS:

1. A method of manufacturing a blank mask, comprising:

providing a light-transmitting substrate; and

disposing a light-shielding film on the light-transmitting substrate, the light-shielding film comprising a first light-shielding layer and a second light-shielding layer disposed on the first light-shielding layer,

wherein the second light-shielding layer includes a transition metal, and one or more of oxygen and nitrogen,

wherein disposing the light-shielding film comprises

controlling a reflectance of a surface of the light-shielding film with respect to light having a wavelength of 193 nm to be 20% or more and 40% or less, and

controlling a hardness value of the second light-shielding layer to be 0.3 kPa or more and 0.55 kPa or less, the hardness value being determined using an atomic force microscope in contact mode at a scan rate of 0.5Hz.

2. The method of claim 1, wherein disposing the light-shielding film further comprises controlling a reflectance of the surface of the light-shielding film with respect to light having a wavelength of 350 nm to be 25% or more and 45% or less.

3. The method of claim 1, wherein:

disposing the light-shielding film further comprises controlling

a reflectance of the surface of the light-shielding film with respect to all light having a wavelength of 350 nm or more and 400 nm or less to be included in a range of 25% or more and 50% or less; and

a reflectance of the surface of the light-shielding film with respect to all light having a wavelength of 480 nm or more and 550 nm or less to be included in a range of 30% or more and 50% or less.

4. The method of claim 1, wherein disposing the light-shielding film further comprises controlling the hardness value of the second light-shielding layer to be 0.15 times or more and 0.55 times or less than a hardness value of the first light-shielding layer.

5. The method of claim 1, wherein disposing the light-shielding film further comprises controlling

a Young's modulus value of the second light-shielding layer to be 1.0 kPa or more.

6. The method of claim 1, wherein disposing the light-shielding film further comprises controlling

a Young's modulus value of the second light-shielding layer to be 0.15 times or more and 0.55 times or less than a Young's modulus value of the first light-shielding layer.

7. The method of claim 1, wherein disposing the light-shielding film further comprises controlling

an absolute value of a value obtained by subtracting a transition metal content of the first light-shielding layer from a transition metal content of the second light-shielding layer to be 30 at% or less.

8. The method of claim 1, wherein disposing the light-shielding film further comprises controlling

a thickness ratio of the first light-shielding layer and the second light-shielding layer to be 1:0.02 to 0.25.

9. The method of claim 1, wherein the transition metal comprises at least one selected from the group consisting of Cr, Ta, Ti and Hf.

10. The method of claim 1, wherein the transition metal comprises Cr.

11. A method of manufacturing a photomask, comprising:

providing a light-transmitting substrate; and

disposing a patterned light-shielding film on the light-transmitting substrate, the patterned light-shielding film comprising a first light-shielding layer and a second light-shielding layer disposed on the first light-shielding layer,

wherein the second light-shielding layer includes a transition metal, and one or more of oxygen and nitrogen, and

wherein disposing the patterned light-shielding film comprises

controlling a reflectance of an upper surface of the patterned light-shielding film with respect to light having a wavelength of 193 nm to be 20% or more and 40% or less, and

controlling a hardness value of the second light-shielding layer to be 0.3 kPa or more and 0.55 kPa or less, the hardness value being determined using an atomic force microscope in contact mode at a scan rate of 0.5Hz.