CLAIMS

1. A reflective mask blank comprising a substrate, a multilayer reflective film that is formed on the substrate and reflects EUV light, and a layered film formed on the multilayer reflective film, wherein

the layered film includes a first layer and a second layer formed on the first layer, and has an absolute reflectance of 2.5% or less with respect to the EUV light, and

the first layer includes a phase shift film that shifts a phase of the EUV light.

2. The reflective mask blank according to claim 1, wherein the second layer is an interference layer that reduces the absolute reflectance of the layered film to 2.5% or less by utilizing optical interference.

3. The reflective mask blank according to claim 2, wherein the interference layer has a film thickness of 1 nm or more and 20 nm or less and a refractive index n of 0.85 or more and 0.96 or less.

~~4. The reflective mask blank according to claim 2 or 3, wherein the interference layer includes a material containing ruthenium (Ru).~~

~~5. The reflective mask blank according to claim 1, wherein the second layer is an absorption layer that reduces the reflectance (absolute reflectance) of the layered film to 2.5% or less by utilizing a light absorbing effect.~~

~~6. The reflective mask blank according to claim 5, wherein the absorption layer has a film thickness of 5 nm or more and 70 nm or less and an extinction coefficient k of 0.02 or more.~~

~~7. The reflective mask blank according to claim 5 or 6, wherein the absorption layer includes a material containing at least one element selected from the group consisting of tantalum (Ta), chromium (Cr), cobalt (Co), and nickel (Ni).~~

~~8~~4. The reflective mask blank according to any one of claims 1 to ~~7~~3, wherein the first layer has a relative reflectance of 3% or more and 40% or less and a phase difference of 160 to 200° with respect to the EUV light.

~~9~~5. The reflective mask blank according to any one of claims 1 to ~~8~~4, wherein the first layer has a film thickness of 5 nm or more and 70 nm or less and a refractive index n of 0.85 or more and 0.96 or less.

~~10~~6. The reflective mask blank according to any one of claims 1 to ~~9~~5, wherein the first layer includes a material containing at least one element selected from the group consisting of tantalum (Ta), titanium (Ti), ruthenium (Ru), and chromium (Cr).

~~11. A reflective mask blank comprising a substrate, a multilayer reflective film that is formed on the substrate and reflects EUV light, and a layered film formed on the multilayer reflective film, wherein~~

~~the layered film is a phase shift film that includes a first layer and a second layer formed on the first layer, and shifts a phase of the EUV light, and~~

~~the first layer includes an absorption layer having an absolute reflectance of 2.5% or less with respect to the EUV light.~~

~~12. The reflective mask blank according to claim 11, wherein the second layer is an interference layer that shifts a phase of EUV light reflected by the layered film by utilizing optical interference.~~

~~13. The reflective mask blank according to claim 11 or 12, wherein the second layer has a film thickness of 1 nm or more and 20 nm or less and a refractive index n of 0.85 or more and 0.96 or less.~~

~~14. The reflective mask blank according to any one of claims 11 to 13, wherein the second layer includes a material containing ruthenium (Ru).~~

~~15. The reflective mask blank according to any one of claims 11 to 14, wherein the first layer has a film thickness of 5 nm or more and 70 nm or less and an extinction coefficient k of 0.02 or more.~~

~~16. The reflective mask blank according to any one of claims 11 to 15, wherein the first layer includes a material containing at least one element selected from the group consisting of tantalum (Ta), chromium (Cr), cobalt (Co), and nickel (Ni).~~

~~17. The reflective mask blank according to any one of claims 11 to 16, wherein the layered film has a relative reflectance of 3% or more and 40% or less and a phase difference of 160 to 200° with respect to the EUV light.~~

~~18~~7. The reflective mask blank according to any one of claims 1 to ~~17~~6, further comprising a protective film between the multilayer reflective film and the first layer, wherein

the protective film contains at least one material selected from the group consisting of a material containing ruthenium (Ru), a material containing silicon (Si) and oxygen (O), a material containing yttrium (Y) and oxygen (O), and a material containing chromium (Cr).

~~19~~8. A reflective mask having a layered film pattern in which the layered film in the reflective mask blank according to any one of claims 1 to ~~18~~ 7 is patterned.

~~20~~9. A method for manufacturing a semiconductor device, the method comprising a step of forming a transfer pattern on a semiconductor substrate using the reflective mask according to claim ~~19~~8.