CLAIMS

1. A reflective photomask blank for producing a reflective photomask for pattern transfer using an extreme ultraviolet light as a light source comprising:

a substrate;

a reflective part formed on the substrate and configured to reflect an incident light; and

a low reflective part formed on the reflective part and configured to absorb an incident light, wherein

the low reflective part is a multi-layer structural body having at least two or more layers including an absorption layer and a phase shift layer,

the absorption layer and the phase shift layer are deposited in this order on the reflective part,

an optical constant to a wavelength of 13.5 nm of a material constituting the absorption layer satisfies an extinction coefficient $k > 0.041$, and

the optical constant to the wavelength of 13.5 nm of a material constituting the phase shift layer satisfies a refractive index $n < 0.94$ and the extinction coefficient $k < 0.02$,

wherein the phase shift layer consists of at least one kind of element selected from a group consisting of molybdenum (Mo) and niobium (Nb), and oxides, nitrides, and oxynitrides thereof.

2. The reflective photomask blank according to claim 1, wherein the absorption layer contains a total of

50 at% or more of at least one kind of element selected from the group consisting of tellurium (Te), cobalt (Co), nickel (Ni), platinum (Pt), silver (Ag), tin (Sn), indium (In), copper (Cu), zinc (Zn), and bismuth (Bi).

3. The reflective photomask blank according to claim 1 or 2, wherein the low reflective part including the absorption layer and the phase shift layer has a phase difference of 160 to 200° to the reflective part and a reflectance of 1% to 40% according to a film thickness ratio of the absorption layer and the phase shift layer.

4. A reflective photomask for pattern transfer using an extreme ultraviolet light as a light source comprising:

a substrate;

a reflective part formed on the substrate and configured to reflect an incident light; and

a low reflective part formed on the reflective part and configured to absorb an incident light, wherein

the low reflective part is a multi-layer structural body having at least two or more layers including an absorption layer and a phase shift layer,

the absorption layer and the phase shift layer are deposited in this order on the reflective part,

an optical constant to a wavelength of 13.5 nm of a material constituting the absorption layer satisfies an extinction coefficient $k > 0.041$, and

the optical constant to the wavelength of 13.5 nm of a material constituting the phase shift layer satisfies a refractive index $n < 0.94$ and the extinction coefficient $k < 0.02$,

wherein the phase shift layer consists of at least one kind of element selected from a group consisting of molybdenum (Mo) and niobium (Nb), and oxides, nitrides, and oxynitrides thereof.