CLAIMS

1. A reflective mask blank for EUV lithography, the reflective mask blank comprising:

a substrate;

a multilayer reflective film configured to reflect EUV light; and

an absorption layer configured to absorb EUV light, in this order from a substrate side, wherein

the absorption layer comprises a first absorption film and a second absorption film in this order from the substrate side,

the absorption layer has a refractive index for EUV light having a wavelength of 13.5 nm of 0.95 or less, and

the first absorption film is more easily chemically dry etched than the second absorption film.

2. The reflective mask blank according to claim 1, wherein the second absorption film comprises one or more metal elements selected from Group 9 elements to Group 13 elements.

3. The reflective mask blank according to claim 2, wherein the one or more metal elements in the second absorption film are selected from a group consisting of cobalt (Co), rhodium (Rh), iridium (Ir), nickel (Ni), palladium (Pd), platinum (Pt), copper (Cu), silver (Ag), gold (Au), cadmium (Cd), and indium (In).

4. The reflective mask blank according to claim 1, wherein the first absorption film comprises one or more metal elements selected from Group 4 elements to Group 8 elements and Group 14 elements.

5. The reflective mask blank according to claim 4, wherein the one or more metal elements in the first absorption film are selected from a group consisting of titanium (Ti), niobium (Nb), tantalum (Ta), chromium (Cr), molybdenum (Mo), tungsten (W), rhenium (Re), iron (Fe), ruthenium (Ru), osmium (Os), silicon (Si), germanium (Ge), and tin (Sn).

6. The reflective mask blank according to claim 1, wherein the absorption layer has a

total thickness of 60 nm or less.

7. The reflective mask blank according to claim 1, wherein a phase difference between a reflected light from a surface of the multilayer reflective film and a reflected light from a surface of the absorption layer is 150 ° to 270 ° with respect to an incident light of EUV light having a wavelength of 13.5 nm at an incident angle of 6 °.

8. The reflective mask blank according to claim 1, further comprising an antireflection film configured to prevent reflection of DUV light having a wavelength of 190 nm to 260 nm on or above the absorption layer.

9. A reflective mask comprising:

the reflective mask blank according to any one of claims 1 to 8; and

a mask pattern formed on the absorption layer.

10. A method for manufacturing the reflective mask according to claim 9, the method comprising:

forming the mask pattern, wherein

the formation of the mask pattern is performed by subjecting the absorption layer of the reflective mask blank to a sputtering etching treatment and then to a chemical dry etching treatment.

11. A reflective mask blank for EUV lithography, the reflective mask blank comprising:

a substrate;

a multilayer reflective film configured to reflect EUV light; and

an absorption layer configured to absorb EUV light, in this order from a substrate side, wherein

the absorption layer comprises a first absorption film and a second absorption film in this order from the substrate side,

the absorption layer has a refractive index for EUV light having a wavelength of 13.5 nm of 0.95 or less,

the first absorption film is more easily chemically dry etched than the second

absorption film,

the second absorption film comprises one or more metal elements selected from Group 9 elements to Group 13 elements, and

the absorption layer has a total thickness of 60 nm or less.

12. A reflective mask blank for EUV lithography, the reflective mask blank comprising:

a substrate;

a multilayer reflective film configured to reflect EUV light; and

an absorption layer configured to absorb EUV light, in this order from a substrate side, wherein

the absorption layer comprises a first absorption film and a second absorption film in this order from the substrate side,

the absorption layer has a refractive index for EUV light having a wavelength of 13.5 nm of 0.95 or less,

the first absorption film is more easily chemically dry etched than the second absorption film, and

the first absorption film comprises one or more metal elements selected from a group consisting of niobium (Nb), molybdenum (Mo), tungsten (W), rhenium (Re), iron (Fe), osmium (Os), silicon (Si), germanium (Ge), and tin (Sn).