CLAIMS

1. A reflective mask comprising:

a substrate;

a reflective portion formed on the substrate and reflecting an incident light;

an absorption portion formed on at least a part of the reflective portion and absorbing the incident light; and

a coating film formed on the reflective portion and the absorption portion and transmitting the incident light, wherein

the coating film has an extinction coefficient k of 0.04 or less to an extreme ultraviolet (EUV: wavelength of 13.5 nm) light, is resistant to cleaning with a cleaning chemical solution, and is formed with a uniform film thickness on an outermost surface and side surfaces of the absorption portion, and

wherein a thickness of the absorption potion is 20 nm or more and 40 nm or less.

2. The reflective mask according to claim 1, wherein the coating film is formed of a compound containing at least one of silicon dioxide, silicon nitride, aluminum oxide, ruthenium, zirconium, chromium, hafnium, niobium, rhodium, tungsten, vanadium, and titanium.

3. The reflective mask according to claim 1 or 2, wherein the absorption portion is formed of a compound containing at least one of tantalum, tin, indium, nickel, osmium, hafnium, tungsten, platinum, tellurium, cobalt, and palladium.

4. A production method for the reflective mask according to any one of claims 1 to 3, the method comprising:

forming the coating film by an atomic layer deposition method.

5. The production method for the reflective mask according to claim 4, wherein, in the formation of the coating film, the coating film is formed by the atomic layer deposition method using a metal hydride, a metal halide, or an organometallic compound as a material gas.