

[ABSTRACT]

MASK BLANK, METHOD FOR MANUFACTURING PHASE SHIFT MASK, AND
METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE

Provided is a mask blank (100) for manufacturing a phase shift mask, the mask blank enabling formation of a high-precision and fine pattern on a light shielding film.

The mask blank (100) in which a phase shift film (2) made of a material containing silicon, a light shielding film (3) made of a material containing chromium, oxygen, and carbon, and a hard mask film (4) made of a material containing one or more elements selected from silicon and tantalum are provided in this order on a transparent substrate (1) is characterized in that the light shielding film (3) is a single layer film having a composition gradient portion with an increased oxygen content at a surface on the hard mask film (4) side and in a region close thereto, the light shielding film (3) has a maximum peak of N1s narrow spectrum obtained by analysis of X-ray photoelectron spectroscopy of lower detection limit or less, and a part of the light shielding film (3) excluding the composition gradient portion has a chromium content of 50atom% or more and has a maximum peak of Cr2p narrow spectrum obtained by analysis of X-ray photoelectron spectroscopy at binding energy of 574eV or less.

FIG. 1