

[DOCUMENT] ABSTRACT

Provided is a mask blank, including a phase shift film which has a function to transmit an ArF exposure light at a predetermined transmittance and also a function to generate a predetermined phase difference, and which can inhibit position displacement of a pattern due to thermal expansion.

The phase shift film has a function to transmit an exposure light of an ArF excimer laser at a transmittance of 15% or more and a function to generate a phase difference of 150 degrees or more and 210 degrees or less; the phase shift film is formed of a material containing a non-metallic element and silicon; the phase shift film has a structure where a first layer, a second layer, and a third layer are stacked in this order; refractive indexes n_1 , n_2 , n_3 of the first, second, and third layers, respectively, at a wavelength of an exposure light satisfy relations of $n_1 > n_2$ and $n_2 < n_3$; extinction coefficients k_1 , k_2 , k_3 of the first, second, and third layers, respectively, at a wavelength of an exposure light satisfy relations of $k_1 > k_2$ and $k_2 < k_3$; and film thicknesses d_1 , d_3 of the first layer and the third layer, respectively, satisfy a relation of $0.5 \leq d_1/d_3 < 1$.