

[DOCUMENT] ABSTRACT

The object is to provide a mask blank including a phase shift film which can prevent thermal expansion of the phase shift film pattern and prevent the movement of the pattern caused by the thermal expansion.

The phase shift film has a function to transmit an exposure light of a KrF excimer laser at a transmittance of 2% or more, and a function to generate a phase difference of 150 degrees or more and 210 degrees or less between the exposure light transmitted through the phase shift film and the exposure light transmitted through the air for a same distance as a thickness of the phase shift film, in which the phase shift film has a structure where a lower layer and an upper layer are stacked in order from a side of the transparent substrate, in which a refractive index n_L of the lower layer at a wavelength of the exposure light and a refractive index n_U of the upper layer at a wavelength of the exposure light satisfy a relation of $n_L > n_U$, in which an extinction coefficient k_L of the lower layer at a wavelength of the exposure light and an extinction coefficient k_U of the upper layer at a wavelength of the exposure light satisfy a relation of $k_L > k_U$; and in which a thickness d_L of the lower layer and a thickness d_U of the upper layer satisfy a relation of $d_L < d_U$.