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

[DOCUMENT] ABSTRACT

Provided is a mask blank that can suppress generation of surface roughness of a transparent substrate when an EB defect repair was performed, and can suppress generation of a spontaneous etching in a pattern of a phase shift film.

The phase shift film in contact with a transparent substrate includes a stacked structure of two or more layers including a lowermost layer, the layers other than the lowermost layer are made of a material consisting of silicon and one or more elements selected from a metalloid element and a non-metallic element, the lowermost layer is made of a material consisting of silicon and nitrogen or a material consisting of the aforementioned material and a material consisting of one or more elements selected from a metalloid element and a non-metallic element, in which a ratio calculated by dividing a number of Si_3N_4 bonds being present in the lowermost layer by a total number of Si_3N_4 bonds, Si_aN_b bonds (provided that $b/[a+b]<4/7$), and Si-Si bonds being present is 0.05 or less, and a ratio calculated by dividing a number of Si_aN_b bonds being present in the lowermost layer by a total number of Si_3N_4 bonds, Si_aN_b bonds, and Si-Si bonds being present is 0.1 or more.

FIG. 1