Method For Preparing Halftone Phase Shift Photomask Blank

ABSTRACT

A halftone phase shift film containing Si and N and/or O is deposited on a transparent substrate by reactive sputtering of a Si-containing target with a reactive gas containing N and/or O. One layer is sputter deposited while the reactive gas flow rate is set equal to or lower than the lower limit of the reactive gas flow rate in the hysteresis region, and another layer is sputter deposited while the reactive gas flow rate is set inside the lower and upper limits of the reactive gas flow rate in the hysteresis region. The phase shift film exhibits satisfactory in-plane uniformity of optical properties.

[FIG. 1]

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A halftone phase shift film containing Si and N and/or O is deposited on a transparent substrate by reactive sputtering of a Si-containing target with a reactive gas containing N and/or O. One layer is sputter deposited while the reactive gas flow rate is set equal to or lower than the lower limit of the reactive gas flow rate in the hysteresis region, and another layer is sputter deposited while the reactive gas flow rate is set inside the lower and upper limits of the reactive gas flow rate in the hysteresis region. The phase shift film exhibits satisfactory in-plane uniformity of optical properties.