DESCRIPTION

REFLECTIVE MASK BLANK AND METHOD FOR MANUFACTURING SAME, REFLECTIVE MASK, AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE

TECHNICAL FIELD

[0001] The present invention relates to a reflective mask blank that facilitates discovery of contaminants or scratches and other critical defects by inhibiting pseudo defects attributable to surface roughness of a substrate or film in a defect inspection using a highly sensitive defect inspection apparatus, a method of manufacturing the reflective mask blank, a reflective mask using the reflective mask blank and a method of manufacturing a semiconductor device using such reflective mask.

BACKGROUND ART

[0002] Accompanying the increasingly higher levels of integration of semiconductor devices in the semiconductor industry in recent years, there is a need for fine patterns that exceed the transfer limitations of conventional photolithography methods using ultraviolet light. Extreme ultraviolet (EUV) lithography is considered to be a promising exposure technology that uses EUV light to enable the formation of such fine patterns. Here, EUV light refers to light in the wavelength band of the soft X-ray region or vacuum ultraviolet region, and more specifically, light having a wavelength of about 0.2 nm to 100 nm. Reflective masks have been proposed as transfer masks for use in EUV lithography. Such reflective masks have a multilayer reflective film that reflects exposure light formed on a substrate, and an absorber film formed in a pattern on the multilayer reflective film that absorbs exposure light.

[0003] The reflective mask is manufactured from a substrate, a multilayer reflective film formed on the substrate, and a reflective mask blank having an absorber film formed on the multilayer reflective film, by forming an absorber film pattern by photolithography and the like.

[0004] As described above, due to the growing demand for miniaturization in the lithography process, significant problems are being encountered in the lithography process. One problem relates to defect information of mask blank substrates, substrates with multilayer reflective films and reflective mask blanks and the like used in the lithography process.

[0005] Mask blank substrates are being required to have even higher smoothness from