ABSTRACT

HALOGEN-FREE AMORPHOUS CARBON MASK ETCH HAVING HIGH SELECTIVITY TO PHOTORESIST

In one embodiment of the present invention, a halogen-free plasma etch processes is used to define a feature in a multi-layered masking stack including an amorphous carbon layer. In a particular embodiment, oxygen (O_2), nitrogen (N_2), and carbon monoxide (CO) are utilized to etch the amorphous carbon layer to form a mask capable of producing sub-100 nm features in a substrate film having a reduced line edge roughness value. In another embodiment, the present invention employs an O_2 plasma pretreatment preceding the halogen-free amorphous carbon etch to first form an oxidized silicon region in a patterned photoresist layer to increase the selectivity of the amorphous carbon etch relative to a patterned photoresist layer containing unoxidized silicon.