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(54) Title: METHOD OF ETCHING CARBON-CONTAINING SILICON OXIDE FILMS

(57) Abstract: We have discovered a method for plasma etching a carbon-containing silicon oxide film which provides excellent etch profile control, a rapid etch rate of the carbon/containing silicon oxide film, and high selectivity for etching the carbon-containing silicon oxide film preferentially to an overlying photoresist masking material. Then the method of the inention is used, a highter carbon content in the carbon/containing silicon oxide film results in a faster etch rate, at least up to ta carbon content of 20 atomic percent. In particular, the carbon-containgin silicon oxide film results in a faster etch rate, at least up to a carbon content of 20 atomic percent. In particular, the carbon containg silicon oxide film is plama etched using a plama generated from source gas comprising NH_3 and C_xF_y. It is necessary to achieve the proper balance between the relative amounts of NH_3 and $C_xF_¿y$?in the plasma source gas in order to provide a balance between etch by/product polymer deposition and removal on various surfaces of the substrate being etched. The $NH_¿3$?gas functions to "clean up" deposited polzmer on the photoresist surface, on the etched surface, and on process chamber surfaces. The atomic ratio of carbon: nitrogen in the plasma source gas typically ranges from about 0.3:1 to about 3:1. We have found that C_2F_6 and C_4F_8 provide excellent etch rates during etching of carbon-containing silicon oxide films.