ABSTRACT

USE OF AMORPHOUS CARBON AS A REMOVABLE ARC MATERIAL FOR DUAL DAMASCENE FABRICATION

An improved method of controlling a critical dimension during a photoresist patterning process is provided which can be applied to forming vias and trenches in a dual damascene structure. An amorphous carbon ARC is deposited on a substrate by a PECVD method. Preferred conditions are a RF power from 50 to 500 Watts, a bias of 500 to 2000 Watts, a chamber and substrate temperature of 300^{O}C to 400^{O}C with a trimethylsilane flow rate of 50 to 200 sccm, a helium flow rate of 100 to1000 sccm, and an argon flow rate of 50 to 200 sccm. Argon plasma imparts an amorphous character to the film. The refractive index (n and k) can be tuned for a variety of photoresist applications including 193 nm, 248 nm, and 365 nm exposures. The α-carbon layer provides a high etch selectivity relative to oxide and can be easily removed with a plasma etch.

FIGURE 1e