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ABSTRACT

NOVEL DEPOSITION AND SPUTTER ETCH APPROACH TO EXTEND THE GAP FILL CAPABILITY OF HDP CVD PROCESS TO≤ 0.10 MICRONS

A method of filling an STI feature with a dielectric material using a HDP CVD technique is described. By omitting an inert carrier gas like argon in the first CVD step, a small keyhole in a SiO_2 layer is formed near the top of the trench. A sputter etch step in the same CVD chamber then removes dielectric material above the keyhole. A second CVD step completely fills the STI trench which is free of voids and forms a layer above the adjacent nitride layer. The nitride layer serves as an etch stop during a CMP step to lower the level of dielectric material until it is coplanar with the nitride layer. The method is low cost since all deposition and sputter etch steps are performed in an existing CVD tool and the same tool is useful in forming trenches of various sizes ranging from below 0.13 micron to above 0.25 micron.

FIGURE 10

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