ABSTRACT

A METHOD TO CREATE A CONTROLLABLE AND REPRODUCIBLE DUAL COPPER DAMASCENE STRUCTURE

A new method is provided to construct a copper dual damascene structure. A layer of IMD is deposited over the surface of a substrate. A cap layer is deposited over this layer of IMD, the dual damascene structure is then patterned through the cap layer and into the layer of IMD. A barrier layer is blanket deposited, a copper seed layer is deposited over the barrier layer. The dual damascene structure is then filled with a spin-on material. The barrier layer and the copper seed layer are removed above the cap layer; the cap layer can be partially removed or can be left in place. The spin on material remains in place in the via and trench opening during the operation of removing the copper seed layer and the barrier layer from above the cap surface thereby protecting the inside surfaces of these openings. The spin-on material is next removed from the dual damascene structure and copper is deposited. The cap layer that is still present above the surface of the IMD protects the dielectric from being contaminated with copper solution during the deposition of the copper. The excess copper is removed using a touch-up CMP. The cap layer over the surface of the IMD can, after the copper has been deposited, be removed if this is so desired. As a final step in the process, a liner or oxidation/diffusion protection layer is deposited over the dual damascene structure and its surrounding area.

(FIGURE 1 IS SUGGESTED FOR PUBLICATION)