

ABSTRACT

**METHOD OF FILLING STRUCTURES FOR FORMING VIA-FIRST DUAL
DAMASCENE INTERCONNECTS**

A method of forming via-first, dual damascene interconnect structures by using a gapfilling, bottom anti-reflective coating material whose thickness is easily controlled by a solvent is provided. After application to a substrate, the bottom anti-reflective coating is partially cured by baking at a low temperature. Next, a solvent is dispensed over the coated wafer and allowed to contact the coating for a period of time. The solvent removes the bottom anti-reflective coating at a rate controlled by the bottom anti-reflective coating's bake temperature and the solvent contact time to yield a bottom anti-reflective coating thickness that is thin, while maintaining optimum light-absorbing properties on the dielectric stack. In another possible application of this method, sufficient bottom anti-reflective coating may be removed to only partially fill the vias in order to protect the bottoms of the vias during subsequent processing. The solvent is removed from the wafer, and the bottom anti-reflective coating is cured completely by a high-temperature bake. The wafer is then coated with photoresist, and the trench pattern exposed. The bottom anti-reflective coating material used maintains a greater planar topography for trench patterning, eliminates the need for an inorganic light-absorbing material layer on the top of the dielectric stack, protects the bottom of the vias during the trench etch, and prevents the formation of fencing problems by using a solvent to control the thickness in the vias.

Figure 3a