~~OXYGEN DOPED SiC FOR Cu BARRIER AND ETCH STOP LAYER IN DUAL~~
DAMASCENE FABRICATION


## ABSTRACT

A method of forming a dual damascene structure with improved performance is described. A first etch stop layer comprised of oxygen doped SiC is deposited on a SiC barrier layer to form a composite barrier/etch stop layer on a substrate. The remainder of the damascene stack is formed by sequentially depositing a first dielectric layer, a second oxygen doped SiC etch stop layer, and a second dielectric layer. A via and overlying trench are formed and filled with a diffusion barrier layer and a metal layer. The oxygen doped SiC layers have a lower dielectric constant than SiC or SiCN and a higher breakdown field than SiC. The etch selectivity of a $C_4F_8$/Ar etch for a SiCOH layer relative to the oxygen doped SiC layer is at least 6:1 because of a lower oxygen content in the oxygen doped SiC layer.


Fig. 5

# COMPOSITE BARRIER/ETCH STOP LAYER COMPRISING OXYGEN DOPED SIC AND SIC FOR INTERCONNECT STRUCTURES

## ABSTRACT

A dual damascene structure comprising a composite barrier/etch stop layer including a lower silicon carbide (SiC) layer and an upper first oxygen doped SiC layer formed over a substrate is provided. A first dielectric layer is formed over the first oxygen doped SiC layer followed by a second oxygen doped SiC etch stop layer, and a second dielectric layer. An opening with a via and an overlying trench extends through the second dielectric layer, the second oxygen doped SiC etch stop layer, the first dielectric layer, the upper first oxygen doped SiC layer and at least a portion of the lower silicon carbide (SiC) layer. The opening is filled with a diffusion barrier layer and a metal layer.

Fig. 5