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