USE OF BORON CARBIDE AS AN ETCH-STOP AND BARRIER LAYER FOR COPPER DUAL DAMASCENE METALLIZATION

ABSTRACT

A method of forming a boron carbide layer for use as a barrier and an etch-stop layer in a copper dual damascene structure, and the structure itself are disclosed. In addition to providing a good barrier to copper diffusion, good insulating properties, high etch selectivity with respect to dielectric insulators, boron carbide also provides good electrical characteristics because of its low dielectric constant of less than 5. The amorphous boron carbide is formed in a PECVD chamber by introducing a boron source gas such as B_2H_6, B_5H_{9+}, and carbon source gas such as CH_4 and C_2H_6 at a deposition temperature of about 400 °C. Any one, or any combination of the passivation, etch-stop, cap layers of the damascene structure can comprise boron carbide.

(Figure 2F)