ABSTRACT

A COMBINED COPPER PLATING METHOD TO IMPROVE GAP FILL

A method of filling gaps in dielectric layers is disclosed. A wafer is provided having a dielectric layer containing gaps to be filled with copper, some of the gaps, denoted deeper gaps, having aspect ratios so large that filling these gaps with copper using ECP could result in pinhole like voids. A blanket conformal metal barrier layer is formed and the wafer is then submerged in a solution to electroless plate a blanket conformal copper seed layer. A partial filling of deeper gaps with copper reduces the effective aspect ratios of the deeper gaps to the extent that ECP could be used to complete the copper filling of the gaps without forming pinhole like voids. ECP is then used to complete the copper filling of the gaps. The wafer is annealed and CMP performed to planarize the surface, giving rise to a structure in which the gaps are filled with copper and are separated by the dielectric layer.

Fig. 6