ABSTRACT

A NOVEL METHOD TO REDUCE DISHING IN METAL CHEMICAL-MECHANICAL POLISHING

A new method of metal plug metallization utilizing a sacrificial high polishing rate layer to prevent dishing and metal residues after CMP is described. An oxide layer is provided overlying semiconductor device structures in and on a semiconductor substrate. A sacrificial high polishing rate (HPR) layer is deposited overlying the oxide layer. An opening is etched through the HPR layer and the oxide layer to one of the semiconductor device structures. A barrier layer and a metal layer are deposited over the surface of the HPR layer and within the opening. The metal layer, barrier layer, and HPR layer overlying the oxide layer are polished away by CMP. The polishing rate of the HPR layer is higher than that of the metal layer with the result that after the HPR layer is completely removed, the metal layer remaining within the opening has a concave shape. The oxide layer is over-polished until endpoint detection is received. Since the metal polishing rate is higher than the oxide polishing rate, the concave shape is made substantially planar during the over-polishing to complete metal plug metallization in the fabrication of an integrated circuit.

(FIGURE 3 IS SUGGESTED FOR PUBLICATION)