ABSTRACT

METHOD TO FORM COPPER INTERCONNECTS BY ADDING A ALUMINUM LAYER TO THE COPPER DIFFUSION BARRIER

A method to form copper interconnects is described. The method may be used to form single or dual damascene interconnects. The addition of an aluminum barrier layer to the conventional barrier layer creates a superior barrier to copper diffusion. A substrate layer is provided. A dielectric layer is deposited overlying the substrate layer. The dielectric layer patterned to form interconnect trenches. An optional titanium adhesion layer may be deposited. An aluminum barrier layer is deposited overlying the interior surfaces of the trenches. A second barrier layer, comprising for instance titanium and titanium nitride, is deposited overlying the aluminum barrier layer. A copper layer is deposited overlying the second barrier layer and filling the interconnect trenches. The copper layer, the second barrier layer, and the aluminum barrier layer are polished down to the top surface of the dielectric layer to define the copper interconnects, and complete the fabrication of the integrated circuit device.

(FIGURE 3 IS SUGGESTED FOR PUBLICATION)