PRETREATMENT OF NICKEL AND COBALT LINERS FOR ELECTRODEPOSITION OF COPPER INTO THROUGH SILICON VIAS

ABSTRACT

Prior to electrodeposition of copper onto a nickel-containing or a cobalt-containing seed layer, a semiconductor wafer is pretreated by contacting the seed layer with a pre-wetting liquid comprising cupric ions at a concentration of at least about 10 g/L, more preferably of at least about 30 g/L, and an electroplating suppressor, such as a compound from the class of polyalkylene glycols. This pre-treatment is particularly useful for wafers having one or more large recessed features, such as through silicon vias (TSVs). The pre-wetting liquid is preferably degassed prior to contact with the wafer substrate. The pretreatment is preferably performed under subatmospheric pressure to prevent bubble formation within the recessed features. After the wafer is pretreated, copper is electrodeposited from an electroplating solution (such as an acidic electroplating solution) to fill the recessed features on the wafer. The described pretreatment minimizes corrosion of seed layer during electroplating and reduces plating defects.

Fig. 4