

ETCHING FORMULATIONS FOR ISOTROPIC COPPER ETCHING

ABSTRACT

A formulation for isotropically etching copper includes an aqueous solution comprising: (a) a bidentate, tridentate or quadridentate complexing agents selected from the group consisting of a diamine, a triamine, and a tetramine; and (b) an oxidizer, wherein the solution has a pH of between about 5 and 12. In one embodiment, the etching solution comprises ethylenediamine (EDA) and hydrogen peroxide at a pH of between about 6 and 10. Provided solutions are capable of etching copper at high rates (e.g., at least about 1,000 Å/minute) without causing substantial surface roughening of the copper layer. The formulations are particularly useful for removing copper from partially fabricated semiconductor devices, e.g., for etching copper overburden.

Figure 2



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