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(71) Applicant: APPLIED MATERIALS, INC. [US/US]; 3050 Bowers Avenue, Santa Clara, CA 95054 (US).

(72) Inventors: YE, Yan; 3862 Via Salice, Campbell, CA 95008 (US). MA, Diana, Xiaobing; 19600 Kilt Court, Saratoga, CA 95070 (US).

(74) Agents: BERNADICOU, Michael, A. et al.; Blakely, Sokoloff, Taylor & Zafman LLP, 7th floor, 12400 Wilshire Boulevard, Los Angeles, CA 90025 (US).

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(57) Abstract

The present invention provides a method of etching a copper layer to remove the portion of the film which is not part of the desired conductive interconnect structure, while avoiding over etching of the structure and the formation of corrosive surface contaminants on the surface of the etched copper. The deposited copper layer is etched back to the upper or "field" surface of a substrate containing trenches and vias which are filled by copper. The copper layer etchback may be conducted on a substrate surface using a low temperature regime, using essentially physical bombardment of the copper surface. Or, the etchback may be carried out at high temperature, above about 150 °C, using three different etch chemistries. The etch plasma may be formed solely from non–reactive gases; solely from gases which produce reactive species of chlorine or fluorine, or it may be formed from a combination of non–reactive gases which are tailored to adjust seletively and etch rate.