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(54) Title: FOCUSED ION BEAM PROCESS FOR SELECTIVE AND CLEAN ETCHING OF COPPER

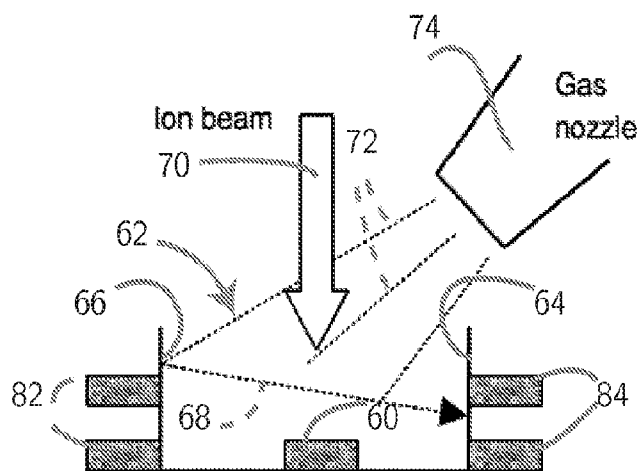


Fig. 4B

(57) Abstract: Etch assisting agents for focused ion beam (FIB) etching of copper for circuit editing of integrated circuits both prevent loss of adjacent dielectric due to sputtering by the ion beam, and render sputtered re-deposited copper on adjacent surfaces non-conductive to avoid electrical short circuits. The agents are characterized by having an N - N (N being Nitrogen) bonding in their molecules and boiling points between about 70°C and about 220°C, and include hydrazine and water solutions, hydrazine derivatives, NitrosAmine derivatives saturated with two hydrocarbon groups selected from Methyl, Ethyl, Propyl and Butyl, NitrosAmine related compounds, and Nitrogen Tetroxide. Preferred agents are Hydrazine monohydrate (HMH), HydroxyEthylHydrazine (HEH), CEH, BocMH, BocMEH, NDMA, NDEA, NMEA, NMPA, NEPA, NDPA, NMBA, NEBA, NPYR, NPIP, NMOR and Carmustine, alone or in combination with Nitrogen Tetroxide. The agents are effective for etching copper in high aspect ratio (deep) holes.