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(71) Applicant *(for all designated States except US)*: **PRESIDENT AND FELLOWS OF HARVARD COLLEGE** [US/US]; 17 Quincy Street, Cambridge, MA 02138 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **GORDON, Roy, Gerald** [US/US]; 22 Highland Street, Cambridge, MA 02138 (US). **BHANDARI, Harish** [IN/US]; 376 Riverway, Boston, MA 02115 (US). **AU, Yeung** [—/US]; 25 Agassiz Avenue, Belmont, MA 02478 (US). **LIN, Youbo** [CN/US]; 28 9th Street, #308, Medford, MA 02155 (US).

(74) Agents: **SCOZZAFAVA, Mary, Rose** et al.; Wilmer Cutler Pickering Hale And Dorr LLP, 60 State Street, Boston, MA 02109 (US).

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[Continued on next page]

(54) Title: SELF-ALIGNED BARRIER AND CAPPING LAYERS FOR INTERCONNECTS

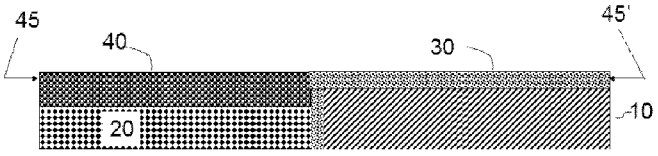


Figure 2

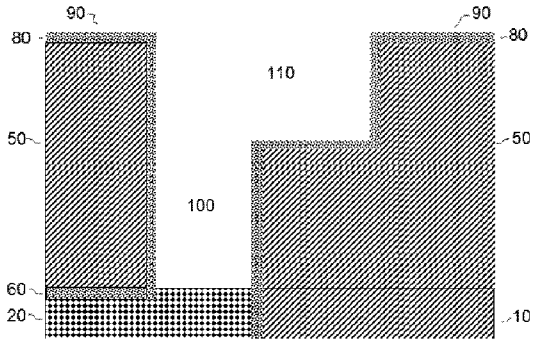


Figure 8

(57) Abstract: An interconnect structure for integrated circuits for copper wires in integrated circuits and methods for making the same are provided. Mn, Cr, or V containing layer forms a barrier against copper diffusing out of the wires, thereby protecting the insulator from premature breakdown, and protecting transistors from degradation by copper. The Mn, Cr, or V containing layer also promotes strong adhesion between copper and insulators, thus preserving the mechanical integrity of the devices during manufacture and use, as well as protecting against failure by electromigration of the copper during use of the devices and protecting the copper from corrosion by oxygen or water from its surroundings. In forming such integrated circuits, certain embodiments of the invention provide methods to selectively deposit Mn, Cr, V, or Co on the copper surfaces while reducing or even preventing deposition of Mn, Cr, V, or Co on insulator surfaces. Catalytic deposition of copper using a Mn, Cr, or V containing precursor and an iodine or bromine containing precursor is also provided.

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