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(54) METHOD OF PROVIDING A STRUCTURE USING SELF-ALIGNED FEATURES

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(52) **U.S. Cl.** **438/674**; 438/678; 438/622; 438/645

(58) **Field of Search** 438/674–678, 438/597, 622–629, 637–641, 668, 645, 648, 653–655, 687, 585

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,080,656 A		6/2000	Shih et al.	438/626
6,083,815 A	*	7/2000	Tsai et al.	438/585
6,168,704 B1	*	1/2001	Brown et al.	205/118
6,291,332 B1	*	9/2001	Yu et al.	438/618
6,391,769 B1		5/2002	Lee et al.	438/643
6,420,258 B1	*	7/2002	Chen et al.	438/622

* cited by examiner

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(57) **ABSTRACT**

In a copper plating process, a seed layer is uniformly deposited over a surface, including lining a high aspect ratio trench defined by that surface. A mask layer is provided using a process that fails to deposit in the trench. In one exemplary embodiment, the failure is due to the decrease in the isotropic flux of neutrals toward the bottom of the trench. Copper is subsequently electroplated. Because the seed layer is exposed only within the trench, copper deposits only therein. The self-aligned mask prevents plating outside of the trench. A chemical-mechanical planarization step removes the mask and the seed layer extending beyond the trench, leaving a copper structure within the trench. The structure may serve as a conductive line, an interconnect, or a capacitor plate.

8 Claims, 9 Drawing Sheets