



[54] METHOD OF FABRICATING A SELF-ALIGNED CONTACT USING ORGANIC DIELECTRIC MATERIALS

FOREIGN PATENT DOCUMENTS

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OTHER PUBLICATIONS

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Ser. No. 08/234,100, Apr. 27, 1994, Havemann.
Ser. No. 08/234,099, Apr. 27, 1994, Havemann

[21] Appl. No.: 294,290

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[51] Int. Cl. H01L 21/44

[57] ABSTRACT

[52] U.S. Cl. 437/195; 437/228; 437/236; 437/203; 156/644.1; 156/651.1

A semiconductor device and process for making the same are disclosed which incorporate organic dielectric materials to form self-aligned contacts (SACTs) reliably, even in deep, narrow gaps. In one embodiment, conductors 26 with insulating conductor caps 28 are formed over a silicon substrate 20 with a thin gate oxide 22. A conformal dielectric layer 30, preferably of thermally-grown oxide, is deposited over this structure, which is then covered with an organic-containing layer 32 and an inorganic cap layer 34 (e.g., CVD TEOS). An etch window 38 is patterned in photoresist layer 36 and used as a mask to etch cap window 39 through layer 34, using layer 32 as an etch stop. A second etch removes organic-containing layer 32 in contact window 41 (and preferably strips photoresist), using conformal layer 30 as an etch stop. A short anisotropic etch may be used to clear conformal layer 30 from gap bottom 43, after which conducting material 40 may be used to make electrical contact to the substrate.

[58] Field of Search 437/195, 231, 437/52, 48, 60, 228, 235, 236, 203, 919, 238; 156/644.1, 651.1

[56] References Cited

U.S. PATENT DOCUMENTS

Table with 4 columns: Patent Number, Date, Inventor, and Reference Number. Includes entries for Chiang, Miller et al., Huebner, Mele et al., Cathey et al., Dennison, Haskell et al., Bollinger et al., Lin et al., Kim, Greco et al., and Rostoker et al.

11 Claims, 5 Drawing Sheets

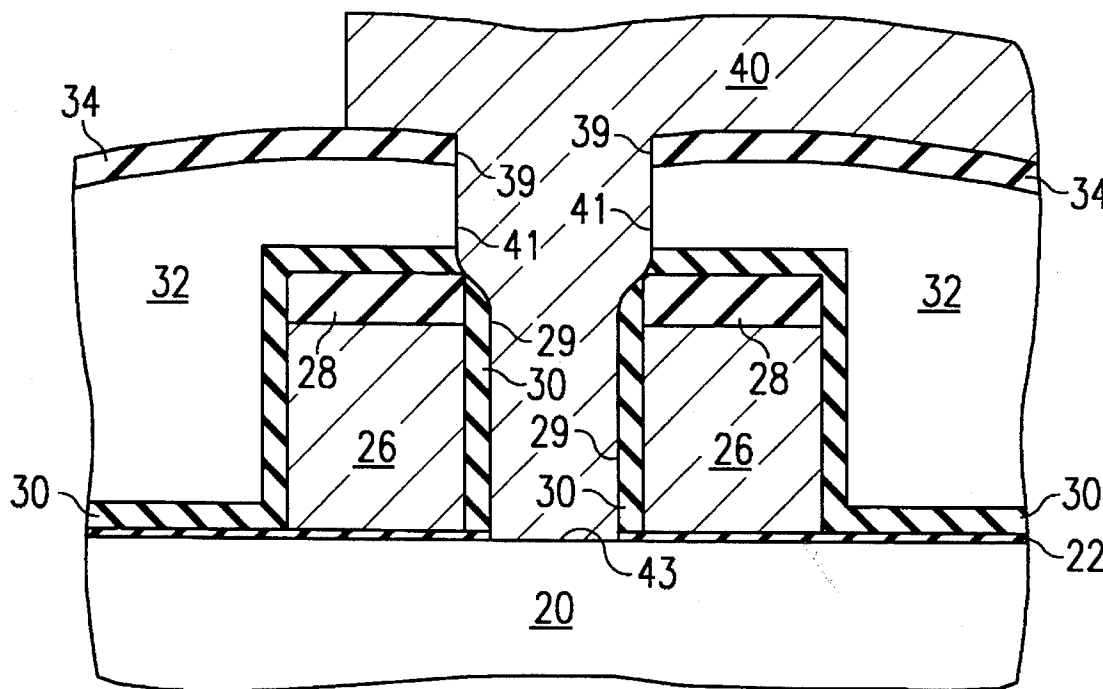


FIG. 1A

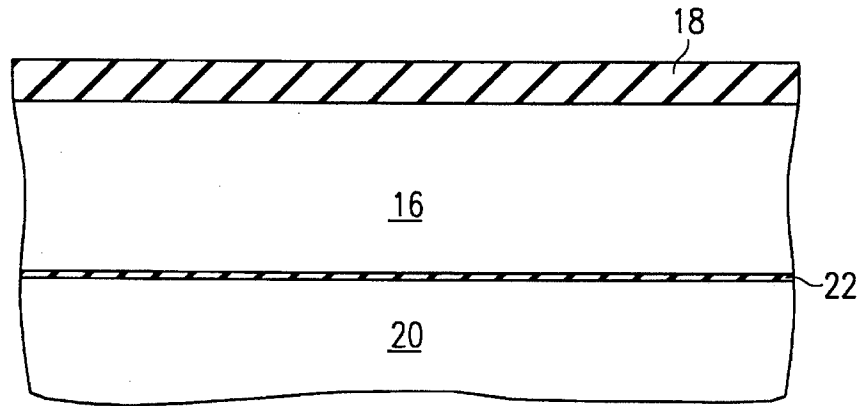


FIG. 1B

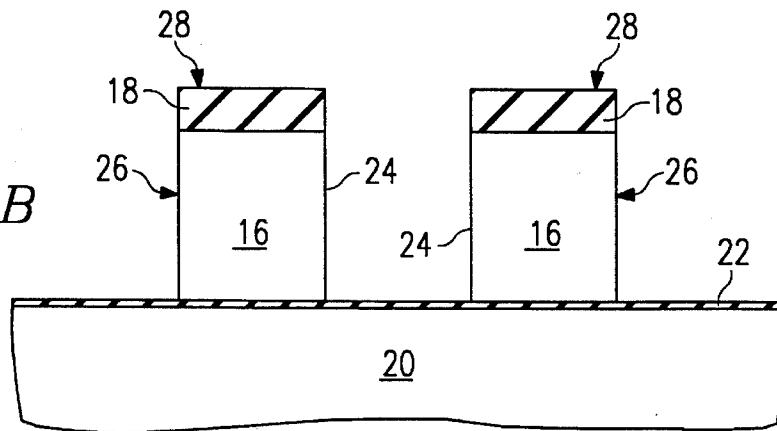


FIG. 1C

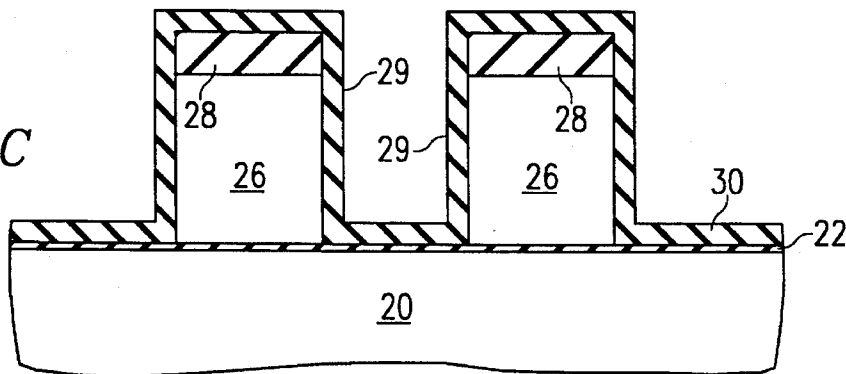


FIG. 1D

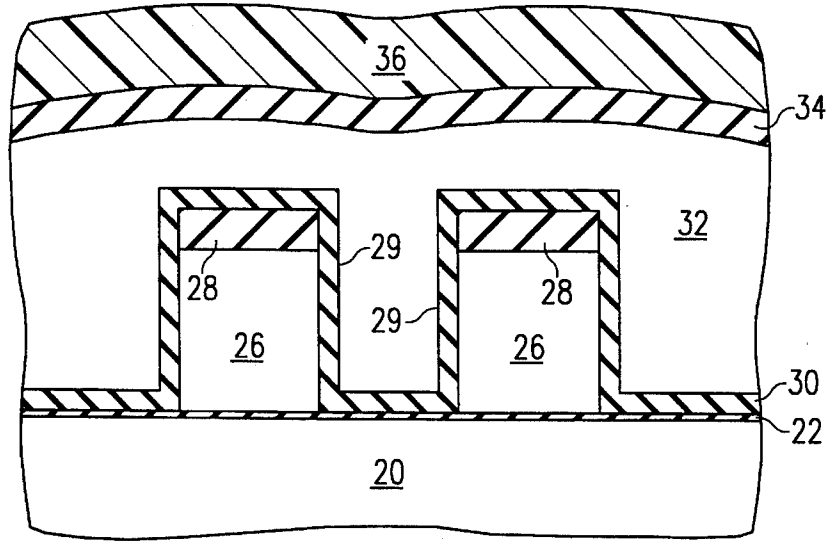


FIG. 1E

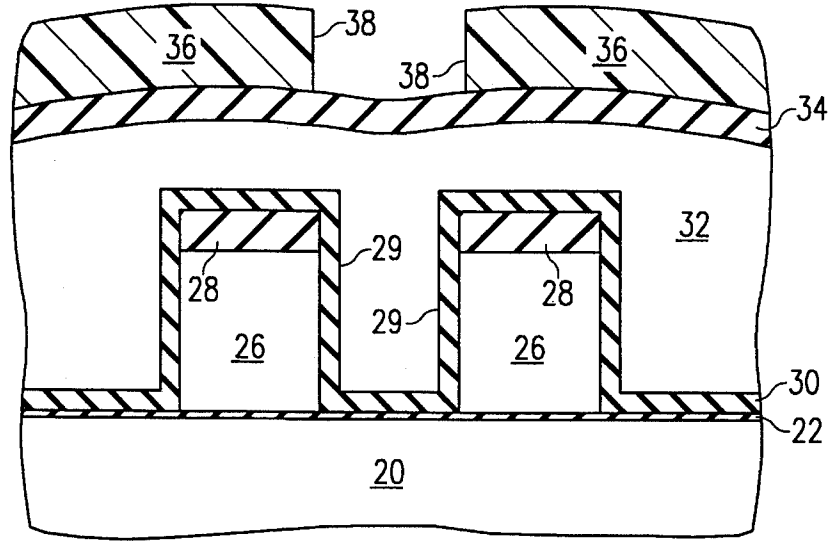


FIG. 1F

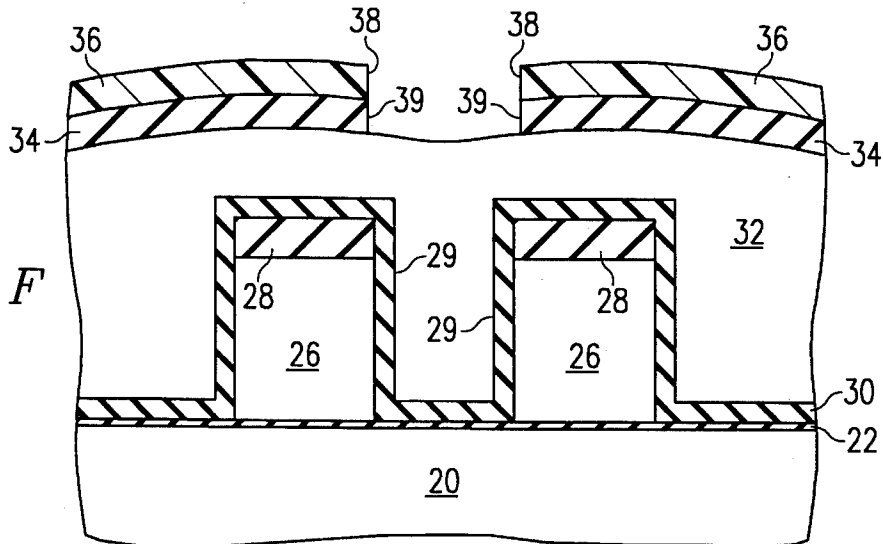


FIG. 1G

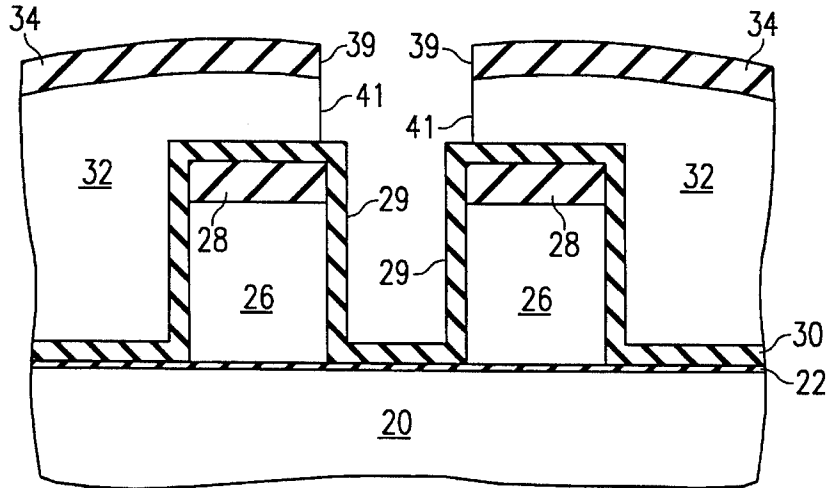


FIG. 1H

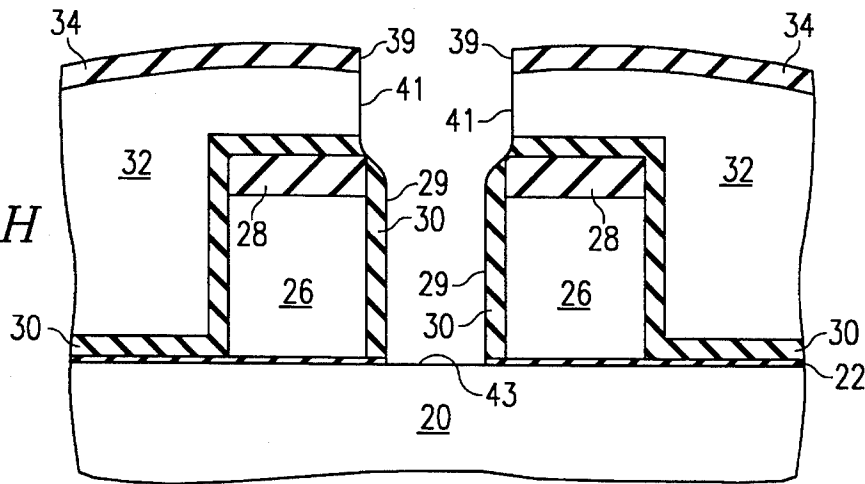


FIG. 1I

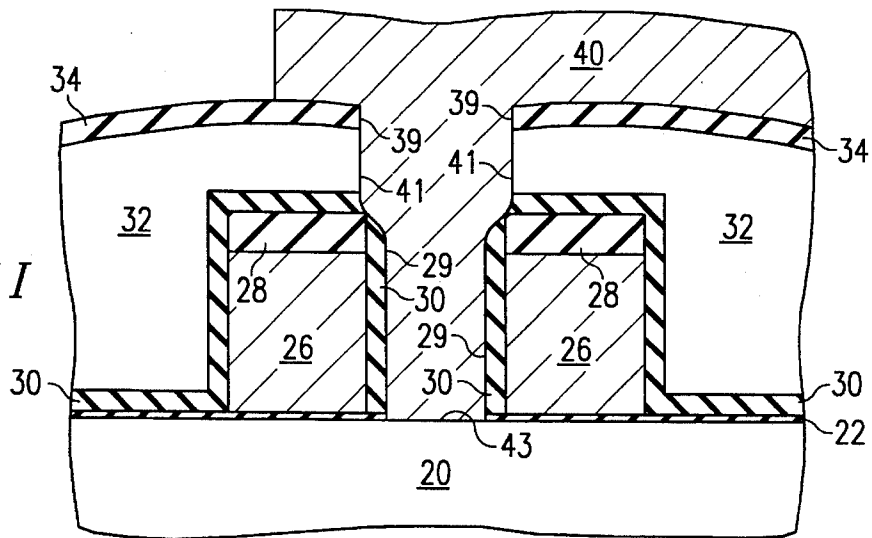


FIG. 2A

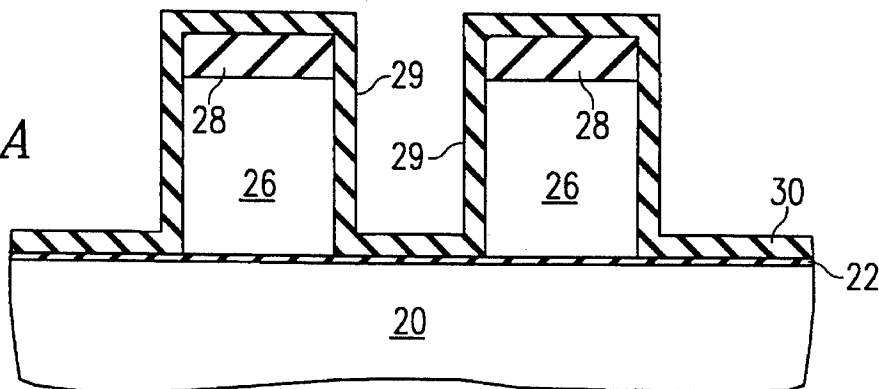


FIG. 2B

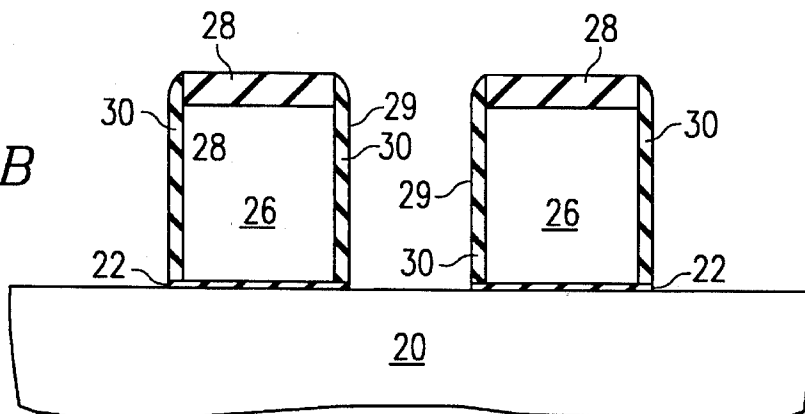
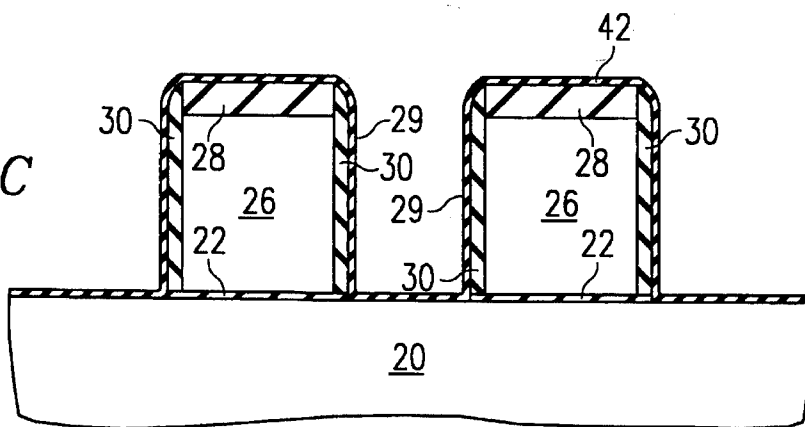


FIG. 2C



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