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United States Patent [19]

Havemann

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

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[73] Assignee: **Texas Instruments Incorporated**, Dallas, Tex.

[21] Appl. No.: **294,290**

[22] Filed: **Aug. 23, 1994**

[51] **Int. Cl.**[6] **H01L 21/44**

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

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

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Attorney, Agent, or Firm—James E. Harris; Richard L. Donaldson; Richard A. Stoltz

[57] **ABSTRACT**

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.

11 Claims, 5 Drawing Sheets

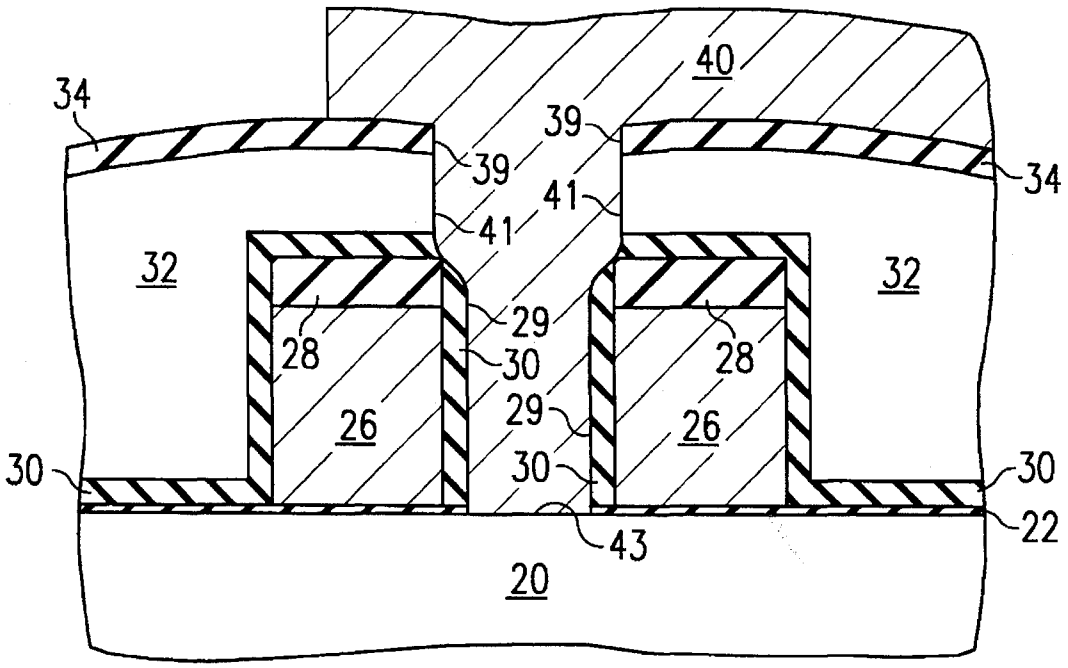


FIG. 1A

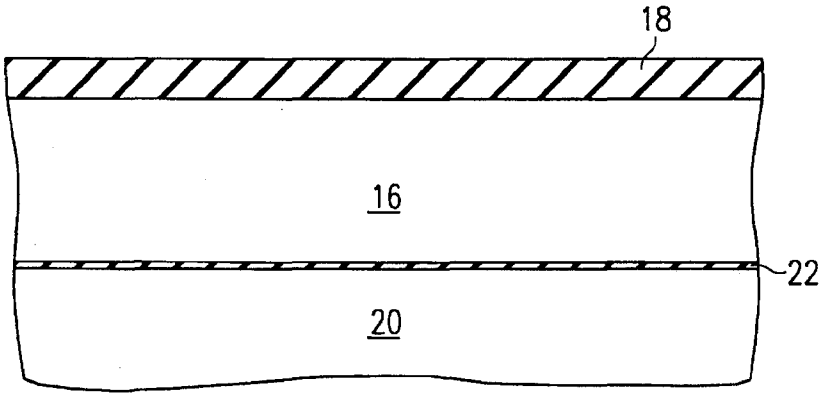


FIG. 1B

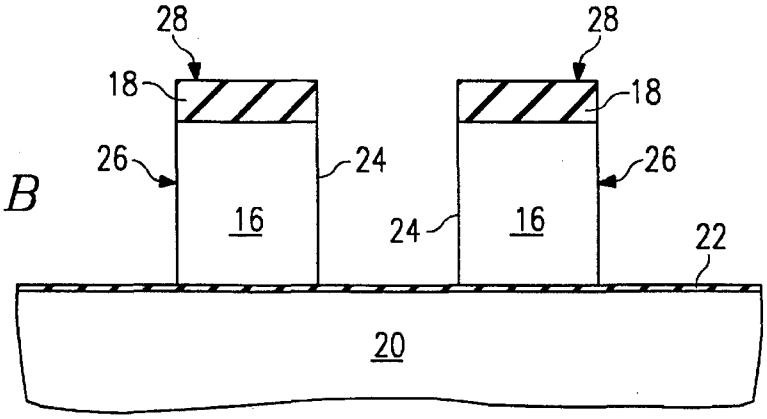


FIG. 1C

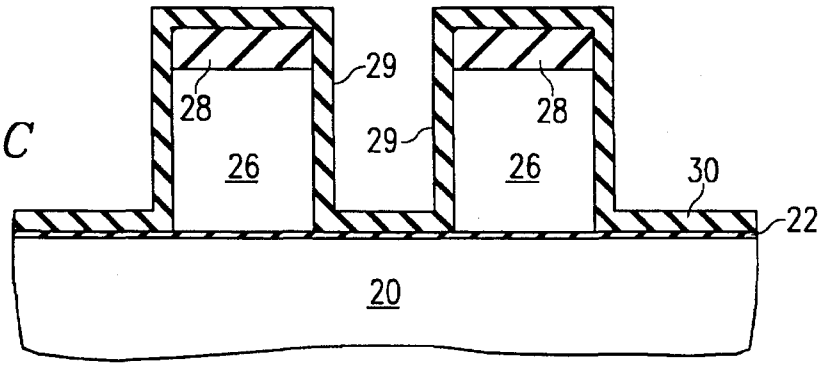


FIG. 1D

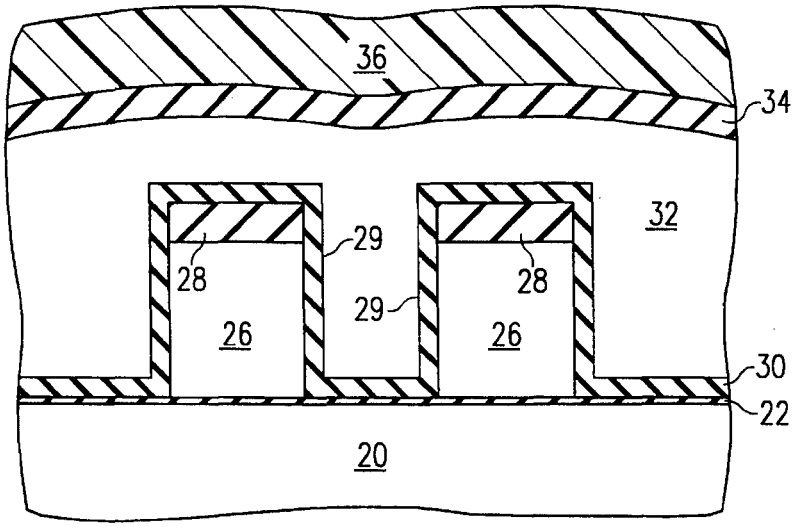


FIG. 1E

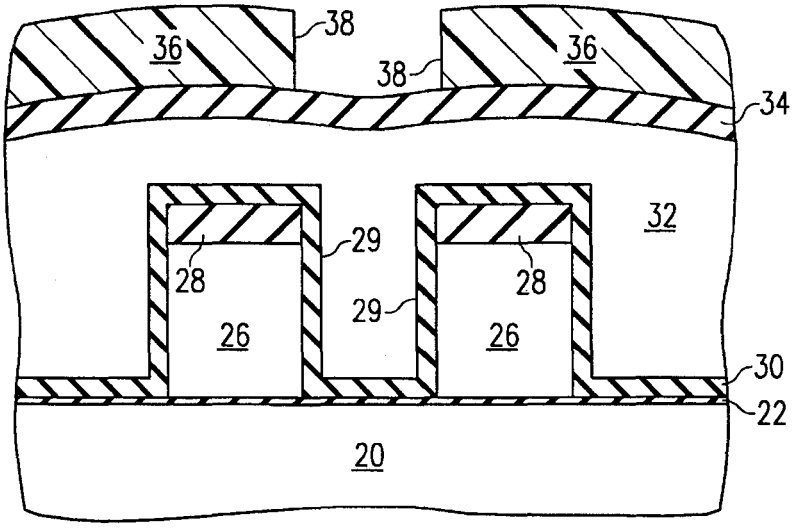


FIG. 1F

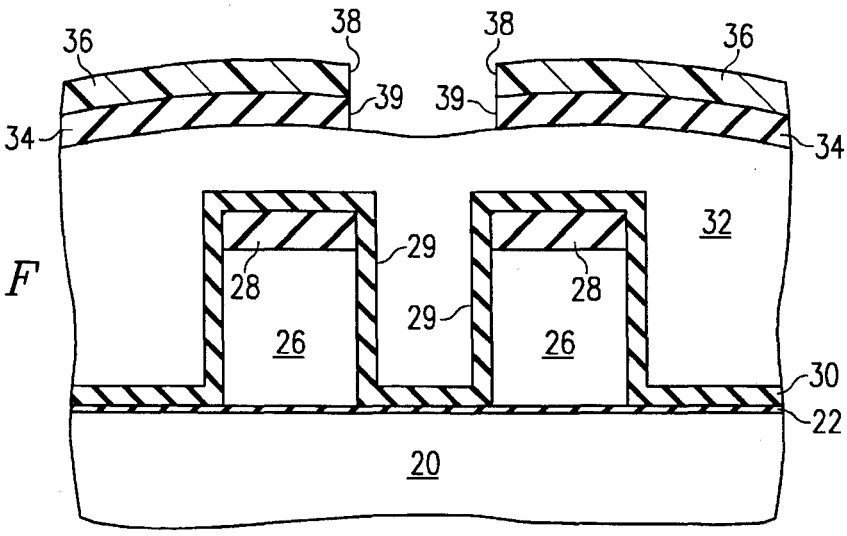


FIG. 1G

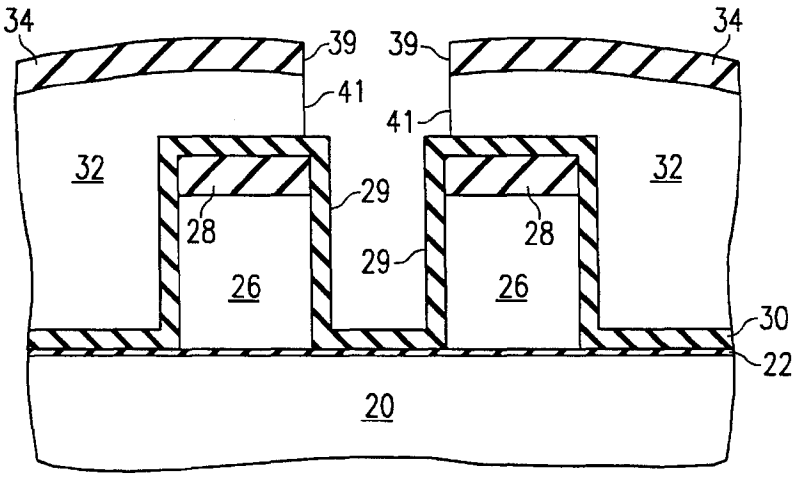


FIG. 1H

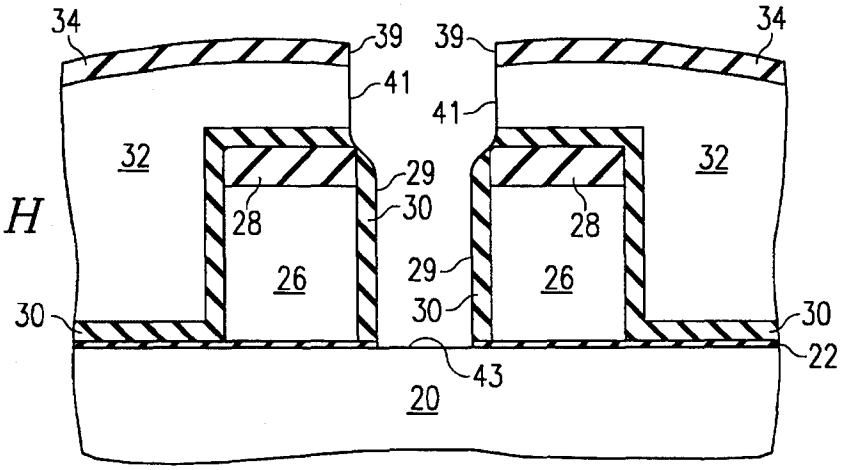


FIG. 1I

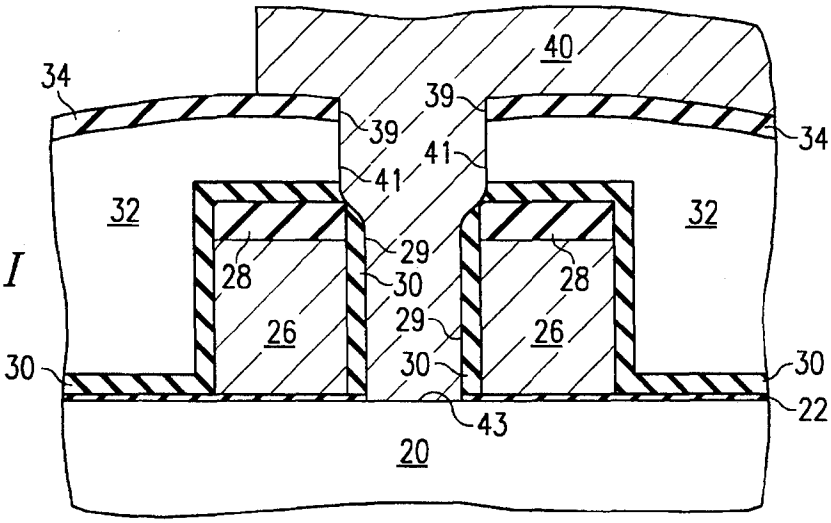


FIG. 2A

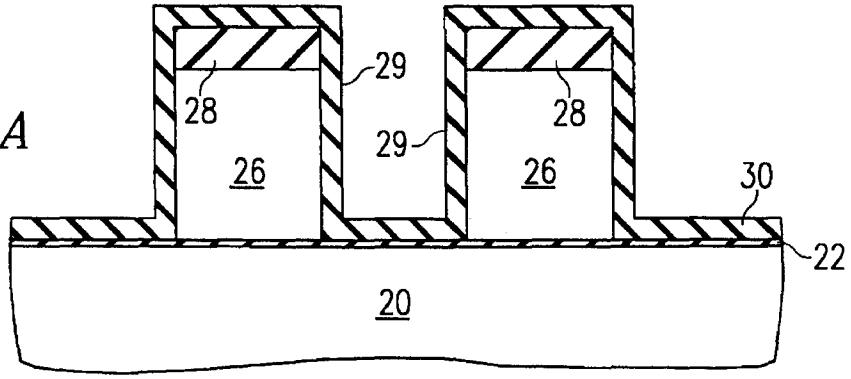


FIG. 2B

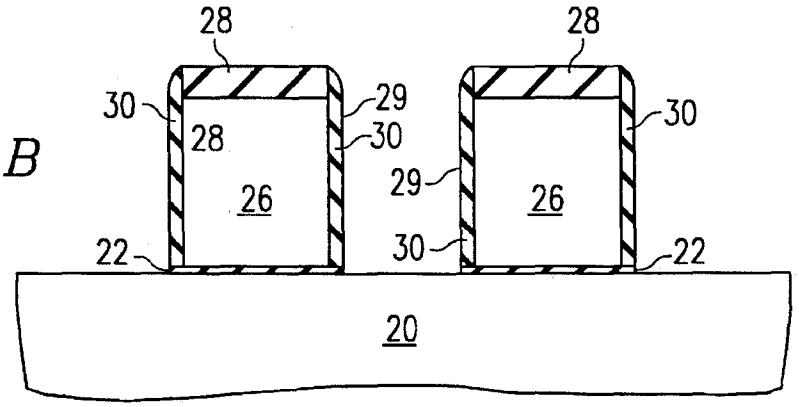
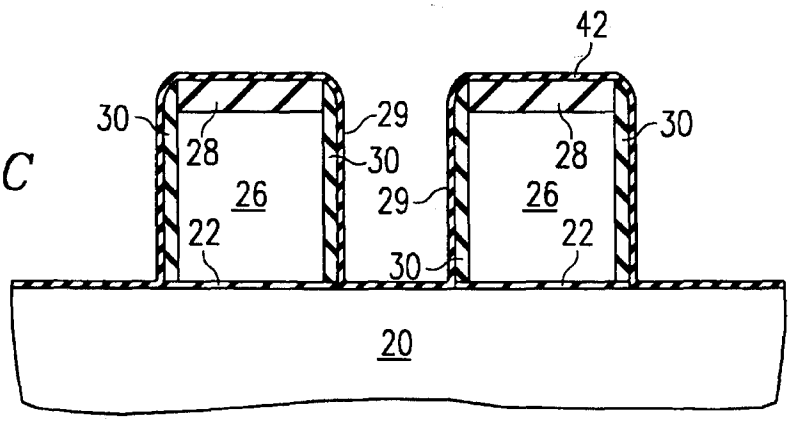


FIG. 2C



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