US005635423A

# United States Patent [19]

**Huang et al.**

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[45] **Date of Patent: Jun. 3, 1997**

[54] **SIMPLIFIED DUAL DAMASCENE PROCESS FOR MULTI-LEVEL METALLIZATION AND INTERCONNECTION STRUCTURE**

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[73] Assignee: **Advanced Micro Devices, Inc.**, Sunnyvale, Calif.

[21] Appl. No.: **320,516**

[22] Filed: **Oct. 11, 1994**

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

[52] **U.S. Cl.** ..... **437/195**; 437/190; 437/203; 156/652.1; 156/653.1

[58] **Field of Search** ..... 437/195, 190, 437/182, 203; 156/DIG. 652.1, DIG. 653.1

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*Assistant Examiner*—Lynne A. Gurley

[57] **ABSTRACT**

A semiconductor device containing an interconnection structure having a reduced interwiring spacing is produced by a modified dual damascene process. In one embodiment, an opening for a via is initially formed in a second insulative layer above a first insulative layer with an etch stop layer therebetween. A larger opening for a trench is then formed in the second insulative layer while simultaneously extending the via opening through the etch stop layer and first insulative layer. The trench and via are then simultaneously filled with conductive material.

**13 Claims, 8 Drawing Sheets**

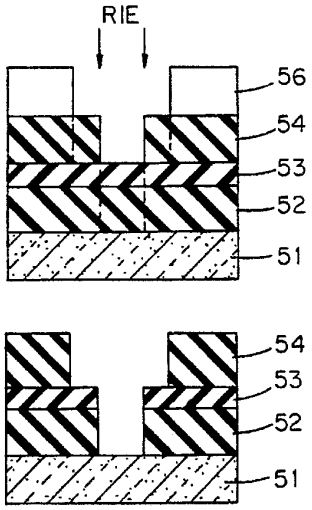


FIG. 1(a) PRIOR ART

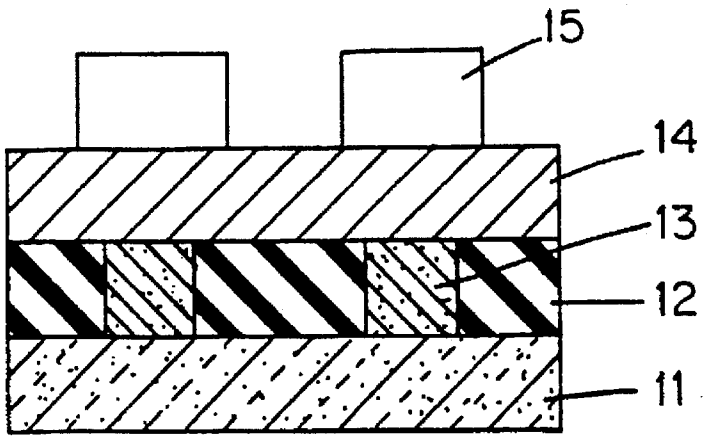



FIG. 1(b) PRIOR ART

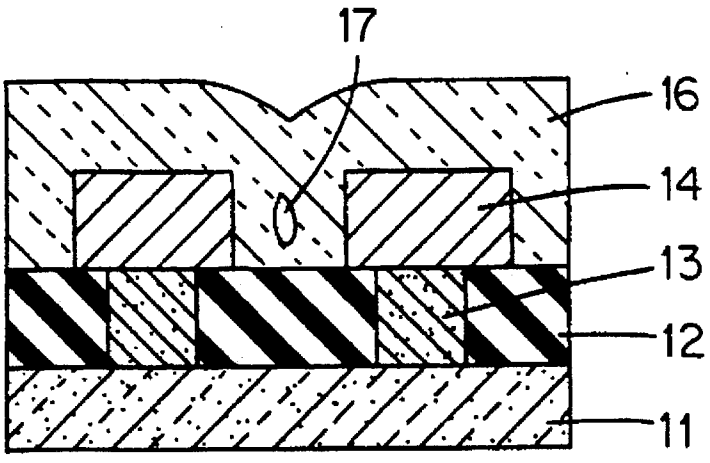


FIG. 2(a)
PRIOR ART

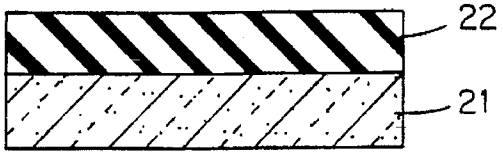



FIG. 2(b)
PRIOR ART

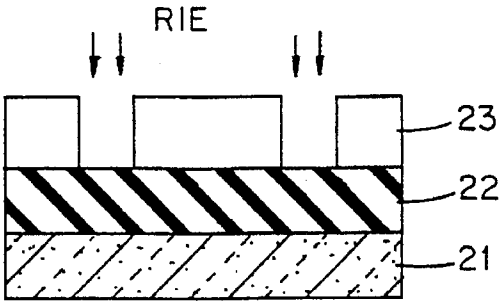



FIG. 2(c)
PRIOR ART

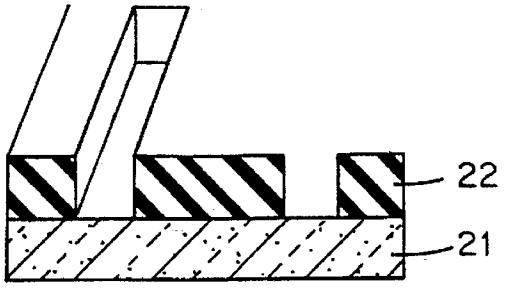



FIG. 2(d)
PRIOR ART

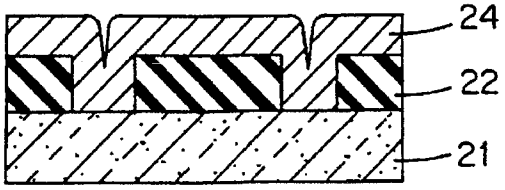
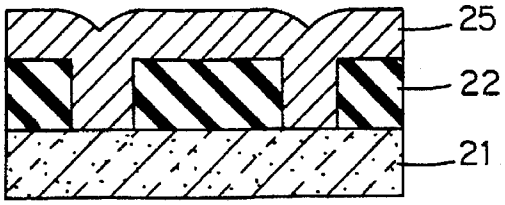



FIG. 2(e)
PRIOR ART



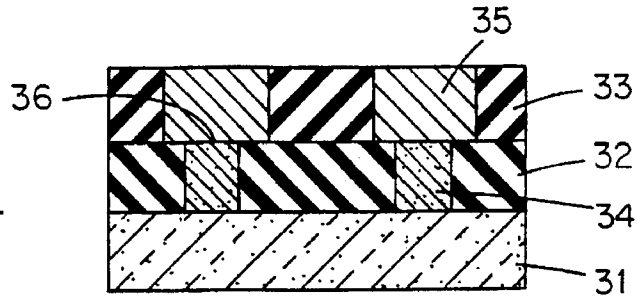



FIG. 3
PRIOR ART

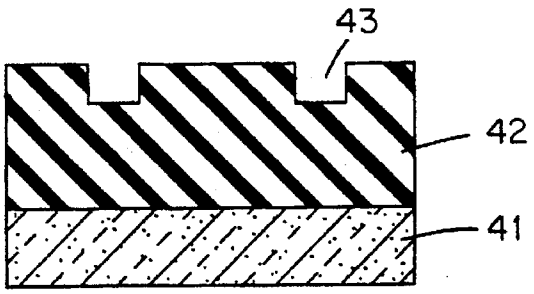



FIG. 4(a)
PRIOR ART

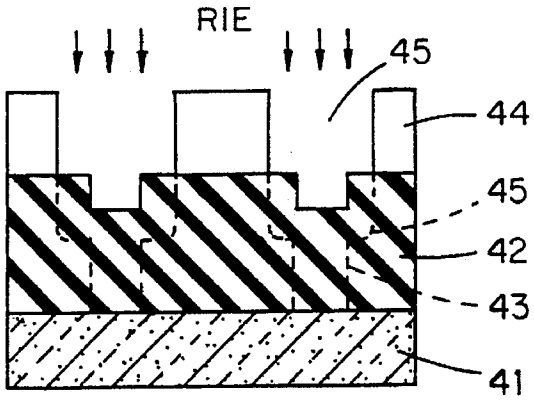



FIG. 4(b)
PRIOR ART

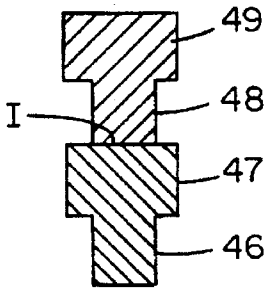



FIG. 4(c)
PRIOR ART

FIG. 5(a)

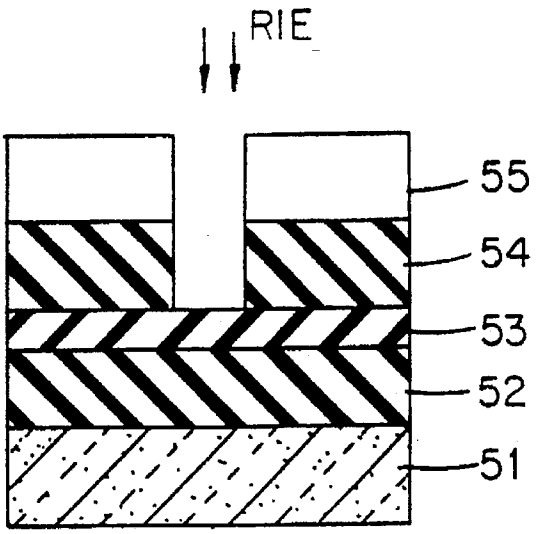



FIG. 5(b)

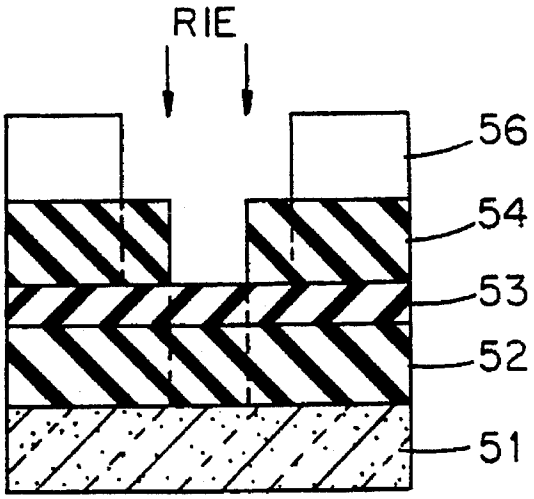
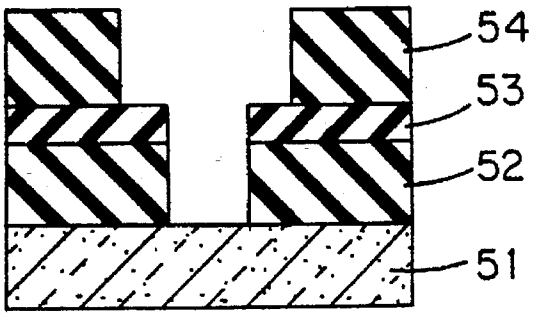



FIG. 5(c)



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