

- [54] **PROCESS FOR FORMING A SEMICONDUCTOR DEVICE**
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- [73] Assignee: **Motorola, Inc.**, Schaumburg, Ill.
- [21] Appl. No.: **895,017**
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- [51] Int. Cl.<sup>6</sup> ..... **H01L 21/00**
- [52] U.S. Cl. .... **438/692**; 216/18; 216/38; 216/88; 438/627; 438/628; 438/633
- [58] **Field of Search** ..... 438/626, 627, 438/628, 633, 692, 693, 697, 748; 216/18, 38, 39, 56, 88

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Attorney, Agent, or Firm—George R. Meyer

[57] **ABSTRACT**

A process for forming a semiconductor device (68) in which an insulating layer (52) is nitrided and then covered by a thin adhesion layer (58) before depositing a composite copper layer (62). This process does not require a separate diffusion barrier as a portion of the insulating layer (52) has been converted to form a diffusion barrier film (56). Additionally, the adhesion layer (58) is formed such that it can react with the interconnect material resulting in strong adhesion between the composite copper layer (62) and the diffusion barrier film (56) as well as allow a more continuous interconnect and via structure that is more resistant to electromigration.

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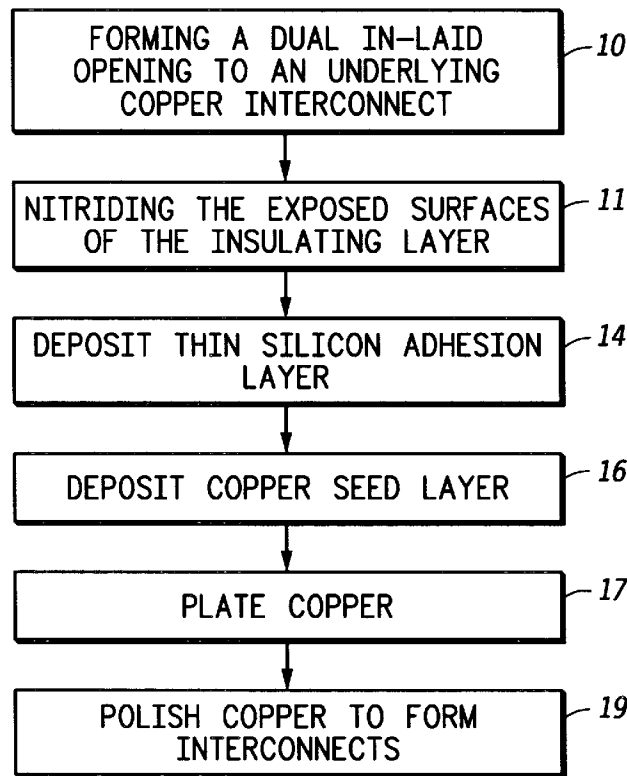
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21 Claims, 5 Drawing Sheets



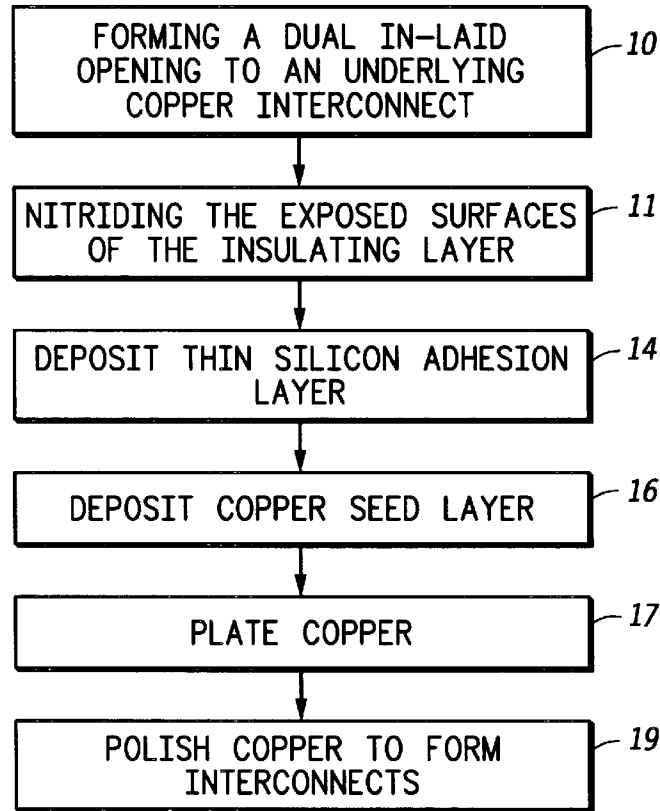


FIG. 1

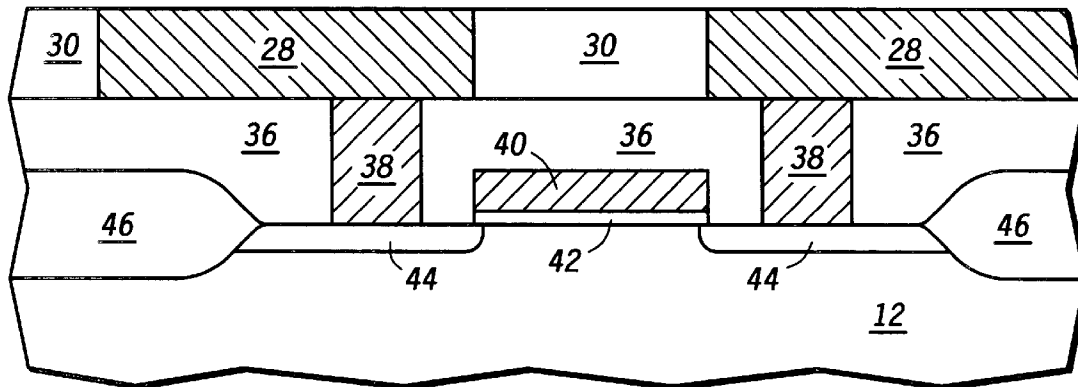
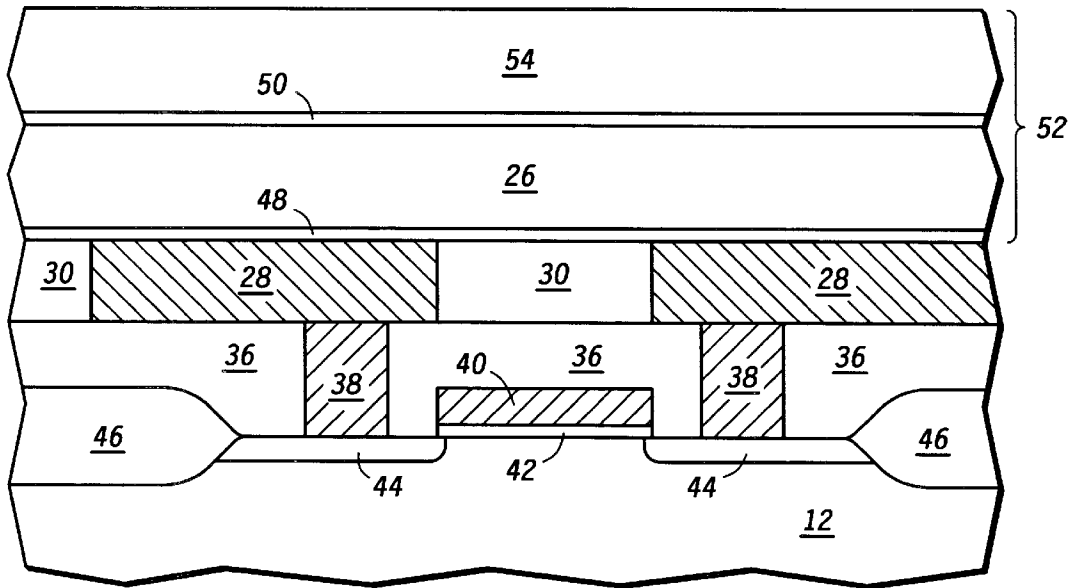
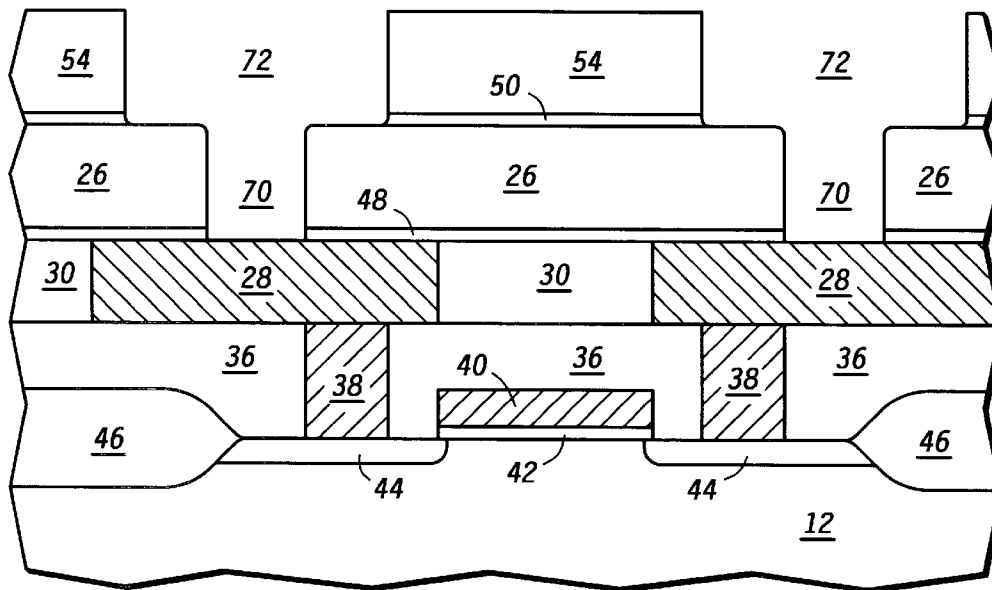


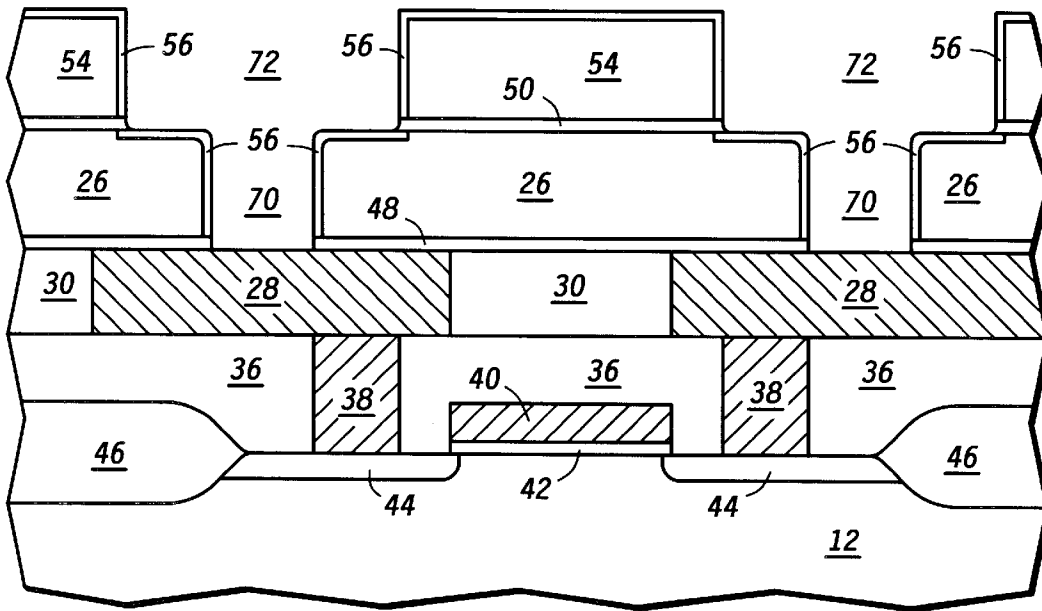
FIG. 2



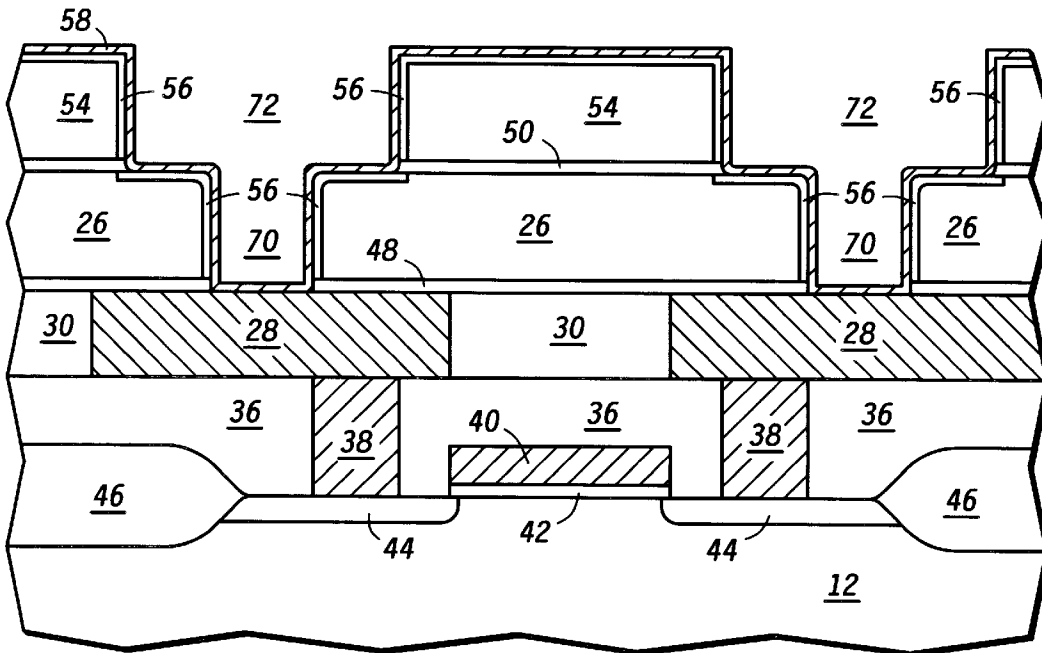
**FIG. 3**



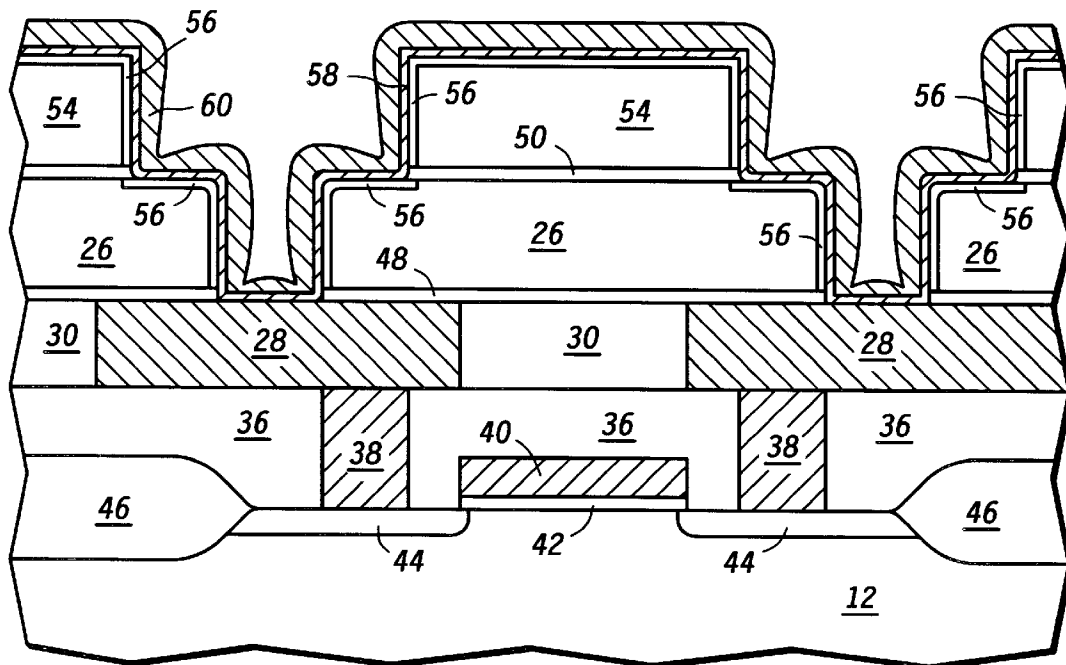
**FIG. 4**



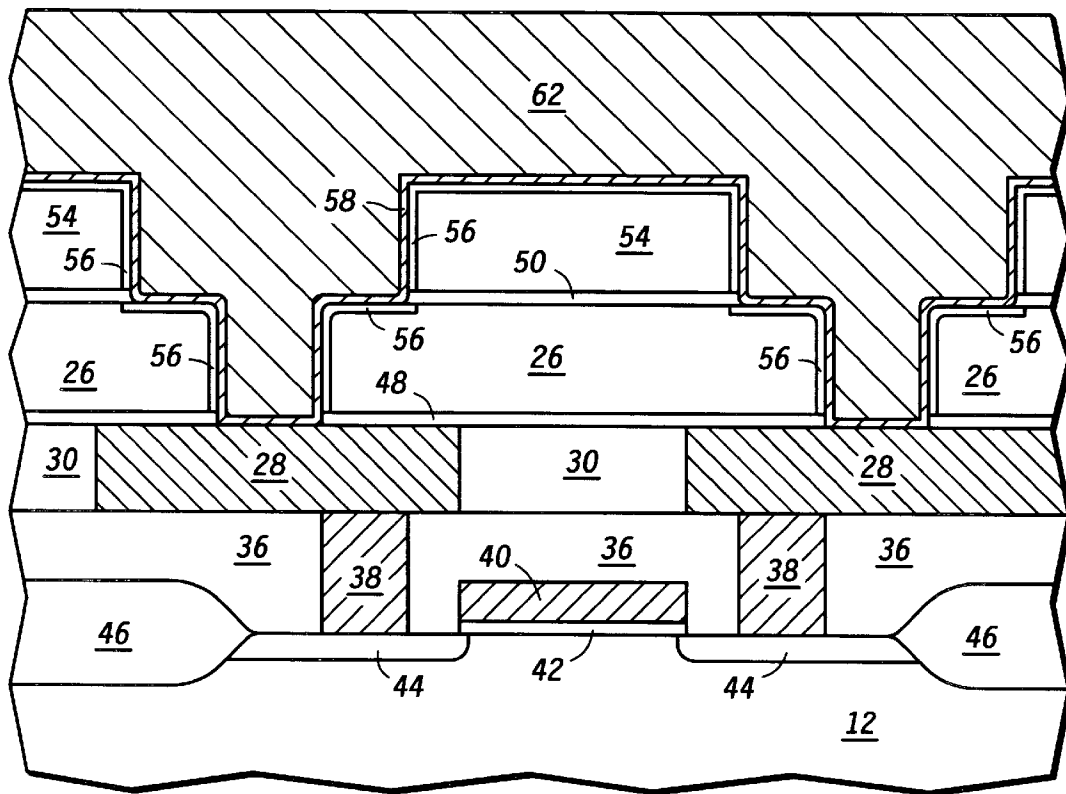
**FIG. 5**



**FIG. 6**



**FIG. 7**



**FIG. 8**

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