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# United States Patent [19]

Schuegraf et al.

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[54] SHALLOW TRENCH ISOLATION USING LOW DIELECTRIC CONSTANT INSULATOR

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[73] Assignee: Micron Technology, Inc., Boise, Id.

[21] Appl. No.: 547,620

[22] Filed: Oct. 24, 1995

[51] Int. Cl.<sup>6</sup> ..... H01L 21/76

[52] U.S. Cl. .... 437/67; 437/240; 437/238; 148/DIG. 50

[58] Field of Search ..... 437/64, 65, 67, 437/238, 240; 148/DIG. 50

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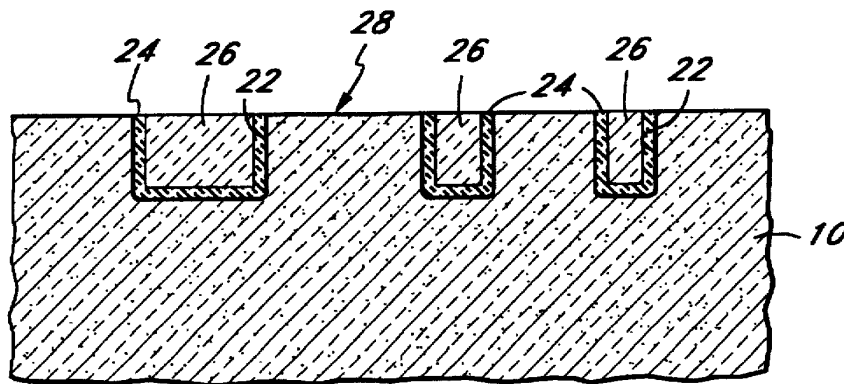
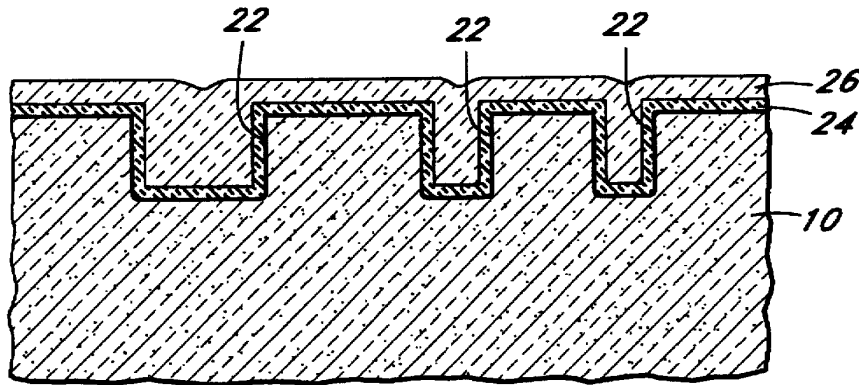
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Primary Examiner—Trung Dang  
Attorney, Agent, or Firm—Knobbe, Martens, Olson & Bear, LLP.

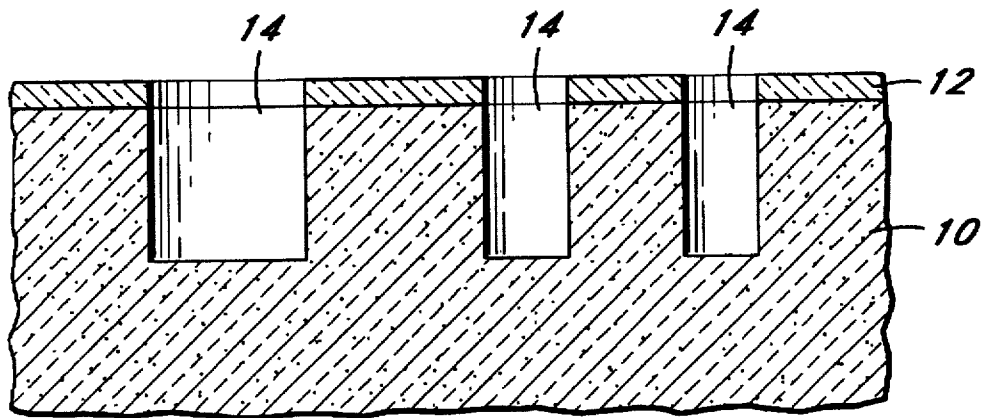
[57] **ABSTRACT**

A shallow trench isolation is disclosed wherein the trench depth is reduced beyond that achieved in prior art processes. The reduced trench depth helps to eliminate the formation of voids during the trench refill process and provides for greater planarity in the final isolation structure. Effective device isolation is achieved with a reduced trench depth by utilizing refilling dielectric materials having low dielectric constant.

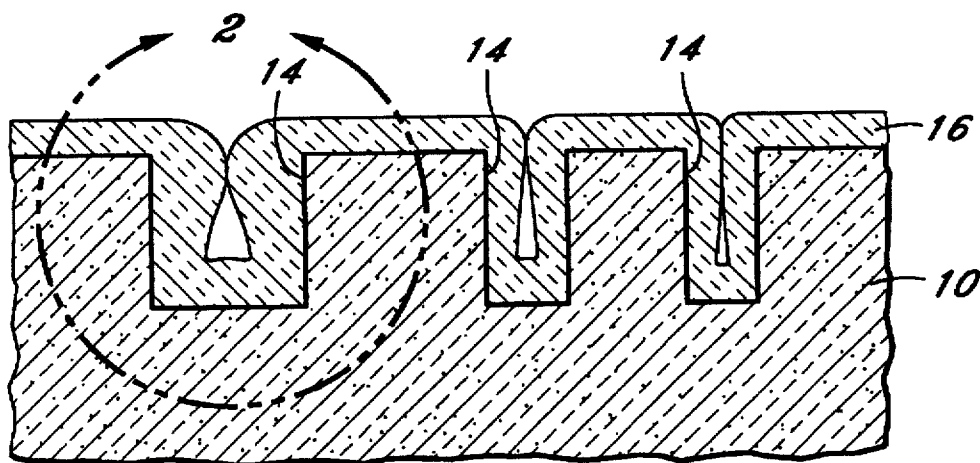
22 Claims, 4 Drawing Sheets



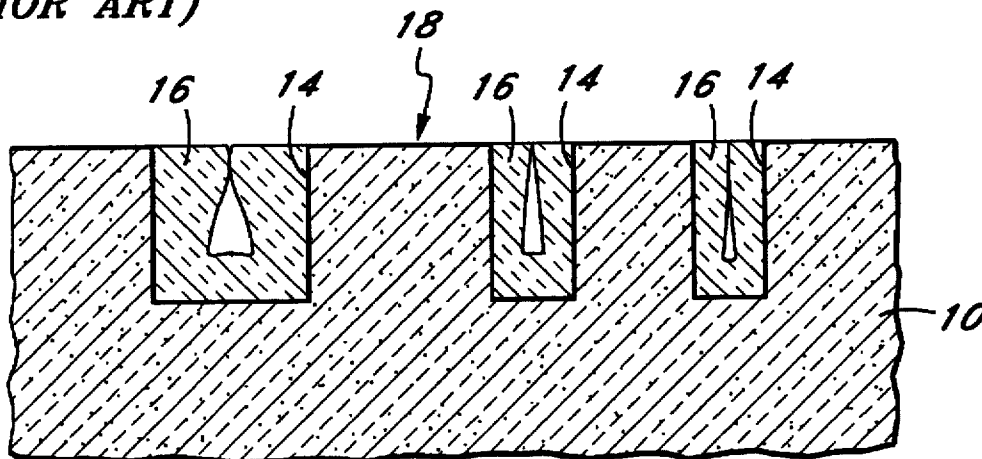
*Fig. 1A*  
(PRIOR ART)



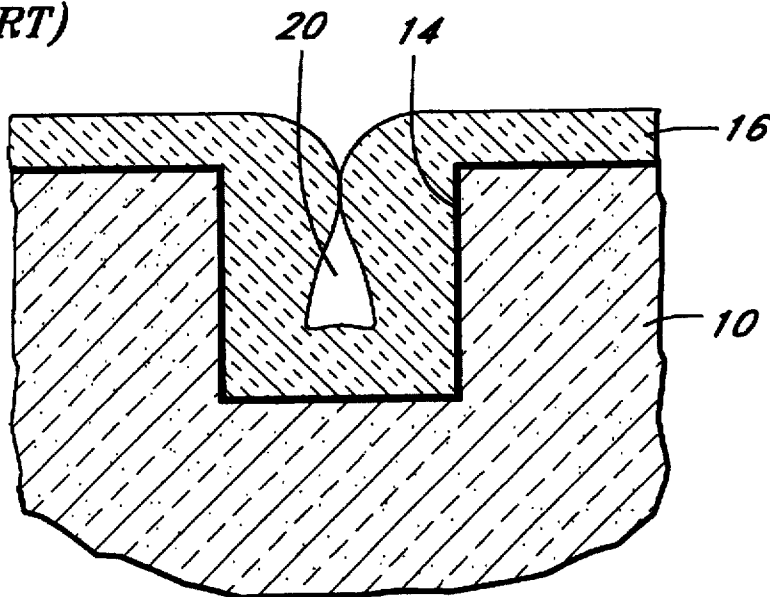
*Fig. 1B*  
(PRIOR ART)



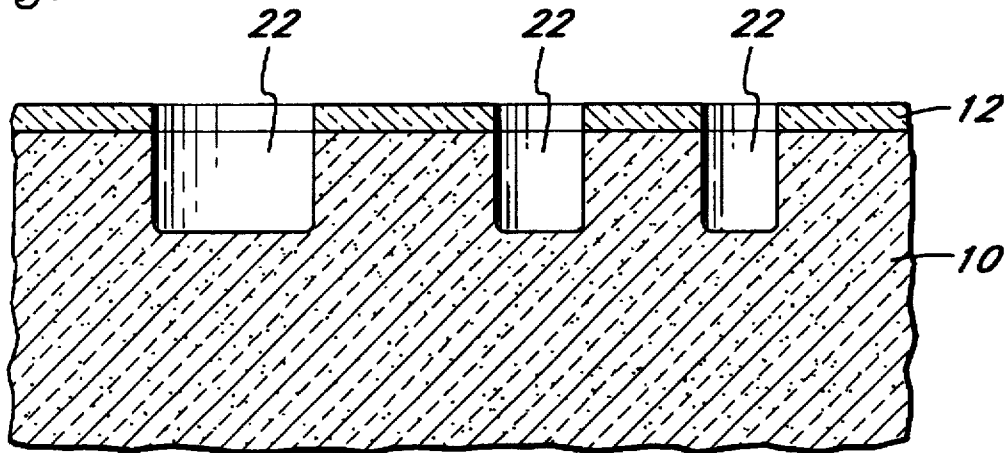
*Fig. 1C*  
(PRIOR ART)



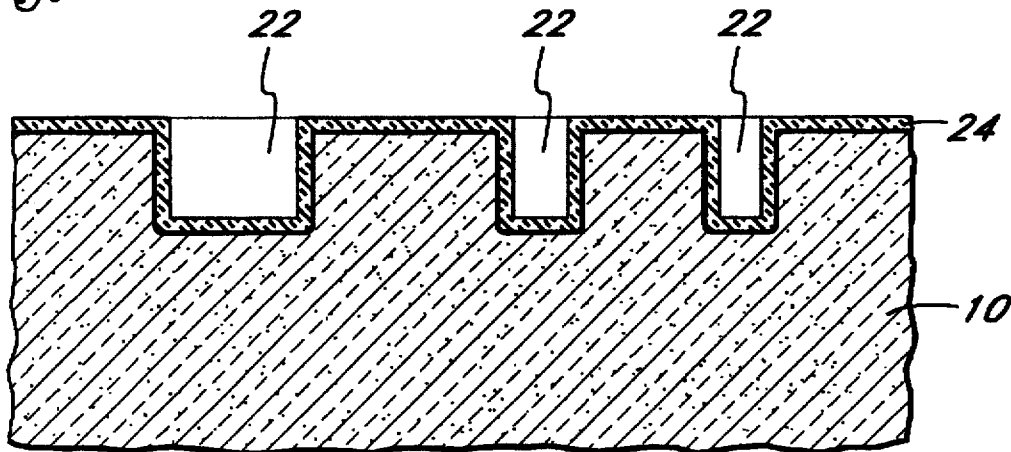
*Fig. 2*  
(PRIOR ART)



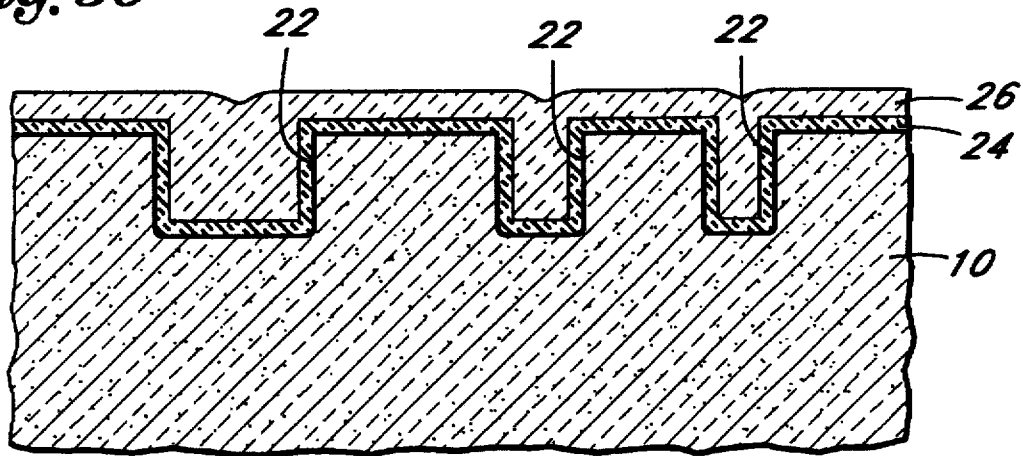
*Fig. 3A*



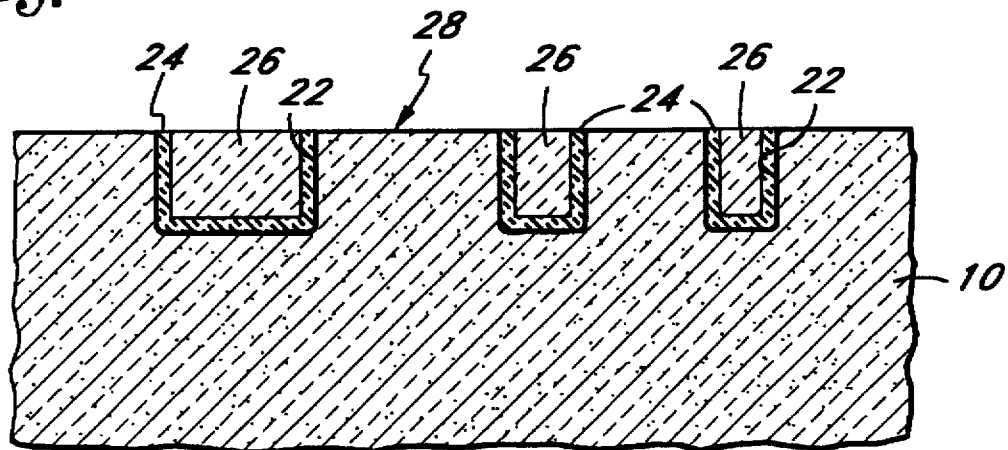
*Fig. 3B*



*Fig. 3C*



*Fig. 3D*



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