

United States Patent [19]

Ogawa et al.

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[45] Date of Patent: Mar. 26, 1985

[54] METHOD FOR PRODUCTION OF SEMICONDUCTOR DEVICES

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[73] Assignee: Fujitsu Limited, Kawasaki, Japan

[21] Appl. No.: 414,803

[22] Filed: Sep. 3, 1982

[30] Foreign Application Priority Data

Sep. 10, 1981 [JP] Japan 56-142911

[51] Int. Cl.³ H01L 21/76; H01L 21/302; H01L 21/20

[52] U.S. Cl. 29/571; 29/578; 29/576 W; 148/1.5; 148/175; 148/187; 156/643; 156/648; 156/662; 357/49

[58] Field of Search 29/571, 576 R, 576 B, 29/576 W, 578; 148/174, 175, 187, 1.5; 357/47, 48, 49, 50; 156/643, 648, 653, 661.1, 662

[56] References Cited

U.S. PATENT DOCUMENTS

3,421,055	1/1969	Bean et al.	156/648 X
3,719,535	3/1973	Zoroglu	148/187
4,104,086	8/1978	Bondur et al.	29/576 W X
4,192,059	3/1980	Khan et al.	29/571
4,209,349	1/1980	Ho et al.	148/174 X
4,209,350	6/1980	Ho et al.	148/1.5 X
4,252,582	2/1981	Anantha et al.	29/578 X
4,261,763	4/1981	Kumar et al.	29/576 W X
4,385,433	5/1983	Ozawa	29/571 X

4,391,650 7/1983 Pfeifer et al. 29/571 X

FOREIGN PATENT DOCUMENTS

3023410 1/1982 Fed. Rep. of Germany .

2174 1/1977 Japan 156/661.1

51872 4/1977 Japan 156/653

OTHER PUBLICATIONS

IBM Technical Disclosure Bulletin, vol. 23, No. 8, Jan. 1981, New York, D. W. Ormond, pp. 3694-3697.

IBM Technical Disclosure Bulletin, vol. 21, No. 7, Dec. 1978, New York, H. B. Pogge, pp. 2734-2735.

IBM Technical Disclosure Bulletin, Abbas et al., "Simplified Isolation for an Integrated Circuit", vol. 25, No. 12, May 1983, pp. 6611-6614.

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[57] ABSTRACT

A method for producing semiconductor devices having a substrate, element fabrication areas formed in the substrate and isolation areas surrounding the element fabrication areas. The method comprises forming a thermal strain absorbing layer on the top surface of the element fabrication areas, forming at least one groove in an area which is to become the isolation areas, inlaying an insulator in the at least one groove, and annealing the insulator to make the density thereof uniform.

9 Claims, 21 Drawing Figures

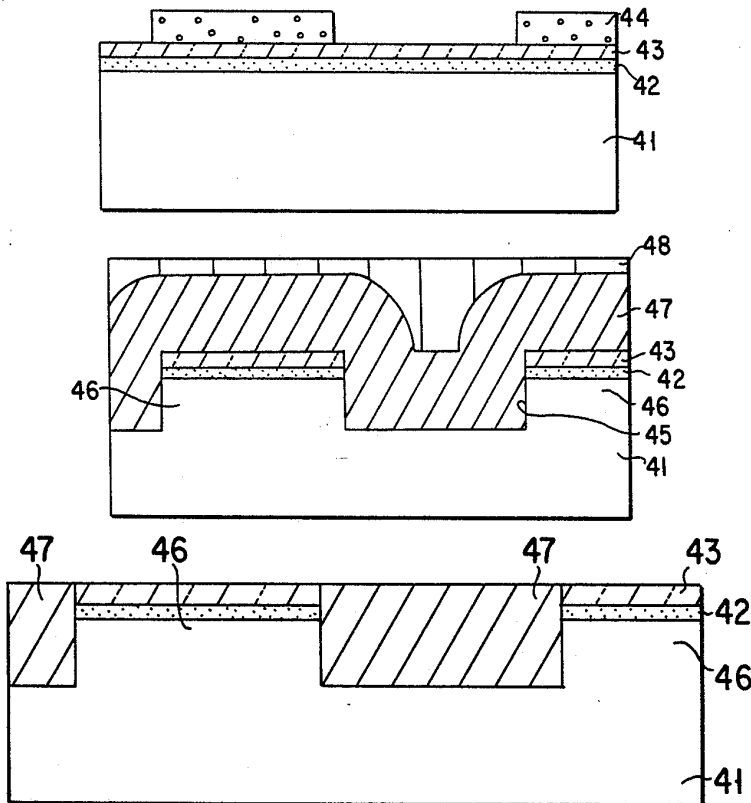


Fig. 1

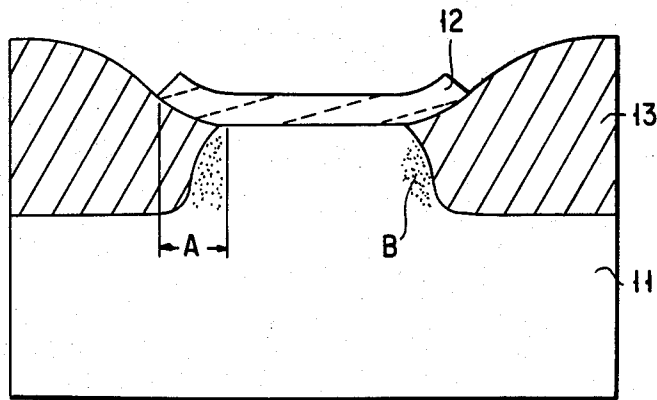


Fig. 2(a)

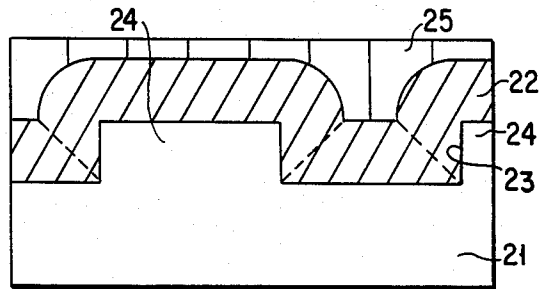


Fig. 2(b)

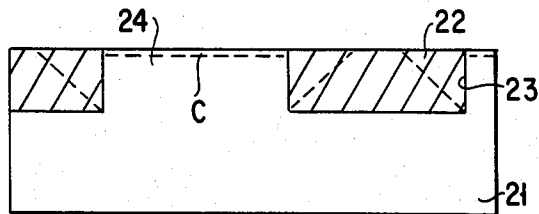


Fig.2(c)

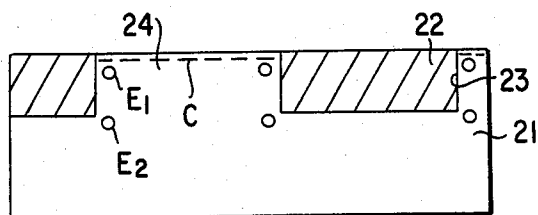


Fig.2(d)

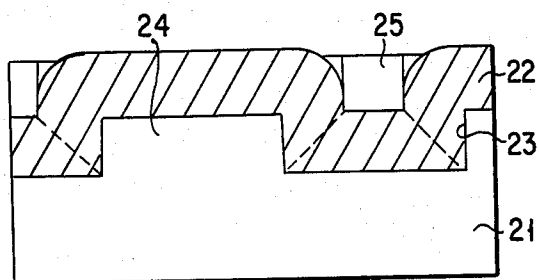


Fig.2(e)

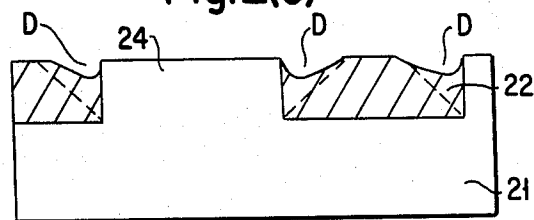


Fig.2(f)

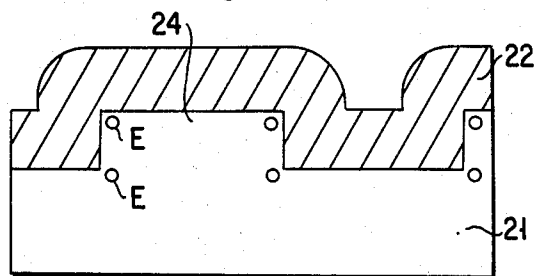


Fig.3

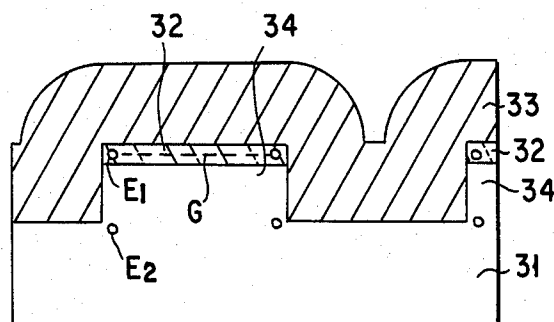


Fig.4(a)

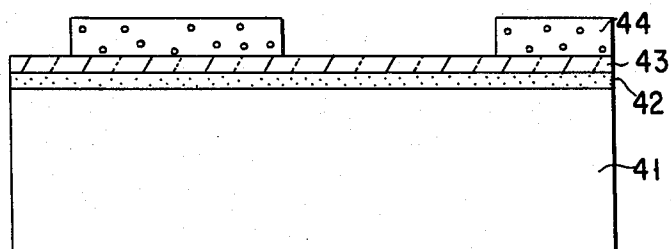


Fig.4(b)

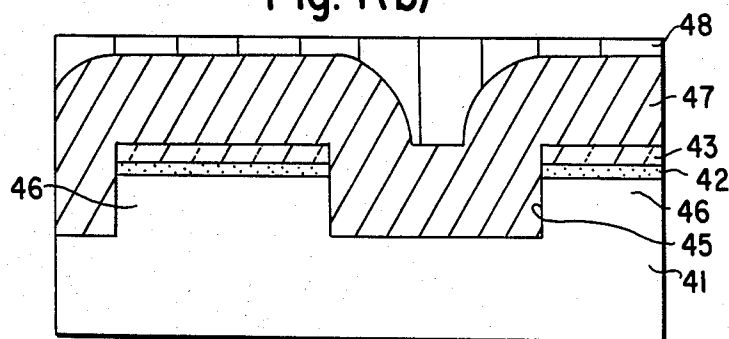


Fig. 4(c)

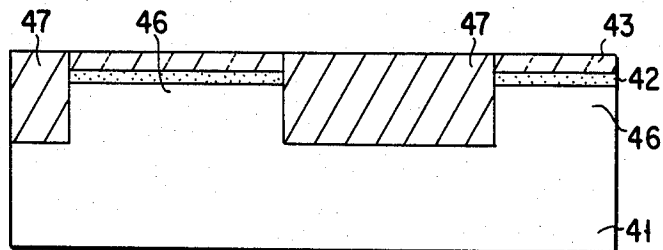


Fig.(d)

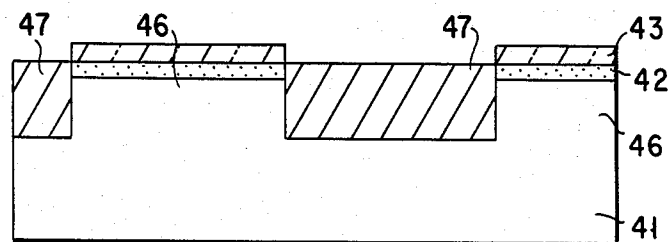
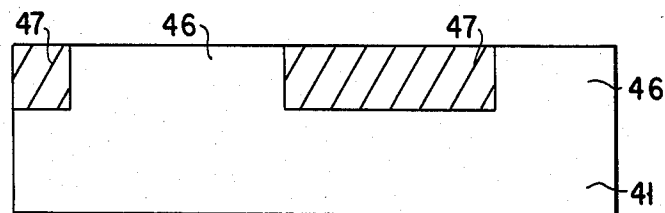


Fig.(e)



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