

[54] **METHOD FOR PLANARIZING A SEMICONDUCTOR DEVICE HAVING A AMORPHOUS LAYER**

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4,735,679	4/1988	Laske	437/62
4,879,258	11/1989	Fisher	437/225
4,910,155	3/1990	Cote et al.	437/8
4,940,507	7/1990	Harbarger	156/636
5,036,015	7/1991	Sandhu et al.	437/8
5,064,683	11/1991	Poon et al.	427/39
5,078,801	1/1992	Malik	437/225
5,084,071	1/1992	Neuadic et al.	51/309
5,110,428	5/1992	Prigge et al.	204/129.3
5,166,096	11/1992	Cote et al.	437/195
5,236,861	8/1993	Otsu	437/67
5,246,884	9/1993	Jaso et al.	437/225
5,262,346	11/1993	Bindal et al.	156/636
5,272,117	12/1993	Roth et al.	437/228

[21] Appl. No.: 66,375

[22] Filed: May 25, 1993

[30] Foreign Application Priority Data

May 26, 1992	[JP]	Japan	4-132978
Sep. 25, 1992	[JP]	Japan	4-256889
Oct. 20, 1992	[JP]	Japan	4-281194
Nov. 30, 1992	[JP]	Japan	4-319175
Dec. 11, 1992	[JP]	Japan	4-331945

[51] Int. Cl.<sup>6</sup> H01L 21/302; H01L 21/463  
 [52] U.S. Cl. 437/225; 437/101; 437/966; 437/235  
 [58] Field of Search 156/636; 437/228, 966, 437/960, 225, 101, 637

[56] References Cited

U.S. PATENT DOCUMENTS

3,715,842	2/1973	Tredinnick et al.	51/303
4,671,851	6/1987	Beyer et al.	156/645

FOREIGN PATENT DOCUMENTS

0272531A1	6/1988	European Pat. Off.	.
0403287A2	12/1990	European Pat. Off.	.
63-266830	11/1988	Japan	.

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 Assistant Examiner—H. Jey Tsai  
 Attorney, Agent, or Firm—Finnegan, Henderson, Farabow, Garrett & Dunner

[57] ABSTRACT

To planarize an insulating film formed on a semiconductor substrate, a polishing slurry containing cerium oxide is used to polish the surface of the insulating film. Using the cerium oxide included slurry as a polishing agent, the insulating film is not contaminated by alkali metals during the polishing process. Furthermore, the insulating film is polished at an enhanced polishing rate.

1 Claim, 41 Drawing Sheets

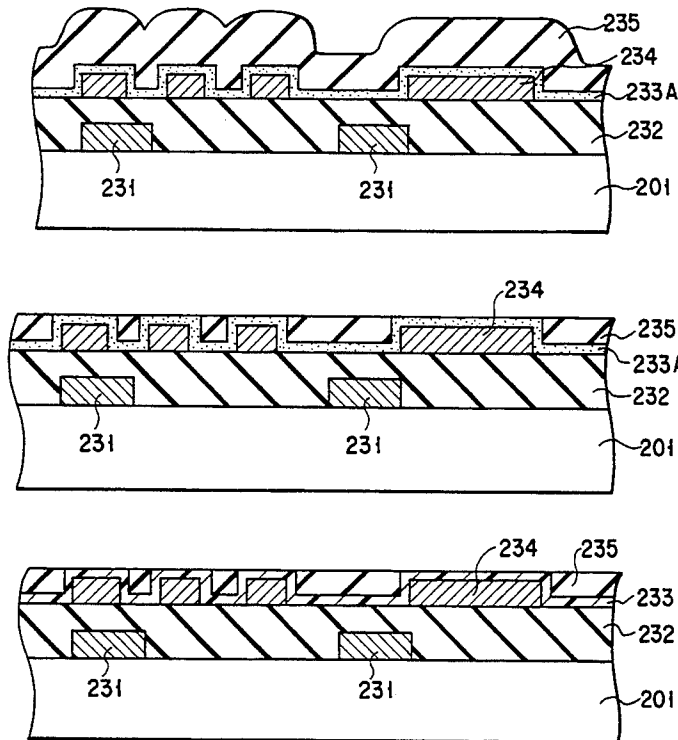


FIG. 1A  
PRIOR  
ART

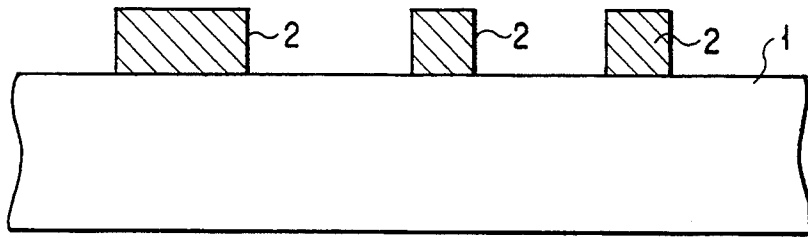


FIG. 1B  
PRIOR  
ART

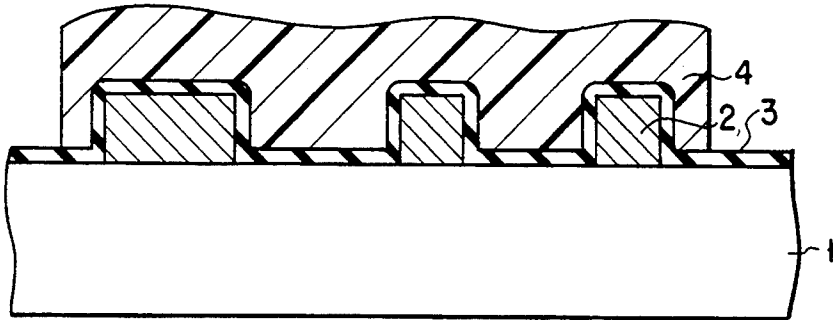


FIG. 1C  
PRIOR  
ART

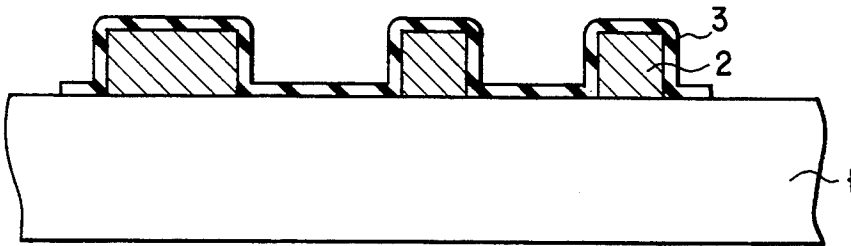


FIG. 1D  
PRIOR  
ART

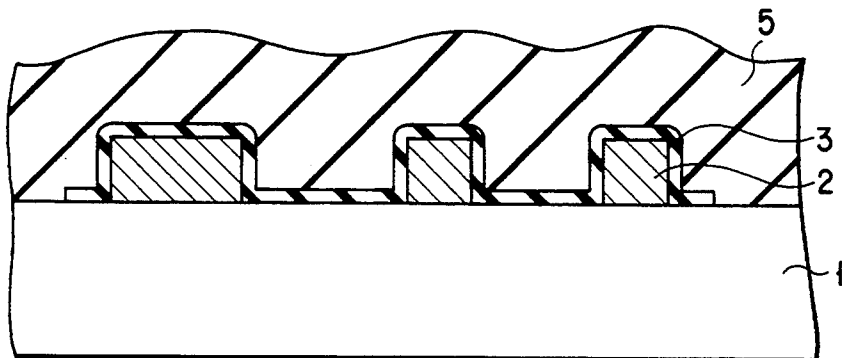


FIG. 1E  
PRIOR  
ART

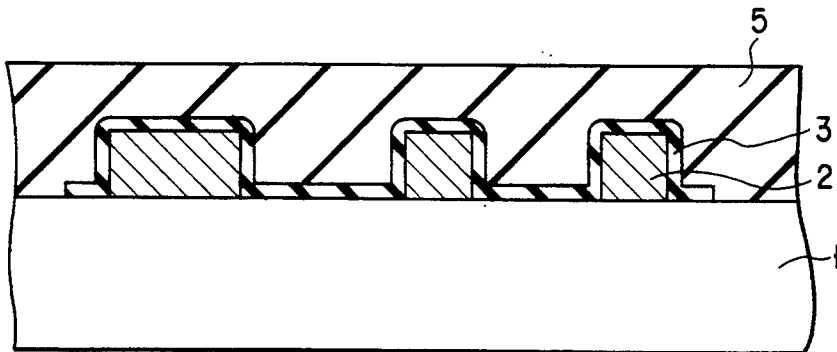


FIG. 2A  
PRIOR ART

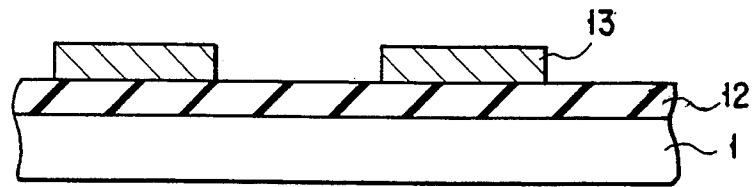


FIG. 2B  
PRIOR ART

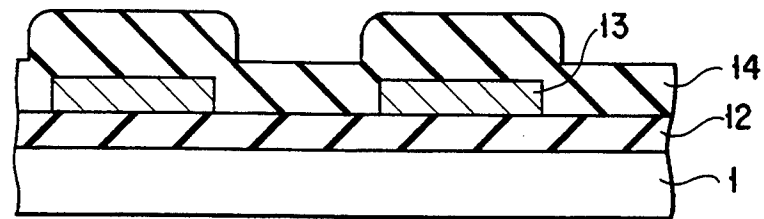


FIG. 2C  
PRIOR ART

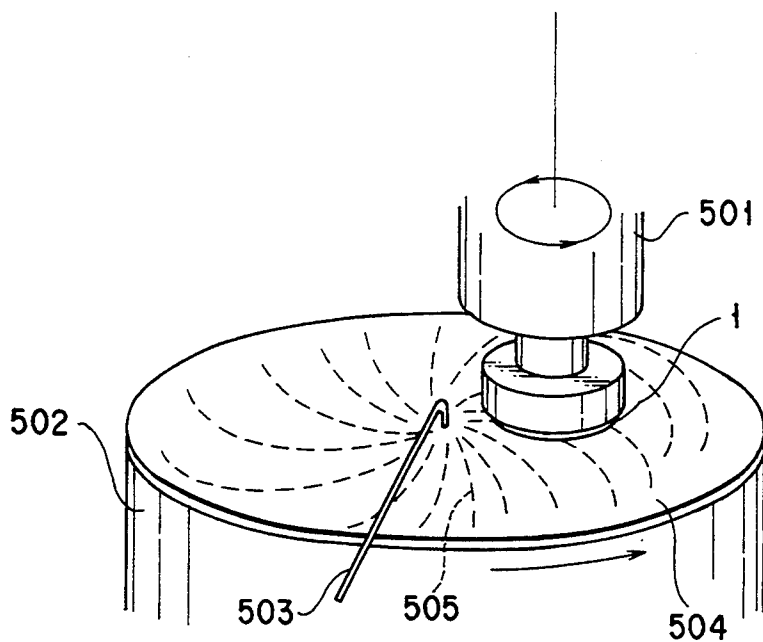
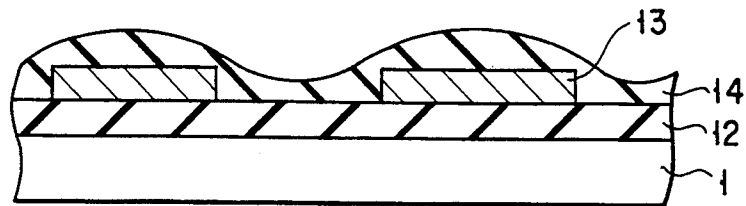


FIG. 3  
PRIOR ART

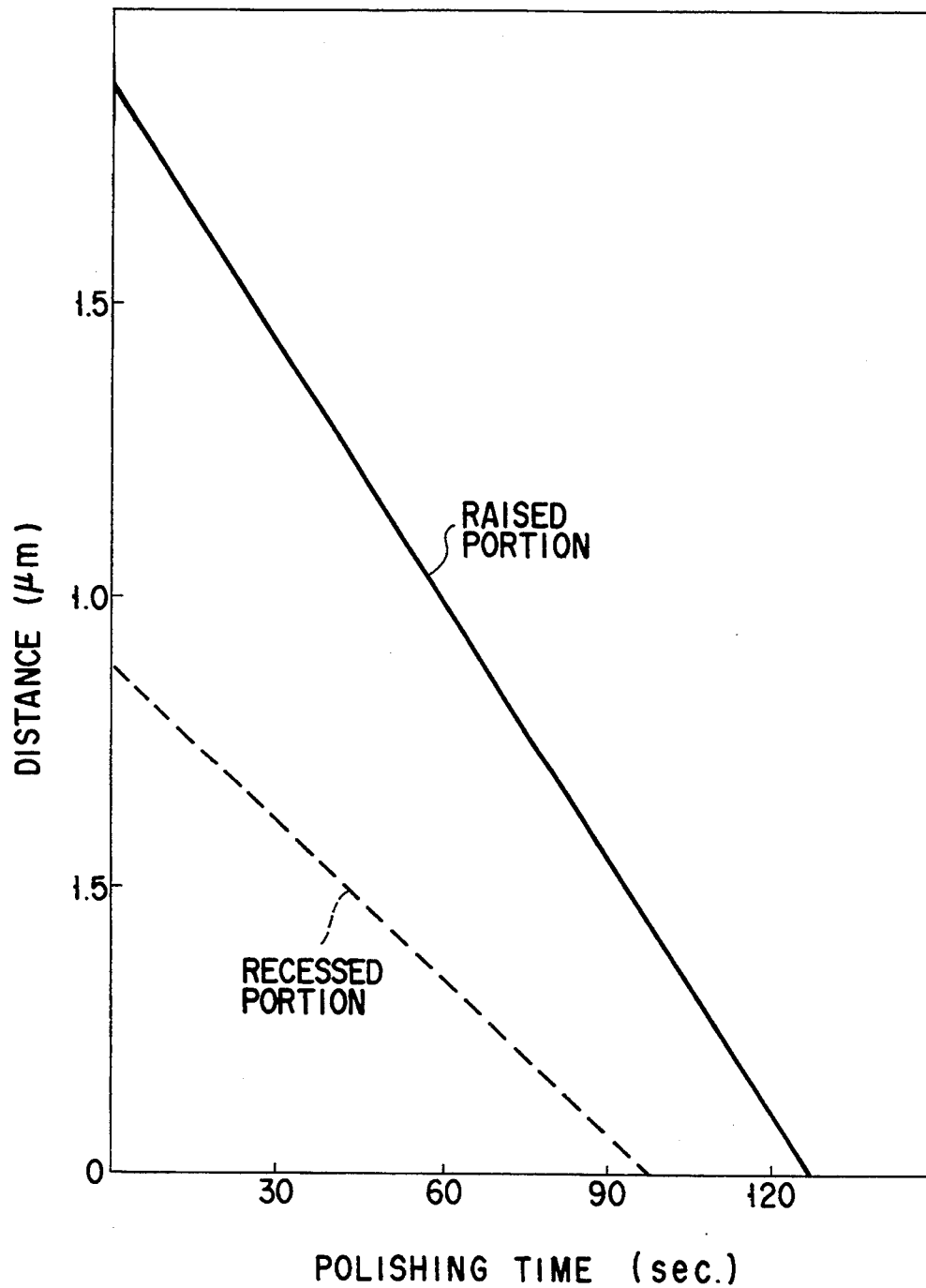


FIG. 4  
PRIOR ART

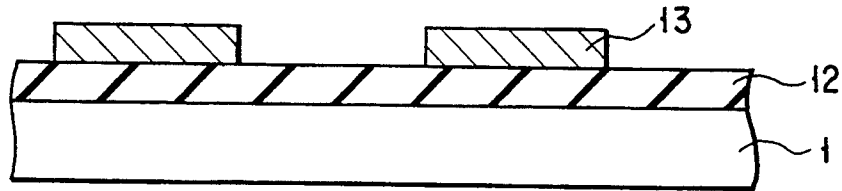


FIG. 5A  
PRIOR ART

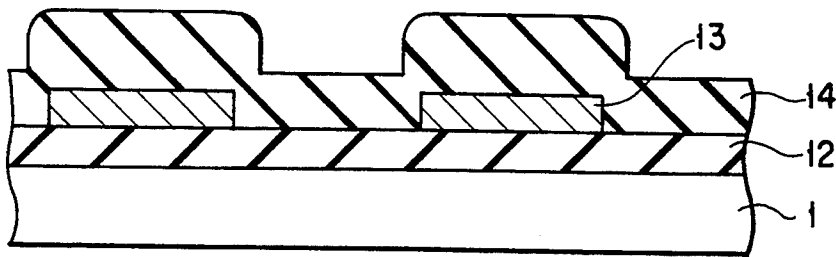


FIG. 5B  
PRIOR ART

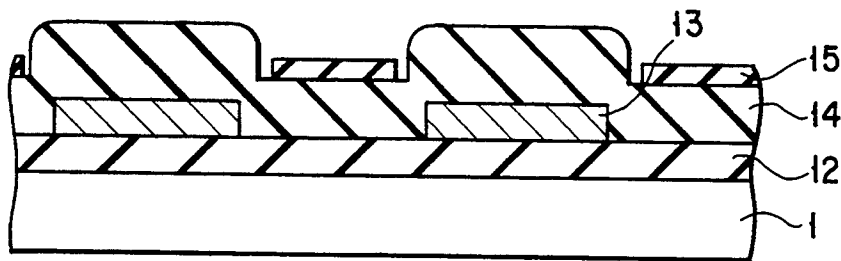


FIG. 5C  
PRIOR ART

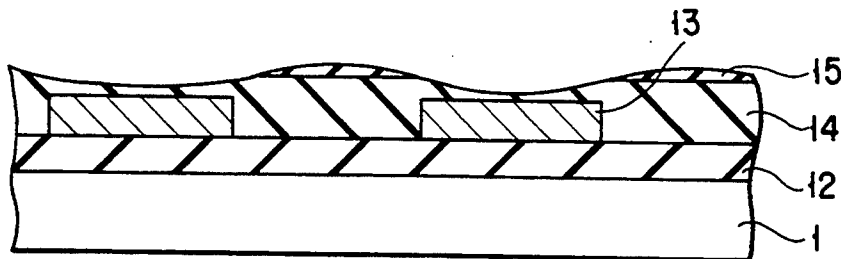


FIG. 5D  
PRIOR ART

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