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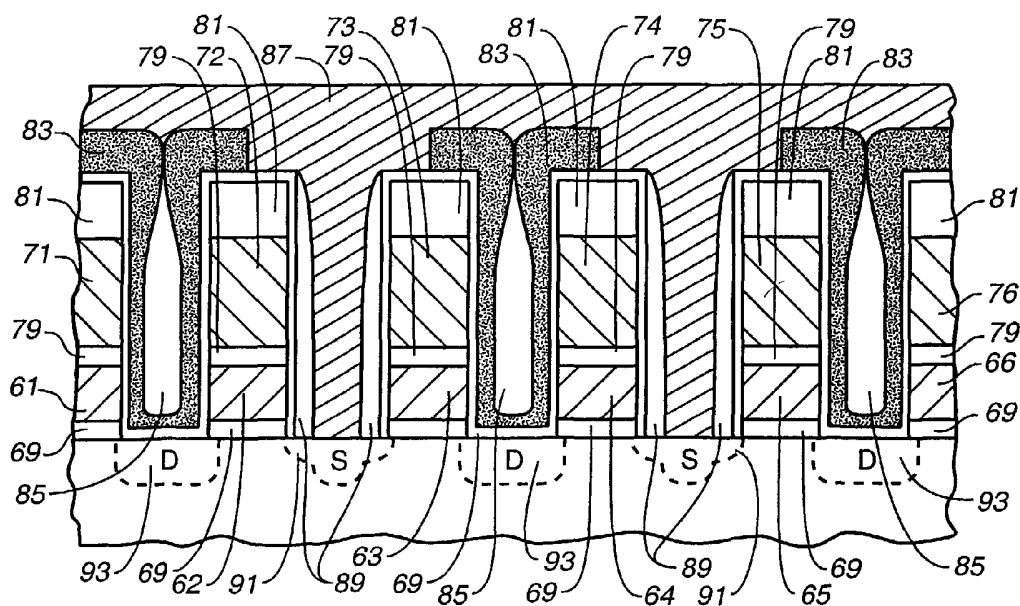
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[Continued on next page]

(54) Title: USE OF VOIDS BETWEEN ELEMENTS IN SEMICONDUCTOR STRUCTURES FOR ISOLATION



(57) Abstract: A flash EEPROM or other type of memory cell array having adjacent charge storage elements is formed with a gas filled void between them in order to reduce the level of capacitive coupling between storage elements, thus reducing cross-coupling between charge storage elements and resulting errors occurring in the data read from the array.



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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 469 339 B1 (SHIMIZU SATOSHI ET AL) 22 October 2002 (2002-10-22) the whole document	1-17
A	US 2001/003379 A1 (SEO WON CHEUL) 14 June 2001 (2001-06-14) the whole document	1-3, 5, 6, 8-10, 12-17
A	US 6 303 464 B1 (MARIEB THOMAS N D ET AL) 16 October 2001 (2001-10-16) the whole document	1-3, 5, 6, 8-10, 12-17
A	US 2003/006448 A1 (CHEN ZHILHAO ET AL) 9 January 2003 (2003-01-09) paragraph '0012! - paragraph '0014!; figures 1a-1b	1, 3, 4, 9, 14
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 734 607 A (SUNG HUNG-CHENG ET AL) 31 March 1998 (1998-03-31) column 3, line 53 - column 8, line 9; figures 1A-2J -----	1-5,7,9, 11,14

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 6469339	B1	22-10-2002	JP	2002076299 A	15-03-2002
US 2001003379	A1	14-06-2001	JP	11251428 A	17-09-1999
US 6303464	B1	16-10-2001	NONE		
US 2003006448	A1	09-01-2003	US	2003207527 A1	06-11-2003
US 5734607	A	31-03-1998	US	5589413 A	31-12-1996