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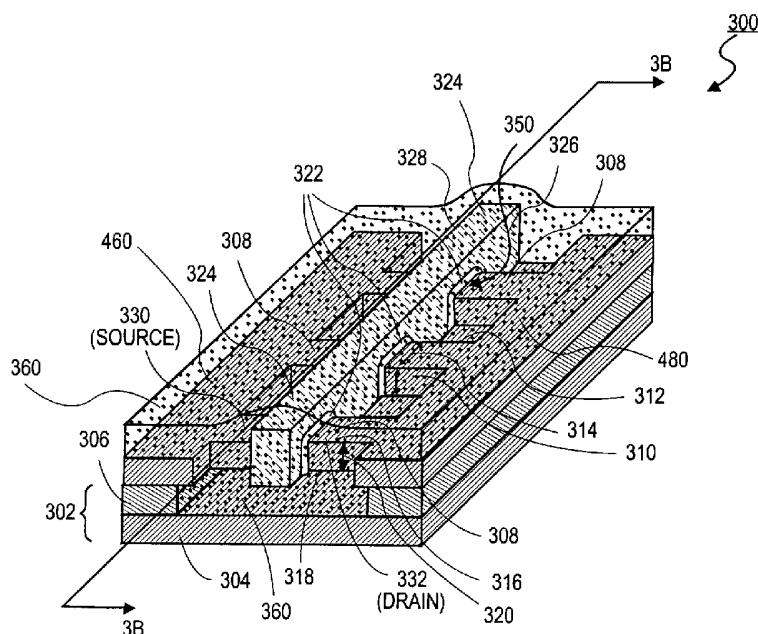
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(54) Title: NONPLANAR DEVICE WITH STRESS INCORPORATION LAYER AND METHOD OF FABRICATION



(57) Abstract: A semiconductor device comprising a semiconductor body having a top surface and laterally opposite sidewalls is formed on an insulating substrate. A gate dielectric layer is formed on the top surface of the semiconductor body and on the laterally opposite sidewalls of the semiconductor body. A gate electrode is formed on the gate dielectric on the top surface of the semiconductor body and is formed adjacent to the gate dielectric on the laterally opposite sidewalls of the semiconductor body. A thin film is then formed adjacent to the semiconductor body wherein the thin film produces a stress in the semiconductor body.

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# INTERNATIONAL SEARCH REPORT

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L29/786 H01L29/423 H01L21/336 H01L29/10

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, 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 6 475 869 B1 (YU BIN) 5 November 2002 (2002-11-05)	1, 3, 4, 7-11, 17
Y	column 5, line 1 - line 25; figures 2-8	2, 12-14, 16, 18-23
A		15, 24-29
Y	WO 02/43151 A (HITACHI ULSI SYS CO LTD ; HITACHI LTD (JP); NONAKA YUSUKE (JP); OKI) 30 May 2002 (2002-05-30) the whole document	2, 12-14, 16, 18-23
A	US 2002/167007 A1 (HAYAKAWA MASAHIKO ET AL) 14 November 2002 (2002-11-14) paragraph '0010!	1-29
A	US 2002/081794 A1 (ITO SHINYA) 27 June 2002 (2002-06-27) paragraph '0050!	1-29



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# INTERNATIONAL SEARCH REPORT

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6475869	B1	05-11-2002	NONE
WO 0243151	A	30-05-2002	AU 6788001 A 03-06-2002 CN 1449585 T 15-10-2003 WO 0243151 A1 30-05-2002 TW 536726 B 11-06-2003 US 2004029323 A1 12-02-2004
US 2002167007	A1	14-11-2002	JP 2000269510 A 29-09-2000 JP 2003249661 A 05-09-2003 US 6380558 B1 30-04-2002
US 2002081794	A1	27-06-2002	JP 2002198368 A 12-07-2002 CN 1362727 A 07-08-2002 GB 2376564 A 18-12-2002 TW 540119 B 01-07-2003