



US007893501B2

(12) **United States Patent**
Tsutsui et al.

(10) **Patent No.:** **US 7,893,501 B2**
(45) **Date of Patent:** ***Feb. 22, 2011**

(54) **SEMICONDUCTOR DEVICE INCLUDING MISFET HAVING INTERNAL STRESS FILM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **12/170,191**

(22) Filed: **Jul. 9, 2008**

(65) **Prior Publication Data**

US 2009/0050981 A1 Feb. 26, 2009

Related U.S. Application Data

(63) Continuation of application No. 11/730,988, filed on Apr. 5, 2007, now Pat. No. 7,417,289, which is a continuation of application No. 10/859,219, filed on Jun. 3, 2004, now Pat. No. 7,205,615.

(30) **Foreign Application Priority Data**

Jun. 16, 2003 (JP) 2003-170335

(51) **Int. Cl.**

H01L 29/76 (2006.01)

H01L 29/94 (2006.01)

H01L 31/062 (2006.01)

H01L 31/113 (2006.01)

H01L 31/119 (2006.01)

(52) **U.S. Cl.** **257/369**

(58) **Field of Classification Search** 257/369

See application file for complete search history.

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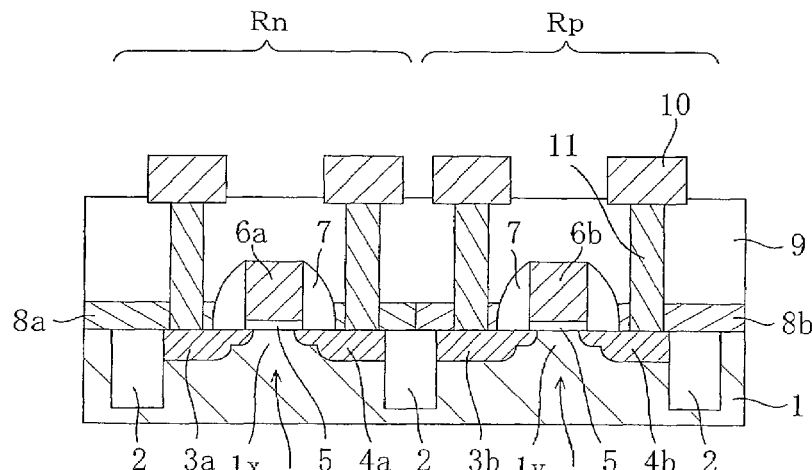
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(57) **ABSTRACT**

A semiconductor device includes a first-type internal stress film formed of a silicon oxide film over source/drain regions of an nMISFET and a second-type internal stress film formed of a TEOS film over source/drain regions of a pMISFET. In a channel region of the nMISFET, a tensile stress is generated in the direction of movement of electrons due to the first-type internal stress film, so that the mobility of electrons is increased. In a channel region of the pMISFET, a compressive stress is generated in the direction of movement of holes due to the second-type internal stress film, so that the mobility of holes is increased.

25 Claims, 9 Drawing Sheets



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FIG. 1

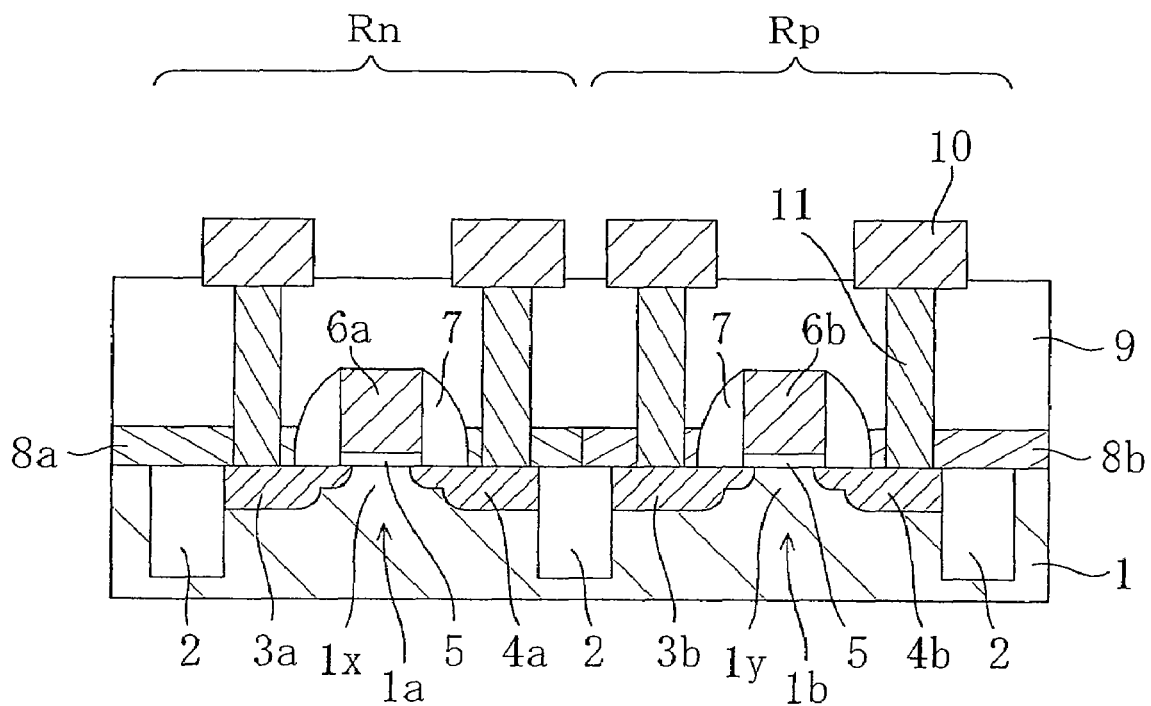


FIG. 2A

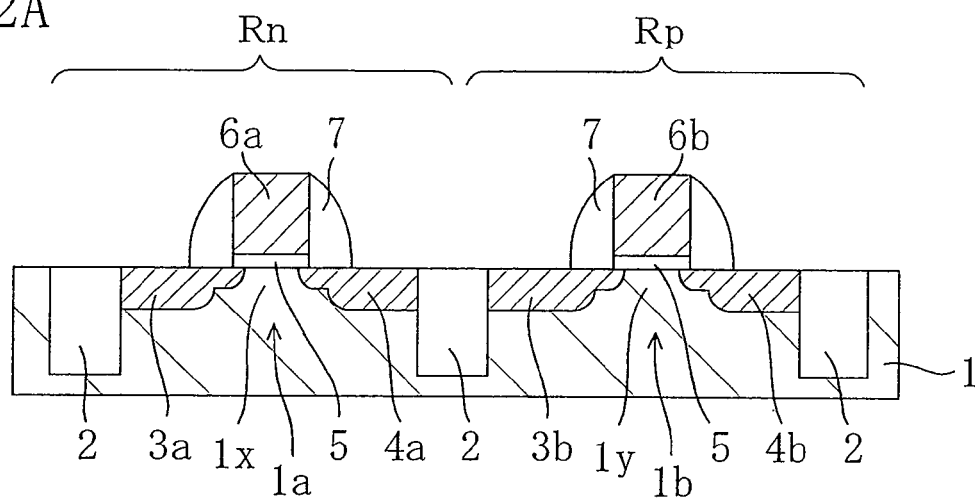


FIG. 2B

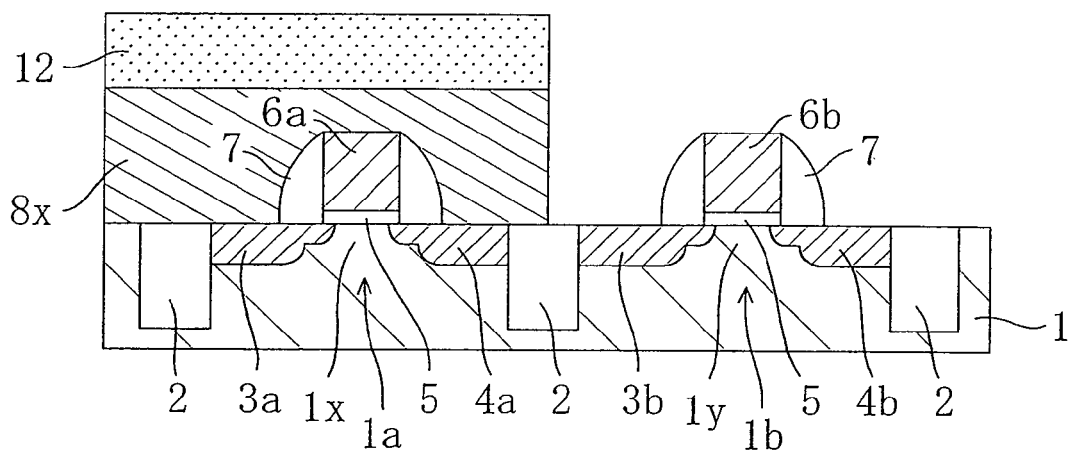


FIG. 2C

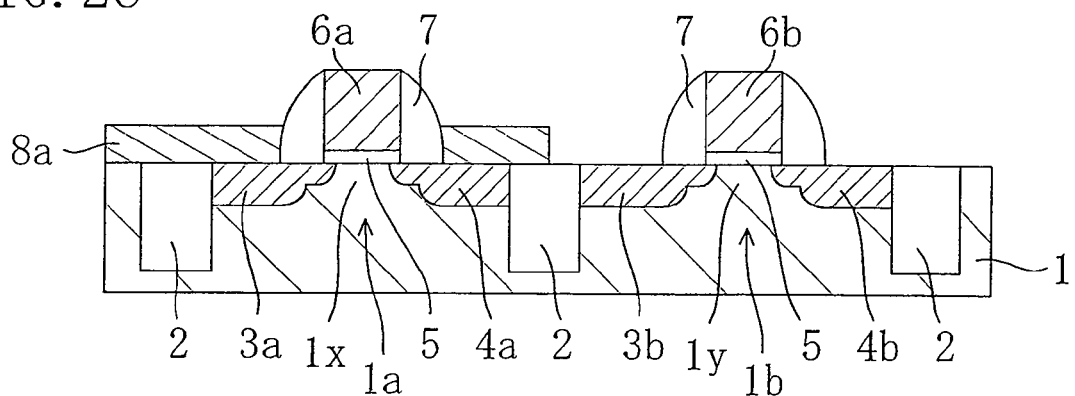


FIG. 3A

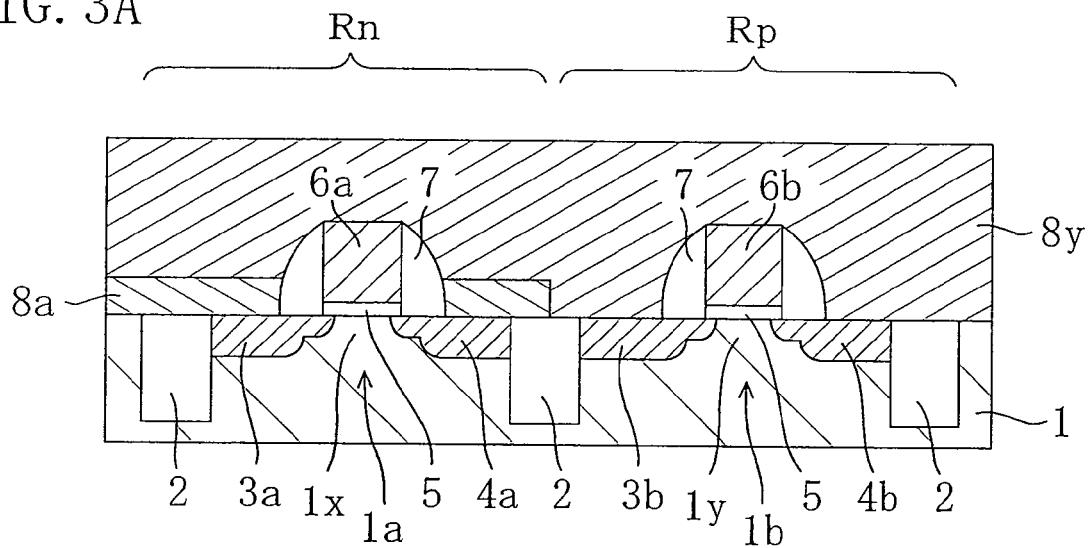


FIG. 3B

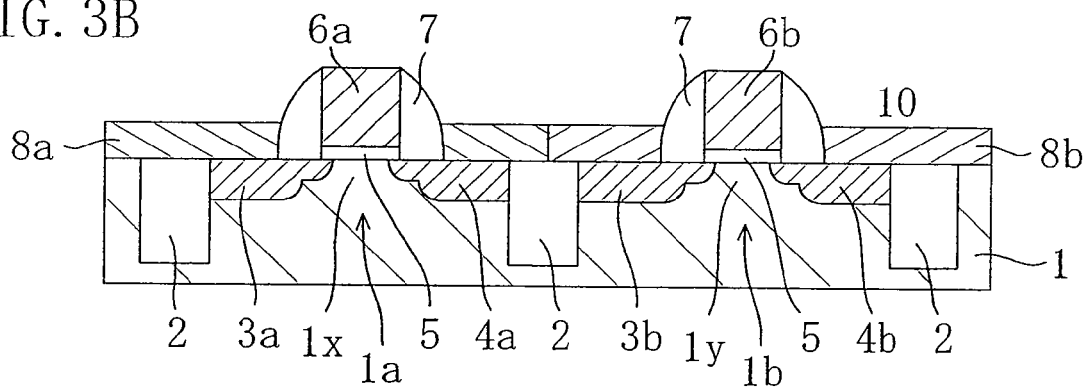
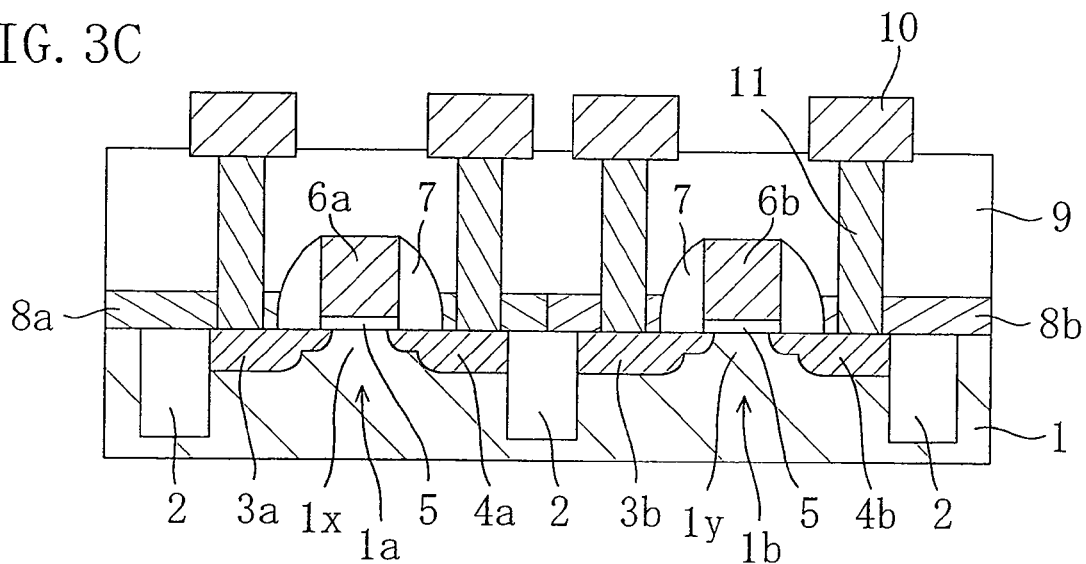


FIG. 3C



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