UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOSHIFUMI YOSHIDA
and JUN OSANAI

Appeal 2007-4284
Application 10/116,641
Technology Center 2800

Decided: March 28, 2008

Before EDWARD C. KIMLIN, BRADLEY R. GARRIS, and CHARLES F. WARREN, *Administrative Patent Judges*.

KIMLIN*, Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 10-12, 15-20, 22, 23, and 25-27. Claim 10 is illustrative:

10. A semiconductor device comprising: an N-channel MOS transistor and a P-channel MOS transistor each having a thermally nitrided gate insulating film, a gate electrode having a P-type conductivity and a thickness in the range of 2000 angstroms to 5000 angstroms and being disposed on the thermally nitrided gate insulating film, a low impurity

concentration diffusion layer, and a high impurity concentration diffusion layer spaced from the gate electrode.

The Examiner relies upon the following references as evidence of obviousness:

Yamaguchi	5,341,028	Aug. 23, 1994
Eklund	5,506,158	Apr. 9, 1996
Schwalke	5,998,271	Dec. 7, 1999
Lustig	5,998,807	Dec. 7, 1999
Unnikrishnan	6,353,245 B1	Mar. 5, 2002

The appealed claims stand rejected under 35 U.S.C. § 103(a) as follows:

(a) claims 10-12, 19, 20, and 22 over Lustig in view of Schwalke and Eklund,

(b) claims 17, 18, 26, and 27 over the stated combination of references further in view of Unnikrishnan, and

(c) claims 15, 16, 23, and 25 over the references cited in (a) above further in view of Yamaguchi.

Appellants do not set forth an argument that is reasonably specific to any particular claim on appeal. Accordingly, all the appealed claims stand or fall together with claim 10.[1]

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we are in complete agreement with the Examiner that the claimed subject matter would have been obvious to one of ordinary

[1] We also note that Appellants do not submit additional substantive arguments against rejections (b) and (c) but, rather, rely upon the arguments set forth against claim 10. Accordingly, we will limit our consideration to the Examiner's § 103 rejection of claim 10.

skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the Examiner's rejections for the reasons set forth in the Answer, and we add the following primarily for emphasis.

There is no dispute that Lustig, like Appellants, discloses a semiconductor device comprising an N-channel MOS transistor and a P-channel MOS transistor having a gate insulating film and a gate electrode having a P-type conductivity, wherein the gate electrode is disposed on the gate insulating film. Also, Appellants do not dispute the Examiner's factual determination that the semiconductor device of Lustig comprises the presently claimed low impurity concentration diffusion layer and high impurity concentration diffusion layer spaced from the gate electrode.

As acknowledged by the Examiner, Lustig does not teach that the gate insulating film is thermally nitrided. However, Schwalke discloses a PMOS or NMOS device comprising a thermally nitrided gate insulating film under a gate electrode for the purpose of acting as a dopant barrier. Accordingly, we fully concur with the Examiner that it would have been obvious for one of ordinary skill in the art to employ the presently claimed thermally nitrided gate insulating film taught by Schwalke as the gate insulating film of Lustig. As explained by the Examiner, the reason disclosed by Schwalke for using a thermally nitrided gate insulating film is similar to Appellants' reason, namely, to serve as a dopant barrier. Moreover, to the extent there is some difference between Appellants' purpose for using a thermally nitrided gate insulating film and the purpose disclosed by Schwalke, the Examiner correctly points out that it is not necessary for a finding of obviousness that the prior art teach the same purpose for a claimed feature as the applicant.

In re Dillon, 919 F.2d 688, 692 (Fed. Cir. 1990)(*en banc*) *cert. denied*, 500 U.S. 904 (1991).

Lustig is silent with respect to the thickness of the gate electrode. However, Eklund evidences that it was known in the art of semiconductor devices to employ a gate electrode having a thickness on the order of 3500 angstroms, which value is precisely at the midpoint of the claimed range of 2000-5000 angstroms (*see* Eklund at col. 3, ll. 56-57). As a result, we conclude that it would have been obvious for one of ordinary skill in the art to form a gate electrode in Lustig's device having a thickness within the claimed range. In general, it is a matter of obviousness for one of ordinary skill in the art to determine the optimum size of a known feature. Appellants have cited no objective data which establishes the criticality for thicknesses of the gate electrode that fall within the claimed range.

Appellants state that "[i]n the present invention, the provision of a thermally nitrided gate insulating film and the specific range of thickness selected from the P-type gate electrode recited in claims 10 and 19 effectively prevent boron from passing through the gate electrode and penetrating the channel region of the semiconductor device during ion implantation while the sheet resistance of the semiconductor device is maintained at a preferred low value" (Br. sentence bridging pages 10-11). However, Appellants have not established with objective data that this effect is unexpected, particularly in light of the prior art teachings with respect to the use of a thermally nitrided gate insulating film as a dopant barrier and the claimed thickness for the gate electrode. Indeed, we note that Appellants have cited no evidence of nonobviousness.

In conclusion, based on the foregoing and the reasons well stated by the Examiner, the Examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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