

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 34

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HISASHI OHTANI

Appeal No. 2003-0751
Application No. 08/995,368

HEARD: July 15, 2003

Before PAK, WARREN and KRATZ, Administrative Patent Judges.
KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's refusal to allow claims 15-17, 24 and 25. Claims 2, 4, 18, 19 and 21-23 have been indicated as allowable by the examiner. Claims 5-14, which are all of the remaining claims pending in this application, stand withdrawn from further consideration by the examiner as drawn to a non-elected invention.

BACKGROUND

Appellant's invention relates to a method of manufacturing a semiconductor device wherein a polishing step is performed on a substrate surface. Subsequently, an amorphous silicon semiconductor film is formed thereon. The latter film formation step is followed by crystallization and patterning steps. The polishing step is carried out such that the root mean square of the substrate surface roughness is smaller than the semiconductor film thickness. An understanding of the invention can be derived from a reading of exemplary claim 15, which is reproduced below.

15. A method of manufacturing a semiconductor device comprising the steps of:
polishing a surface over a substrate;
forming an insulating film comprising silicon oxide over the polished substrate;
forming a semiconductor film comprising amorphous silicon over said insulating film;
crystallizing the semiconductor film by heating; and
patterning the crystallized semiconductor film to form an active layer,
wherein the surface over said substrate is polished so that a root mean square of a surface roughness of said surfaces is smaller than a thickness of the semiconductor film and a density of projection on said surface is 100 pieces/cm² or less.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Zhang et al. (Zhang)

5,403,772

Apr. 04, 1995

Ohtani et al. (Ohtani) 5,923,962 Jul. 13, 1999

Claims 15-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang. Claims 24 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Zhang in view of Ohtani.

We refer to the brief and reply brief and to the answer for a complete exposition of the opposing viewpoints expressed by appellant and the examiner concerning the issues before us on this appeal.

OPINION

Upon careful review of the respective positions advanced by appellant and the examiner with respect to the rejections that are before us for review, we find ourselves in agreement with appellant's position in that the examiner has failed to carry the burden of establishing a prima facie case of obviousness with respect to either of the stated rejections. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992); In re Piasecki, 745 F.2d 1468, 1471-1472, 223 USPQ 785, 787-788 (Fed. Cir. 1984). Accordingly, we will not sustain the examiner's rejections.

In an attempt at establishing the obviousness of the claimed method, the examiner asserts that "it is well within the ordinary skill of the art to polish the substrate to a high degree of smoothness" and that "it would have been obvious to one of ordinary skill in the art to determine through routine experimentation the optimum, operable surface roughness and thickness in the Zhang et al reference in order to create a uniform crystallized silicon layer" (answer, page 3).

However, the examiner has not established where either of the applied references describe or suggest a substrate polishing step prior to the formation of an amorphous silicon film on the surface, let alone a polishing step conducted so as to achieve the surface roughness as here claimed as a preliminary step in forming a semiconductor device. Polishing may be a generally known step as examiner as acknowledged by appellant. However, the examiner has not established that the here claimed polishing step, conducted as part of a semiconductor manufacturing method in the manner and to the extent as set forth in the appealed claims would have been obvious to one of ordinary skill in the art based on the evidence put forward by the examiner.

Concerning this matter, it is well settled that the mere fact that the prior art may be modified to reflect features of

the claimed invention does not make the modification obvious unless the desirability of such modification is suggested by the applied prior art. See In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992). Accordingly, on this record, the rejections fail for lack of a sufficient factual basis upon which to reach a conclusion of obviousness. In re Fine, 837 F.2d 1071, 1073-74, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988).

CONCLUSION

On this record, the decision of the examiner to reject claims 15-17 under 35 U.S.C. § 103(a) as being unpatentable over Zhang and to reject claims 24 and 25 under 35 U.S.C. § 103(a) as being unpatentable over Zhang in view of Ohtani is reversed.

REVERSED

CHUNG K. PAK)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
CHARLES F. WARREN)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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PETER F. KRATZ)
Administrative Patent Judge)

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