

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 72

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOSHIHISA FUJISAKI, YUKIO TAKANO
and TSUTOMU ISHIBA

Appeal No. 1998-1660
Application No. 08/108,499

HEARD: Nov. 14, 2000

Before RUGGIERO, DIXON, and GROSS, Administrative Patent Judges.

RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal from the final rejection of claims 11-15, all of the claims pending in the present application. Claims 1-10 have been canceled.

The claimed invention relates to a GaAs (gallium arsenide) single crystal in the form of a wafer. The distribution of lattice constants across the surface of the

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wafer is controlled to satisfy a particular inequality relationship.

Claim 11 is illustrative of the invention and reads as follows:

11. A GaAs single crystal characterized in that the ratio D/d_0 satisfies the following inequalities in a lattice constant measurement area of a wafer of said GaAs,

$$4 \times 10^{-6} \leq D/d_0 \leq 4 \times 10^{-5}; \text{ and}$$

that a density of contained Si atoms is at most $1 \times 10^{16} \text{ cm}^{-3}$;

wherein said wafer has at least one straight-line length extending at least 2.5 cm in bidirection from its center, said lattice constant measurement area means an area of said wafer on a straight-line extending at least 2.5 cm in bidirection from the center of the wafer, D is defined as the value of difference between the maximum and minimum values of lattice constants measured entirely across said lattice constant measurement area at room temperature, with a series of individual measurements having a unit measurement area of 1 - 100 mm² arranged on said straight line, the unit measurement area being an area on which a measurement was taken by a measuring device; and d_0 is defined as the lattice constant at room temperature of stoichiometric composition GaAs single crystal being the theoretical composition of GaAs single crystal.

The Examiner relies on the following prior art:

Clarke et al. (Clarke)	4,544,417	Oct. 1, 1985
		(Filed May 27, 1983)

S. M. Sze (Sze), Physics of Semiconductor Devices, 33 (Second Edition, John Wiley & Sons, 1981).

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Sorab K. Gandhi (Gandhi), VLSI Fabrication Techniques, 86-90, 98-100 (John Wiley & Sons, 1983).

Claims 13 and 14 stand rejected as being based on an inadequate disclosure under the first paragraph of 35 U.S.C. § 112. Claims 11-14 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Gandhi. In a separate rejection, claims 11-15 stand rejected under 35 U.S.C. § 103. As evidence of obviousness, the Examiner offers the combination of Gandhi and Sze with respect to claim 11-14, and adding Clarke to the basic combination with respect to claim 15.¹

¹ As a result of a Decision on Petition, the Examiner's original statement of the ground of rejection under 35 U.S.C. § 103 in the Examiner's Answer was vacated and restated as a new ground of rejection in a first Supplemental Examiner's Answer dated March 19, 1997.

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Rather than reiterate the arguments of Appellants and the Examiner, reference is made to the Briefs² and Answers for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the Examiner, the arguments in support of the rejections and the evidence of anticipation and obviousness relied upon by the Examiner as support for the prior art rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, Appellants' arguments set forth in the Briefs along with the Examiner's

² The Appeal Brief was filed February 20, 1996. In response to the Examiner's Answer dated October 11, 1996, a Reply Brief was filed December 11, 1996 which was originally denied entry by the Examiner. A resubmitted Reply Brief filed in response to the new ground of rejection was filed May 19, 1997 to which the Examiner responded with a second Supplemental Examiner's Answer on August 7, 1997. A Supplemental Reply Brief in response was filed by Appellants on October 7, 1997.

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rationale in support of the rejections and arguments in rebuttal set forth in the Examiner's Answers.

It is our view, after consideration of the record before us, that the disclosure in this application describes the claimed invention in a manner which complies with the requirements of the first paragraph of 35 U.S.C. § 112. We are also of the view that the disclosure of Ghandhi does not fully meet the invention as set forth in claims 11-14. In addition, we are of the conclusion that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in claims 11-15. Accordingly, we reverse.

We consider first the rejection of claims 13 and 14 under the first paragraph of 35 U.S.C. § 112. We note that the Examiner, instead of relying on the "written description" or "enablement" language of the statute, has used the terminology "lack of support" in the statement of the rejection. Our reviewing court has made it clear that written description and enablement are separate requirements under the first paragraph of 35 U.S.C. § 112. Vas-Cath Inc. v. Mahurkar, 935 F. 2d

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1555, 1560, 19 USPQ 2d 1111, 1114 (Fed. Cir. 1991). The terminology "lack of support" has also been held to imply a reliance on the written description requirement of the statute. In re Higbee and Jasper, 527 F. 2d 1405, 188 USPQ 488, 489 (CCPA 1976).

In view of the factual situation presented to us in this instance we will interpret the Examiner's basis for the 35 U.S.C. § 112, first paragraph rejection as reliance on the "written description" portion of the statute. "The function of the description requirement [of the first paragraph of 35 U.S.C.

§ 112] is to ensure that the inventor has possession, as of the filing date of the application relied on, of the specific subject matter later claimed by him." In re Wertheim, 541 F. 2d 257, 262, 191 USPQ 90, 96 (CCPA 1976). "It is not necessary that the application describe the claim limitations exactly, . . . but only so clearly that persons of ordinary skill in the art will recognize from the disclosure that appellants invented processes including those limitations." Wertheim, 541 F.2d at 262, 191 USPQ at 96 citing In re Smythe, 480 F.2d 1376, 1382, 178 USPQ 279, 284 (CCPA 1973).

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The Examiner asserts (Answer, page 4) that, since silicon is the only impurity mentioned in the specification, there is no support for the claim language which, in the Examiner's interpretation, requires total impurity concentration to be less than $1 \times 10^{16} \text{ cm}^{-3}$ (claim 13) or less than $1 \times 10^{15} \text{ cm}^{-3}$ (claim 14). Our review of Appellants' disclosure, however, reveals that the formation of a GaAs crystal with the defined impurity concentrations is clearly set forth, for example, at page 10, line 4 and page 12, line 6. We agree with Appellants that there is nothing in their disclosure that would limit the impurity concentration to silicon. In our opinion, Appellants have satisfied the statutory written description requirement because they were clearly in possession of the invention at the time of filing of the application. Therefore, we do not sustain the rejection of claims 13 and 14 under the first paragraph of 35 U.S.C. § 112.

We next consider the Examiner's 35 U.S.C. § 102(b) rejection of claims 11-14 as being anticipated by Gandhi. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as

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well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert. dismissed, 468 U.S. 1228 (1984); W.L. Gore and Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

With respect to independent claims 11 and 12, the Examiner attempts (Answer, pages 5 and 6) to read the various claim limitations on the Gandhi reference. In particular, the Examiner points to the disclosure at page 87 of Gandhi which suggests a particular range of melt temperature variation during crystal growth. In the Examiner's line of reasoning, this temperature control criteria will inherently produce a GaAs crystal which would satisfy the particular claimed silicon atom density and lattice constant inequality relationship requirement.

After reviewing the disclosure of Gandhi in light of the arguments of Appellants and the Examiner, we are in agreement with Appellants that the Examiner's conclusion of inherency is lacking of any support on the record. To establish inherency,

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evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference and would be recognized as such by persons of ordinary skill.

In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) citing Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991).

"Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient."

Id. citing Continental, 948 F.2d at 1269, 20 USPQ2d at 1749.

As correctly asserted by Appellants (Brief, page 16), Gandhi describes a crystal growing process in which the temperature of the melt is maintained constant (within a tolerance range of plus or minus $\frac{1}{2}$ °C) over the duration of the crystal growing process. In Appellants' disclosed crystal growing process, on the other hand, the temperature of the melt is intentionally varied over time, i.e. the rate of change of the melt temperature is controlled to reduce the magnitude of lattice distortions to satisfy the claimed inequality relationship. In our view, since the crystal growing processes described by Gandhi and Appellants are so

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fundamentally different, the Examiner's conclusion that Gandhi's process will produce a crystal which satisfies the claimed relationships can only be based on unfounded speculation. Accordingly, since all of the claimed limitations are not disclosed by Gandhi, or inherent therein, the Examiner's rejection under 35 U.S.C. § 102(b) of independent claims 11 and 12, as well as claims 13 and 14 dependent thereon, is not sustained.

Turning to the Examiner's separate rejection of claims 11-14 as being unpatentable under 35 U.S.C. § 103 over the combination of Gandhi and Sze, we do not sustain this rejection as well. As the basis for this rejection, the teachings of Sze, which provide a chart linking resistivity to impurity concentration, have been added to Gandhi to buttress the Examiner's assertion of the inherency of Gandhi's disclosed crystal growing process in producing a GaAs crystal as claimed.

We agree with Appellants, however, that the teachings of Sze do not cure the deficiencies of Gandhi for all of the reasons discussed supra. In our view, the limited showing of a resistivity-impurity concentration link provided by Sze,

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does not add any support for the Examiner's unfounded conclusion that Gandhi's crystal growing process will inherently produce a GaAs crystal with a particular lattice constant distribution which would satisfy the inequality relationship as recited in the claims on appeal. Therefore, since all of the limitations of the appealed claims are not taught or suggested by the prior art, the Examiner has not established a prima facie case of obviousness. Accordingly, the Examiner's 35 U.S.C. § 103 rejection of claims 11-14 is not sustained.

With respect to dependent claim 15 which is limited to a particular wafer diameter dimension of "at least 5 cm", the Examiner has added Clarke to the basic combination of Gandhi and Sze. It is apparent, however, from page 7 of the Answer, that the Examiner has relied on Clarke for the limited teaching of disclosing the availability of 2 to 3 inch diameter (i.e. "at least 5cm") wafers. We find nothing, however, in the disclosure of Clarke which overcome the deficiencies of Gandhi or Sze discussed supra. Therefore, the Examiner's obviousness rejection of dependent claim 15 is not sustained.

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In summary, we have not sustained any of the Examiner's rejections of the claims on appeal. Therefore, the decision of the Examiner rejecting claims 11-15 is reversed.

REVERSED

JOSEPH F. RUGGIERO)
Administrative Patent Judge)
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JOSEPH L. DIXON
Administrative Patent Judge

ANITA PELLMAN GROSS
Administrative Patent Judge

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DECISION: REVERSED
Send Reference(s): Yes No
or Translation (s)
Panel Change: Yes No
Index Sheet-2901 Rejection(s):
Prepared: December 20, 2001

Draft Final

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PALM / ACTS 2 / BOOK
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