

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. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte
LI-SHUN WANG
and JOHN CHU

Appeal No. 2003-1280
Application No. 09/476,633

ON BRIEF

Before LIEBERMAN, KRATZ and POTEATE, Administrative Patent Judges.

LIEBERMAN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner refusing to allow claims 1 through 4 and 6 through 28 which are all the claims pending in this application.

THE INVENTION

The invention is directed to a method for removing a particle from the surface of a metal plug in a via by polishing the metal layer and rinsing the surface of the metal plug with hydrogen peroxide. The rinse removes at least one particle from the surface of the metal plug. Additional limitations are described in the following illustrative claims.

THE CLAIMS

Claims 1, 6 and 23 are illustrative of appellants' invention and are reproduced below.

1. A method of removing a particle from a surface of a metal plug formed in a via comprising:

introducing a first agent to a metal layer;

polishing the metal layer with the first agent;

after polishing the metal layer, introducing a second agent comprising hydrogen peroxide to rinse the surface of the metal plug; and

removing at least one particle from the surface of the metal plug.
6. The method of claim 1, wherein introducing the second agent comprises introducing a second agent of approximately 4% by volume or less of hydrogen peroxide.
23. A method of removing a particle from a surface of a metal plug formed in a via comprising:

introducing a first agent to a metal layer;

polishing the metal layer with the first agent; and

after polishing the metal layer, introducing a second agent consisting of hydrogen peroxide to rinse the surface of the metal plug.

THE REFERENCES OF RECORD

As evidence of obviousness, the examiner relies upon the following references:

Kishii et al. (Kishii)	6,159,858	Dec. 12, 2000
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THE REJECTIONS

Claims 23 through 25 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.¹

Claims 1 through 4, 7, 9 through 12, 15, 18, 19 and 26 through 28 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Kishii.²

Claims 6, 8, 13, 14, 17 and 20 through 22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kishii.

OPINION

We have carefully considered all of the arguments advanced by the appellants and the examiner and agree with the examiner that the rejection of the claims under §§§

¹The rejection of claim 26 is no longer maintained by the examiner. See Answer, page 4.

²Although claim 5 is included in the statement of the rejection, claim 5 was canceled by an amendment received October 10, 2000.

102(e), 103(a) and 112, first paragraph are well founded. Accordingly, we affirm each of the rejections for the reasons in the Answer and as discussed herein.

As an initial matter, it is the appellants position that, “[c]laims be grouped as follows:

Group I: claims 1-4, 6-22 and 27-28; and

Group II: claims 23-26.” See Brief, page 3. Accordingly, we select claims 1 and 23 as representative of the claimed subject matter. We also select claim 6 as representative of the rejection under § 103(a) and limit our consideration to the three enumerated claims. See 37 CFR §1.192(c)(7) (2001).

The Rejection under § 112

It is well settled that a specification complies with the 35 U.S.C. § 112, first paragraph, written description requirement if it conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, the inventor was in possession of the invention. See Vas-Cath, Inc. v. Mahurkar, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991); In re Kaslow, 707 F.2d 1366, 1375, 217 USPQ 1089, 1096 (Fed. Cir. 1983); In re Edwards, 568 F.2d 1349, 1351-52, 196 USPQ 465, 467 (CCPA 1978); In re Wertheim, 541 F.2d 257, 262, 191 USPQ 90, 96 (CCPA 1976).

It is the examiner’s position that, “[t]here is no description in the specification as originally filed of the used [sic, use] of hydrogen peroxide only.” See Answer, page 4. We agree with the examiner’s position.

There are numerous references to hydrogen peroxide throughout the specification. We find that “[a] rinsing solution comprising hydrogen peroxide is introduced.” See specification page 4. We find that, “[f]igure 6 shows that the particle has been removed by using a solution comprising hydrogen peroxide.” See specification, page 5, lines 17-18. We find that, “the wafer has been rinsed with a solution containing hydrogen peroxide.” We further find that similar disclosure appears on page 7, lines 7 and 9, page 9, lines 1-10 and page 12, lines 1-2.

In a further description, we find that, “[i]n one embodiment, the rinsing solution comprises approximately 4% by volume of hydrogen peroxide, and generally comprises hydrogen peroxide in the approximate range of 2% to 4.5%. The upper limit of hydrogen peroxide concentration is that amount that removes too much of metal layer 44 such that the reliability of the wafer is affected. The remainder of the rinse contains deionized water.” See specification, page 8, lines 15-19.

Claim 25 limits the agent to, “consisting of hydrogen peroxide.” Similarly claims 26 and 27 limit the rinse to, “a solution consisting of hydrogen peroxide.” Generally, the appellants have the right to insert the transitional language “consisting of” to a component of the claimed subject matter or to the claimed subject matter as a whole. It is necessary however to consider the effect of the transitional language on the meaning of the claimed subject matter. The term “consisting of” closes the phrase to the presence of any additional components other than “hydrogen peroxide.” Thus claim 23 requires that only pure

hydrogen peroxide be present in the absence of any other components. There is however, no written description in the specification corresponding to the utilization of pure hydrogen peroxide. Similarly, claims 24 and 25 contain inconsistent language as a “solution consisting of hydrogen peroxide” may not have any solvent present, i.e. water. Hence there is a paradox present in the language utilized by the appellants. A solution consisting of one component cannot be a solution as the solvent is barred by the language of the claimed subject matter.

Based upon the above findings and analysis, the rejection of the examiner under § 112, first paragraph is sustainable.

The Rejection under § 102(e)

In order for a claimed invention to be anticipated under 35 U.S.C. § 102(b), all of the elements of the claim must be found in one reference. *Scripps Clinic & Research Found v. Genentech Inc.*, 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991).

It is the appellants’ position that, “Kishii does not disclose rinsing the surface of a plug; only cleaning of a substrate using a cleaning solution containing acid, hydrogen peroxide and water” See Brief, page 5. We disagree with the appellants’ characterization. Exhibit B relied upon by the appellants’ describes “rinsing” as a, “process in which [a] wafer is immersed in deionized water in order to stop chemical reactions initiated during preceding operation and to remove products of these reactions from the surface.” See Brief, pages 5 and 6.

By the appellants' own definition, the method utilized in the claimed subject matter, fails to comply with the definition submitted in Exhibit B. The claimed subject matter requires the presence of hydrogen peroxide as an indispensable component utilized in the method claimed by the appellants. Hydrogen peroxide is not an innocuous neutral agent. It is a well known oxidizing agent which is stabilized by the presence of mineral acid.³ We conclude that one of ordinary skill in the art would expect the hydrogen peroxide to chemically interact with at least one particle of the debris present following the polishing step. Accordingly, little weight is given to the difference between the term "rinse" as it appears in the claimed subject matter, as opposed to the word "clean" as it appears in Kishii inasmuch as both utilize hydrogen peroxide in their respective processes.

With respect to the disclosure of Kishii, we find that Kishii is directed to a process of fabricating a semiconductor device wherein the process includes a polishing step followed by a cleaning step. See column 3, line 29 - column 4, line 34. We find that present in the cleaning step is a mixture of water, hydrogen peroxide and mineral acid in a volumetric ratio of 48:1:1 respectively. See column 9, lines 6-23 and column 14, lines 53-59. Kishii teaches that "the present invention can effectively minimize the remaining particles" See column 4, lines 18-19. We further find that, "any residual abrasive remaining in the substrate can be removed easily by an acid cleaning process." See column 14, lines 53-57. Accordingly, we conclude that the process of Kishii removes at least one particle

³The Merck Index, 9th Ed. P. 633, Merck & Co., Inc., (1976)

from the surface of a semiconductor. We further agree with the examiner's findings that the particle is removed from the surface of a metal plug. See Answer, page 3.

With respect to claim 1, representative of the claims which have been rejected as anticipated by Kishii, the claimed subject matter is directed to "a second agent comprising hydrogen peroxide." The term "comprising" is open to the presence of additional components. Accordingly, the presence of both water and a mineral acid as disclosed by Kishii is not precluded by the claimed subject matter, particularly since mineral acid is known to stabilize hydrogen peroxide as determined *supra*.

Based upon the above findings and analysis, we conclude that the disclosure and teachings of Kishii are sufficient to anticipate the claimed subject matter.

The Rejection under § 103 (a)

With respect to the rejection under § 103(a), we have previously selected claim 6 as representative of the claimed subject matter. The aforesaid claim is directed to "a second agent of approximately 4% by volume or less of hydrogen peroxide." We find that Kishii discloses that, "the concentration of H₂O₂ in the cleaning process is less than 2%" See column 4, lines 29-31. We further find that, "a cleaning solution containing HCl, H₂O₂ and H₂O with a volumetric ratio of 1:1:48 may be used. . . ." in the cleaning process which corresponds to a 2% by volume hydrogen peroxide. See column 14, lines 57-59. The 2% by volume hydrogen peroxide meets the requirements of claim 6. Accordingly, we affirm the rejection under § 103(a).

DECISION

The rejection of claims 23 through 25 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention is affirmed.

The rejection of claims 1 through 5, 7, 9 through 12, 15, 18, 19 and 26 through 28 under 35 U.S.C. § 102(e) as being anticipated by Kishii is affirmed.

The rejection of claims 6, 8, 13, 14, 17 and 20 through 22 under 35 U.S.C. § 103(a) as being unpatentable over Kishii is affirmed.

The decision of the examiner is affirmed.

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

AFFIRMED

PAUL LIEBERMAN
Administrative Patent Judge

LINDA R. POTEATE
Administrative Patent Judge

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KRATZ, Administrative Patent Judge, concurring-in-part and dissenting-in-part.

I concur with the majority's decision to the extent they have affirmed the examiner's decision to reject claims 1-5, 7, 9-12, 15, 18, 19 and 26-28 under 35 U.S.C. § 102(e) as anticipated by Kishii and to reject claims 6, 8, 13, 14, 17 and 20-22 under 35 U.S.C. § 103 as unpatentable over Kishii. However, I respectfully dissent from the majority's decision to affirm the examiner's rejection of claims 23-25 as lacking descriptive support within the meaning of the first paragraph of 35 U.S.C. § 112.

With regard to written descriptive support, all that is required is that appellants' specification reasonably conveys to one of ordinary skill in the art that as of the filing date of the application, appellants were in possession of the presently-claimed invention; how the specification accomplishes this is not material. See In re Kaslow, 707 F.2d 1366, 1375, 217 USPQ 1089, 1096 (Fed. Cir. 1983); In re Edwards, 568 F.2d 1349, 1351-2, 196 USPQ 465, 467 (CCPA 1978).

"[T]he PTO has the initial burden of presenting evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined

by the claims.” In re Wertheim, 541 F.2d 257, 263, 191 USPQ 90, 97 (CCPA 1976).

"Precisely how close the original description must come to comply with the description requirement of § 112 must be determined on a case-by-case basis." Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1562, 19 USPQ2d 1111, 1116 (Fed. Cir. 1991).

Here, the examiner (answer, page 4) urges that :

[t]here is no description in the specification as originally filed of the use of hydrogen peroxide only. There is only seen support for hydrogen peroxide and nitric acid (Page 8, lines 1-2) and hydrogen peroxide and deionized water (Page 8, lines 15-19).

However, a review of claim 23 reveals that appealed method claim does not require the use of hydrogen peroxide only but rather requires that a second agent consisting of hydrogen peroxide is introduced. The last sentence of the first paragraph of page 9 of appellants' specification taken together with the second paragraph of page 7 of the specification reasonably describes such a step. Also, see, e.g., original claims 18 and 19. Moreover, with respect to claims 24 and 25, as urged by appellants (reply brief, page 3), one of ordinary skill in the art would understand that the claim language "solution" implies a solvent in addition to the specified solute. Furthermore, to the extent that the recited "consisting of" language may have been considered inconsistent with such a claim construction as urged by appellants that concern would raise an issue under the second

paragragh of 35 U.S.C. § 112, not the first paragraph.

The examiner simply has not made the case as to why the method of claims 23-25 would have been construed as describing possession of a new concept or invention not conveyed by the original disclosure.

Consequently, I would reverse the examiner's stated rejection under 35 U.S.C. § 112, first paragraph.

PETER KRATZ
Administrative Patent Judge

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