

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JINRU BIAN

Appeal 2008-3625
Application 10/396,013
Technology Center 1700

Decided: September 29, 2008

Before CHUNG K. PAK, CHARLES F. WARREN, and
PETER F. KRATZ, *Administrative Patent Judges*.

KRATZ, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1-7, 11, and 12. We have jurisdiction pursuant to 35 U.S.C. § 6.

Appellant's claimed invention is directed to a chemical mechanical planarization (CMP) solution. Claims 1 and 5 are illustrative and reproduced below:

1. A chemical mechanical planarization solution useful for removing a tantalum barrier material from a semiconductor wafer comprising by weight percent 0.02 to 15 inhibitor for a nonferrous metal, 0 to 20 complexing agent for the nonferrous metal, 0.01 to 12 tantalum removal agent selected from the group consisting of formamidine, formamidine salts, formamidine derivatives, guanidine, guanidine derivatives, guanidine salts and mixtures thereof, 0 to 5 abrasive, 0 to 15 particles selected from the group consisting of polymeric particles and polymer-coated coated particles and balance water and the solution being oxidizer free, a pH greater than 5 to 12 and has a tantalum nitride to TEOS selectivity of at least 3 to 1 as measured with a microporous polyurethane polishing pad pressure measured normal to a wafer of less than 20.7 kPa.

5. A chemical mechanical planarization solution useful for removing a tantalum barrier material from a semiconductor wafer comprising by weight percent 0.02 to 10 inhibitor for a nonferrous metal, 0 to 10 complexing agent for the nonferrous metal, 0.1 to 10 tantalum removal agent selected from the group consisting of formamidine, formamidine salts, formamidine derivatives, guanidine, guanidine derivatives, guanidine salts and mixtures thereof, 0 to 0.09 abrasive, 0 to 10 particles selected from the group consisting of polymeric particles and polymer-coated coated particles and balance water and the solution being oxidizer free with a pH greater than 5 to 12.

The Examiner relies on the following as evidence in rejecting the appealed claims:

Lee	6,436,834 B1	Aug. 20, 2002
Bian	7,241,725 B2	Jul. 10, 2007
Lee ('662)	EP 1 072 662 A1	Jan. 31, 2001
Wang	WO 01/12740 A1	Feb. 22, 2001

Claims 1-7, 11, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee (EP '662) in view of Wang. Claims 1-7, 11, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee '834 in view of Wang. Claims 1-7, 11, and 12 stand rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-6 of U.S. Patent No. 7,421,725.

We reverse the obviousness rejections under 35 U.S.C. § 103(a). We affirm the obviousness-type double patenting rejection. Our reasoning follows.

Starting with the rejections under 35 U.S.C. § 103(a), we note that all of the appealed claims require a CMP solution that includes, among other possible ingredients: a specified amount of a non-ferrous metal inhibitor; a specified amount of tantalum removal agent selected from a small group of compounds, including guanidine, guanidine derivatives, guanidine salts, formamidine, its salts and derivatives, and a mixture thereof; water; and with the further proviso that the pH of the solution is greater than 5-12¹, and which solution is free of oxidizer. Appealed claim 1 and the claims which depend therefrom further require a specified selectivity ratio and all of the other appealed claims require that the maximum amount of abrasive in the solution is 0.09 weight percent or less.

¹ For purposes of deciding this appeal and in giving the claims a broadest reasonable construction when read in light of the Specification, we construe the recited pH range of greater than 5 to 12 to require a pH greater than 5. In so doing, we note that Appellant refers to Specification paragraphs 15 and 16 in the Summary of the Claimed Invention as set forth in the Appeal Brief (App. Br. 3).

The Examiner has determined that Lee (EP '662) discloses a CMP composition that can include, *inter alia*, an abrasive and an abrasion accelerator, which accelerator can be selected to be formamidine or a derivative structure and/or guanidine carbonate (Ans. 4-5; Lee (EP '662) ¶¶ 0010 and 0016). The aforementioned disclosed accelerator component materials of Lee (EP '662) are encompassed by Appellant's claimed tantalum removal agent. The Examiner has found that Lee (EP '662) does not require the presence of an oxidizer (Ans. 4). Lee (EP '662) discloses that the CMP composition can include water as an additive and can be employed at acid, neutral, or basic (alkaline) conditions, which latter disclosure is reasonably suggestive of pH requirements for the CMP composition of Lee (EP '662) that correspond to the claimed pH requirements for Appellant's CMP solution (Lee (EP '662), ¶¶ 0014 and 0018).

Similarly, the Examiner has correctly found that Lee '834 discloses or suggests a CMP composition that includes an abrasive and an accelerator therefore, which accelerator can be selected to be formamidine, guanidine, and/or salts or derivatives thereof (Ans. 6-7; Lee '834, col. 3, l. 65-col. 4, l. 6 and col. 5, ll. 7-27). The Examiner notes that Lee '834 can include an oxidizer (Ans. 6), which disclosed optional ingredient suggests the absence of the oxidizer as another option (Lee '834 col. 5, ll. 51-61). Likewise, Lee '834 provides disclosure that is reasonably suggestive of forming the CMP composition with a pH property that would correspond with Appellant's claimed pH requirements (Lee '834, col. 4, ll. 60-64 and col. 5, ll. 46-50).

Aside from the independent claim 1 functional requirement for the selectivity of the claimed solution and the independent claim 5 requirement

for a 0.09 weight percent or lesser amount of abrasive as claimed features that are separately contested as alleged distinctions for the solution of the two independent claims on appeal, there is another argued distinction for all of the appealed claims. The Examiner acknowledges that this argued distinction, the claimed requirement for a nonferrous metal inhibitor and specified amount thereof, differentiates Appellant's claimed solution from either of the applied Lee patent documents taken alone (Ans. 4-7). The requirement for a nonferrous metal inhibitor and a specified amount thereof, as part of the oxidizer free CMP solution, is required by all of Appellant's appealed claims.

To address this latter argued difference of the subject matter required by all of the rejected claims over that disclosed by either applied Lee patent document, the Examiner turns to Wang in both of the obviousness rejections before us.

Wang discloses a system for polishing at least one layer of a multi-layer substrate, including a first metal layer and a second layer (Wang 1). The polishing system includes a liquid carrier, at least one oxidizing agent, and at least one polishing additive that increases the rate of polishing at least one layer of the substrate (Wang 3, ll. 20-32). Wang discloses a variety of other additions that can optionally be employed as part of the oxidant – containing polishing system. These additives to the system include, *inter alia*, a stopping compound, an abrasive and/or polishing pad, polymeric compounds that reduce polishing rates, pH adjustors, binders, stabilizers, surfactants, buffers, and passivating film-forming additives (Wang 7-10). The last mentioned passivating material can be selected to be a triazole compound, such as benzotriazole (BTA) (Wang 10, ll. 21-37).

BTA is one of the materials that Appellants disclose as being functional as a nonferrous metal inhibitor for their claimed CMP solution (Spec. ¶ 0018).

For the first stated § 103(a) rejection, the Examiner takes the position that:

In view of the primary reference teaching that conventional additives can be added to the composition, it is the examiner[']s position that this provides motivation to add an azole component because this is a conventional additive, as shown by the secondary reference. It is the examiner[']s position that this component will not adversely affect the composition of the primary reference and therefore the use of this material is well within the scope of the skilled artisan and teachings of the primary reference.

Ans. 5.

The Examiner takes a substantially similar position with respect to combining Wang (secondary reference) with Lee '834 (primary reference) in asserting the obviousness of adding an azole component to the CMP composition of Lee '834 in the second stated § 103(a) rejection (Ans. 7).

However, we agree with Appellant that the Examiner has not fairly established a prima facie case of obviousness based on the Examiner's conclusions as to the combinability of a selected polishing system passivation film forming component from the oxidizing agent-containing polishing system of Wang as an additive for the oxidizer free alternative CMP composition of either of the applied Lee references (App. Br. 5-11).

After all, the Examiner bears the initial burden, on review of prior art or on any other ground, of presenting a prima facie case of unpatentability. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

In this regard, “a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007). “[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

Here, the Examiner has not reasonably articulated why one of ordinary skill in the art would have turned to the oxidizer-containing formulations for polishing any of the variety of multi-layer substrates taught by Wang for selecting an optional passivating film forming component thereof as another ingredient to be added to the oxidizer- free version of the abrasion accelerator- containing CMP compositions of either Lee reference. The generalized notation in each of the Lee references that other conventional ingredients that do not cause any adverse effects with regard to their abrasion oriented composition may be included therein is not sufficient.. Indeed, as pointed out by Appellant, this asserted presentation in each of the applied Lee references is followed by a teaching that the optional addition of a small amount of oxidant to the composition of each Lee reference is the principal additive that is being referred to as the conventional ingredient additive for the otherwise oxidant-free CMP solutions of these references; or, in the alternative, such oxidant addition was referred to as an adjunct to any other conventional ingredient additive that each Lee reference may have been suggesting (App. Br. 5-9; Lee (EP ‘662), ¶ 0019; Lee ‘834, col. 5, ll. 51-61).

The Examiner has not reasonably explained why one of ordinary skill in the art would have plucked out a disclosed optional passivating film forming material from the disparate oxidant-containing polishing system of Wang for use in an oxidant-free alternative of the abrasion acceleration agent containing CMP composition of either Lee reference based on the generalized reference to conventional additives, such as the oxidant additives that are furnished in each Lee reference. In other words, the Examiner has not supported the notion that a selected passivation agent from Wang would have been recognized by one of ordinary skill in the art as an applicable additive to a non-oxidative agent containing CMP composition formulation in accordance with either Lee reference, particularly as it relates to the formulation of a composition that would possess all of required features of any of the rejected appealed claims.

Thus, in making the assertions set forth in the Answer, the Examiner has seemingly taken at least some of the applied references' disclosures out of context without providing persuasive reasoning to support the contention that the combination thereof would have led one of ordinary skill in the art to the here claimed subject matter.

Rejections based on § 103(a) must rest on a factual basis with these facts being interpreted without hindsight reconstruction of the invention from the prior art. *See In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967), *cert. denied*, 389 U.S. 1057 (1968). Here, the Examiner's basis for the rejection falls short of identifying a rationale that, *prima facie*, would have led an ordinarily skilled artisan to combine selected features from each reference in a way that would have resulted in a CMP solution corresponding to the claimed solution. *See KSR*, 127 S. Ct. at 1741.

We need not reach the Declaration of Jinru Bian, under 37 C.F.R. § 1.132, that was proffered in rebuttal by Appellant in reaching our Decision.

It follows that we shall reverse both of the Examiner's § 103(a) rejections.

Our disposition of the Examiner's obviousness-type double patenting rejection of all of the appealed claims over claims 1-6 of U.S. Patent No. 7,241,725 is another matter. At the outset, we note that the rejected claims are not separately argued. We select appealed claim 5 as representative.

Appellant contends that the appealed claims require an oxidizer free CMP solution that allows for a high tantalum nitride to TEOS selectivity under specified polishing conditions whereas claims 1-6 of U.S. Patent No. 7,241,725 require an abrasive- free composition (Supp. App. Br. 1).

However, as the Examiner essentially contends (Ans. 8), the appealed claims are not patentably distinct from claims 1-6 of U.S. Patent No. 7,241,725 on this basis. In this regard, for example, claim 1 of the aforementioned U.S. Patent is drawn to a polishing fluid capable of removing tantalum-containing barrier materials that does not require an oxidizer component, includes 00025 - 2 weight percent of BTA (an azole inhibitor) and a nitrogen-containing imine compound ingredient (guanidine compound), and which patented claim 1 is not required to be abrasive-free. Also, the appealed claims do not require an abrasive as evidenced by the zero amount lower limit for abrasive in appealed claim 5. Moreover, given these commonalities between the appealed claims and the claims of the aforementioned U.S. Patent, it would reasonably be expected that tantalum barrier materials, such as tantalum nitride, would be preferentially removed compared to other materials such as TEOS while polishing with a fluid

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composition as claimed in U.S. Patent No. 7, 421,725, to the extent the appealed claims require such a characteristic for the claimed CMP solution.. Consequently, we are not persuaded of reversible error in the obviousness-type double patenting rejection under consideration based on the assertions made in the Supplemental Examiner's Answer.

On this record, we shall affirm the Examiner's obviousness type double patenting rejection of the appealed claims.

CONCLUSION

The decision of the Examiner to reject claims 1-7, 11, and 12 under 35 U.S.C. § 103(a) as being unpatentable over Lee (EP '662) in view of Wang and to reject claims 1-7, 11, and 12 under 35 U.S.C. § 103(a) as being unpatentable over Lee '834 in view of Wang is reversed.

The decision of the Examiner to reject claims 1-7, 11, and 12 under the judicially created doctrine of obviousness-type double patenting over claims 1-6 of U.S. Patent No. 7,421,725 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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