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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RIKA TANAKA

Appeal 2015-004855
Application 13/124,948
Technology Center 1700

Before KAREN M. HASTINGS, GEORGE C. BEST, and
N. WHITNEY WILSON, *Administrative Patent Judges*.

BEST, *Administrative Patent Judge.*

DECISION ON APPEAL

The Examiner finally rejected claims 1–3, 6, and 12 of Application 13/124,948 under 35 U.S.C. § 103(a) as obvious. Final Act. 5–8 (April 8, 2014). Appellant[1] seeks reversal of this rejection pursuant to 35 U.S.C. § 134(a). We have jurisdiction under 35 U.S.C. § 6(b).

For the reasons set forth below, we AFFIRM.

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[1] Nitta Haas Inc. is identified as the real party in interest. Appeal Br. 2.

BACKGROUND

The ’948 Application describes a composition and a method used for Chemical Mechanical Polishing (CMP) of multi-layer wirings on a semiconductor. Spec. 1:9–12; 3:6–10. The Specification describes the claimed invention as providing improved polishing speeds and control over the selection of such speeds when multiple layers are simultaneously polished. *Id.* at 2:16–20; 3:7–9; and 6:5–8.

Claims 1 and 6 are representative of the ’948 Application’s claims and are reproduced below from the Claims Appendix to the Appeal Brief:

> 1. A composition for polishing silicon nitride, comprising:
>
> 1) colloidal silica;
>
> 2) a polishing aid composed of a phosphoric acid compound and a sulfuric acid compound; and
>
> 3) an oxidizing agent, the content of which is more than 0 wt% and at most 0.17 wt%, wherein a pH of said composition for polishing silicon nitride is in a range from 1.5 to 5.5.
>
> 6. A method of controlling a selectivity using the composition for polishing silicon nitride comprising:
>
> 1) colloidal silica;
>
> 2) a polishing aid composed of a phosphoric acid compound and a sulfuric acid compound; and
>
> 3) an oxidizing agent, the content of which is more than 0 wt% and at most 0.17 wt%,
>
> wherein a first selectivity and a second selectivity being controllable depending on a content of said oxidizing agent and a pH of said composition for polishing silicon nitride, said first selectivity representing a ratio of a polishing speed for a metal layer to a polishing speed for a silicon nitride layer and said second selectivity representing a ratio of a polishing speed for

> an oxide insulating layer to a polishing speed for a silicon nitride layer,
>
> wherein said first selectivity is controlled depending on the content of said oxidizing agent,
>
> said second selectivity is controlled depending on the pH of said composition for polishing silicon nitride,
>
> said content of said oxidizing agent is set to a first content when said first selectivity is set to a first value, while said content of said oxidizing agent is set to a second content that is greater than said first content when said first selectivity is set to a second value that is greater than said first value, and
>
> said pH of said composition for polishing silicon nitride is set to a first pH value when said second selectivity is set to a third value, while said pH of said composition for polishing silicon nitride is set to a second pH value that is smaller than said first pH value when said second selectivity is set to a fourth value that is greater than said third value.

Appeal Br. 20–22.

REJECTION

On appeal, the Examiner maintains the following rejection:

1. Claims 1–3, 6, and 12 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Dysard[2] and Lee.[3] Final Act. 5.

DISCUSSION

Appellant argues for the reversal of the obviousness rejection to claims 1–3, 6, and 12 on the basis of limitations present in independent

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[2] US 2007/0298612 A1, published Dec. 27, 2007.

[3] US 8,043,970 B2, issued Oct. 25, 2011.

claims 1 and 6. *See* Appeal Br. 8–18; Reply Br. 4. We, therefore, limit our analysis to claims 1 and 6. Claims 2, 3, and 12 will stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

Rejection 1. The Examiner rejected claims 1–3, 6, and 12 as obvious over the combination of Dysard and Lee. Final Act. 5.

The Examiner found that Dysard describes or suggests every limitation of the composition recited in claims 1 and 6 except that: (i) Dysard is silent as to the limitation concerning a polishing aid composed of phosphoric acid and sulfuric acid compounds, *id.*, and (ii) Dysard does not teach the requisite amount of oxidizing agent. *Id.* at 6.

Regarding (i), the Examiner found that the prior art discloses, *inter alia*, that Dysard's composition includes at least one acidic component having a pKa in the range of about 1 to about 4.5. *Id.* at 5 (citing Dysard ¶ 22; claims 1 and 7). The Examiner determined, therefore, that it would have been obvious for the ordinary skilled artisan "to modify [Dysard's] at least one acidic component . . . to include two acidic components having a pKa in the range of 1 to about 4.5, such as phosphoric acid and sulfuric acid, because the composition is not limited to a single acid component, as taught by Dysard[]." Final Act. 5–6 (citing Dysard ¶ 22; claims 1 and 7).

With regard to (ii), the Examiner found that Dysard "defines the amount of oxidizing agent to be a result effective variable to oxidize one or more selected metallic material or semiconductor materials[]." Final Act. 6 (citing Dysard ¶ 27). The Examiner further found that

> Lee discloses slurry compositions for selectively polishing silicon nitride relative to silicon oxide[], comprising: polyacrylic acid as a first agent; peroxide compound as a second [oxidizing] agent; the second agent may suppress polishing of silicon oxide and increase the polishing selectivity

> of silicon nitride; the amount of the second agent may be in a range of about 0.1 to about 30 wt.%; slurry composition may have a pH of about 1 to about 4 . . . .

Final Act. 6 (citing Lee Abstract; 5:10–7:25; Figs. 14–15).

The Examiner determined that it would have been obvious to the ordinary skilled artisan "to modify [Dysard's] oxidizing agent[] to be within the range of [Lee's] oxidizing agent[] in order to optimize the selectivity of the polishing solution[]." Final Act. 6 (citing Lee 5:10–7:25, Figs. 14–15; Dysard ¶ 27).

With respect to claim 6, the Examiner further found Dysard teaches that "the formulation and pH of the CMP composition can be varied to vary the silicon nitride removal rate[]." Ans. 6 (citing Dysard ¶ 34; *see also* ¶ 35). Under the Examiner's claim construction, the invention "only requires that increased oxidation amounts result in an increased polishing selectivity of metal to silicon nitride (second value greater than first value)." Ans. 4. Thus, the Examiner determined that "the claim can be met by an increase in both the metal polishing rate and silicon nitride rate, as long as the increase in removal rate of the metal is greater than the increase in the removal rate of silicon nitride and the selectivity ratio thereby increases." *Id.* at 4–5.

The Examiner concludes that

> one of ordinary skill in the art would expect the selectivity and polishing rate to be controlled by the amount of the oxidizing agent . . . and would optimize the amount of oxidizing agent to "a sufficient amount[]," in order to obtain a desired removal rates or selectivities for metallic and semiconductor materials, without unexpected results.

Ans. 6 (citing Lee Figs. 14, 15; Dysard ¶¶ 4, 27, 34, and Example 6).

Appellant argues that this rejection should be reversed because: (1) Dysard and Lee "attempt to solve different and opposite problems, which means that there is no reason for a person of ordinary skill in the art to employ the teachings of Lee to solve the problem of Dysard," Appeal Br. 11; (2) the Examiner's applied prior art teaches away from the proposed combination because Dysard does not identify what result is achieved by varying the amount of oxidizing agent and Lee exemplifies achieving selectivity by increasing the amount of oxidizing agent above 1%, *id.* at 12–15; and (3) the Specification provides evidence of unexpected results demonstrating the ability to independently control the first selectivity and second selectivity. *Id.* at 15–18.

First, Appellant's argument (1) is not persuasive because the applied prior art's teachings do not preclude the ordinary skilled artisan, at the time of the invention, from noting that the oxidizing agent amount and pH of the CMP composition can be varied to vary the silicon nitride removal rate relative to other layers. Thus, the ordinarily-skilled artisan would have considered the whole of Dysard's disclosure regarding oxidizing metallic or semiconductor layers with an oxidizing agent and realized that a peroxide may suppress silicon oxide polishing while increasing the polishing selectivity of silicon nitride, according to Lee's teachings.[4] *In re Preda*, 401

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[4] Appellant argues that "for the first time [in the Answer], the Examiner turns to Kurata et al. (US 20050181609 Al)[, published Aug. 18, 2005]" and "[t]he newly cited Kurata highlights the improperness of the appealed rejection." Reply Br. 4 (citing Ans. 4). We, however, discern no reversible error in the Examiner's reliance on Kurata as evidentiary support "that increased oxidizing amounts results in increased removal rates of metallic materials." Ans. 4. Kurata was already present in the record evidence. *See* Final Act. 4 (April 8, 2014); *see also* Non-Final Act. 4 (Oct. 24, 2012).

F.2d 825, 826 (CCPA 1968) ("[I]n considering the disclosure of a reference, it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom.").

Furthermore, the allegedly disparate problems addressed by each of the references in the Examiner's applied prior art are not dispositive to the question of obviousness. *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005) ("One of ordinary skill in the art need not see the identical problem addressed in a prior art reference to be motivated to apply its teachings."); *see also In re Oetiker*, 977 F.2d 1443, 1448 (Fed. Cir. 1992) (Nies, C.J., concurring).

Second, we are likewise not persuaded by Appellant's teaching away argument (2). Because Lee discloses a wt.% range of oxidizing agent that encompasses the claimed range, the Examiner correctly concluded that the claimed range was described or suggested by Lee. *See, e.g.*, *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) (a prima facie case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art); *In re Harris*, 409 F.3d 1339, 1341 (Fed. Cir. 2005); *In re Boesch*, 617 F.2d 272, 275 (CCPA 1980).

Third, Appellant argues that "[b]ecause the purpose of the oxidizing agent in Lee differs from that described in the present specification, and the fact that Dysard is silent regarding the purpose of the oxidizing agent, the results described in the present specification were unexpected." Appeal Br. 15.

Unexpected results must be established by clear and convincing evidence. *In re Heyna*, 360 F.2d 222, 228 (CCPA 1966) ("It was incumbent upon appellants to submit clear and convincing evidence to support their

allegation of unexpected property."); *see also McClain v. Ortmayer*, 141 U.S. 419, 429 (1891) (conclusive evidence needed to establish new function). For the reasons stated by the Examiner in the Answer, Appellant has not met his burden in providing clear and convincing evidence of unexpected results. *See* Ans. 9. The parameters tested are not commensurate in scope with the scope of the instant claims or the prior art reference. For example, Appellant has not provided evidence of unexpected results showing the criticality of the endpoints of 0 wt% to 0.17 wt%, of claim 1 and claim 6. Spec. 17:20–25; Figs. 6–11. Accordingly, Appellant's assertion of unexpected results is unconvincing. Thus, we affirm **Rejection 1**.

CONCLUSION

For the reasons set forth above, we affirm the rejection of claims 1–3, 6, and 12 of the '948 Application.

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