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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* YANG DU<sup>1</sup>

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Appeal 2015-007049  
Application 13/765,080  
Technology Center 2800

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Before MARK NAGUMO, CHRISTOPHER C. KENNEDY, and  
MONTÉ T. SQUIRE, *Administrative Patent Judges*.

KENNEDY, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's decision to reject claims 1–11, 21, and 23. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

BACKGROUND

The subject matter on appeal relates to three-dimensional integrated circuits (“3DIC”). *E.g.*, Spec. ¶ 2; Claim 1. Claim 1 is reproduced below from page 11 (Claims Appendix) of the Appeal Brief:

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<sup>1</sup> According to the Appellant, the real party in interest is Qualcomm Incorporated. Br. 2.

1. A three-dimensional (3D) integrated circuit (IC) (3DIC) comprising:
  - a substrate having a first tier of electronic components thereon;
  - a donor wafer portion having a second tier of electronic components thereon, wherein the donor wafer portion comprises a polished oxidized portion that is substantially free of ions introduced to the donor wafer portion during an ion cutting procedure and wherein the donor wafer portion is substantially free of surface deformation and without thermal diffusion of the ions; and
  - an oxide bond joining the substrate to the donor wafer portion.

#### ANALYSIS

Claims 1–11, 21, and 23 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the Appellant’s admitted prior art (“AAPA”) in combination with Guarini et al. (US 2004/0241958 A1, published Dec. 2, 2004).<sup>2</sup> The Appellant presents separate arguments for limitations that appear in claims 1 and 23. We limit our discussion to those claims. The remaining claims on appeal will stand or fall with claim 1.

After review of the cited evidence in the appeal record and the opposing positions of the Appellant and the Examiner, we determine that the Appellant has not identified reversible error in the Examiner’s rejection. Accordingly, we affirm the rejection for reasons set forth below, in the Final

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<sup>2</sup> In the Examiner’s Answer, the Examiner withdraws a rejection of claim 23 under 35 U.S.C. § 112, ¶ 2. Ans. 2. Additionally, we note that both the Final Action and the Answer list claim 22 as being subject to the § 103 rejection. *See* Final Act. 3; Ans. 2. Claim 22, however, has been canceled and is not before us in this appeal. *See, e.g.*, Claims dated Nov. 11, 2014; Br. 12 (Claims Appendix; listing claim 22 as canceled).

Action, and in the Examiner's Answer. *See generally* Final Act. 3–6; Ans. 2–3.

**Claim 1.**

The Examiner finds that the APA describes a 3DIC comprising each limitation of claim 1 except that the 3DIC of the APA does not comprise “a polished oxidized portion that is substantially free of ions,” as required by claim 1. Final Act. 3–4. The Examiner finds that Guarini teaches:

the steps of oxidation and CMP “to reduce the root mean square (RMS) surface roughness” “to reduce the concentration of OH groups on the surface of the low temperature oxide layer” “to prevent any degradation in the electrical properties of the device layer” and “the exposed low temperature oxide surface is then polished by chemical mechanical polishing (CMP), if required, and cleaned.”

Advisory Act. dated Nov. 26, 2014, at 3 (quoting portions of Guarini ¶¶ 33–37). The Examiner concludes that “[i]t would have been obvious . . . to provide applicant's admitted prior art with the cleaved surface being CMP and/or oxidation and cleaning to improve the quality of the formed device as taught by Guarini.” Final Act. 4.

The Appellant does not persuasively dispute the Examiner's findings concerning the APA, Guarini, or motivation to combine. *See generally* Br. 6–8. Instead, the Appellant argues that Guarini's process requires oxidation followed by polishing, while the claimed 3DIC is formed by polishing followed by oxidation, resulting “in structurally different end products.” *Id.* at 7. For support that claim 1 requires polishing followed by oxidation, the Appellant appears to rely on the fact that claim 1 recites “a polished oxidized portion.” *See id.*

The Appellant’s argument does not persuade us of reversible error in the rejection. As the Examiner explains, and contrary to certain statements in the Appellant’s Brief, *see, e.g., id.* (“[T]he process of Guarini is the opposite of *the claimed process.*” (emphasis added)), claim 1 is directed to an integrated circuit; it is not directed to a process. *See* Ans. 2. The Appellant identifies nothing persuasive in claim 1 or in the Specification that would indicate that polishing must precede oxidation for an integrated circuit to fall within the scope of claim 1.

We recognize that claim 1 recites “a polished oxidized portion.” *See* Br. 7. However, under the broadest reasonable interpretation of that term consistent with the Specification, we do not understand the term to require that polishing must take place before oxidation. Rather, we interpret the term as requiring that the donor wafer comprises a portion that is both polished and oxidized. The Appellant provides no persuasive explanation as to why claim 1 should be interpreted to require polishing before oxidation. *See id.* If we were to adopt the Appellant’s position, it appears that claim 1 and claim 21<sup>3</sup> would be coterminous in scope. *See Seachange Int’l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1369 (Fed. Cir. 2005) (“[T]here is still a

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<sup>3</sup> Claim 21 (unlike claim 1) includes a process limitation in that it specifies that polishing occurs prior to oxidizing. The Appellant’s argument concerning claim 21 is that it “recite[s] similar elements [to claim 1] and [is] not obvious for at least the same reasons [as claim 1].” Br. 8. We do not consider that to be a separate argument for the patentability of claim 21. *Cf. In re Baxter Travenol Labs.*, 952 F.2d 388, 391 (Fed. Cir. 1991) (“It is not the function of this court to examine the claims in greater detail than argued by an appellant . . . .”). In any event, for reasons explained in this decision, the Appellant does not persuasively identify a structural distinction between the claimed 3DIC and the 3DIC of the combined prior art.

presumption that two independent claims have different scope when different words or phrases are used in those claims.”).

The Appellant does not dispute that the Examiner’s proposed combination results in a donor wafer portion that is both polished and oxidized. *See Guarini* ¶¶ 34–37.

The Appellant argues that, “[t]o the extent that the process elements within the claim result in a structurally different end product than one that is oxidized and then polished as taught in *Guarini*, the end structure is different and entitled to patentable weight.” Br. 7 (quotation marks omitted). However, the Appellant fails to identify any “process element” within claim 1 that would result in any particular structure that would distinguish over the applied prior art, and we do not discern any such process element. Claim 1 simply recites a “donor wafer portion compris[ing] a polished oxidized portion.” As discussed above, the Appellant provides no persuasive evidence or reasoning as to why that term implies that polishing must precede oxidation. Nor does the Appellant persuasively explain what structural difference, if any, would arise necessarily from the different order of steps.

Concerning a potential structural difference between the 3DIC of claim 1 and that of the combined prior art, the Appellant argues that “there is no evidence that the end of product of *Guarini* ‘is substantially free of ions introduced to the donor wafer portion during an ion cutting procedure’ as recited in claim 1.” Br. 7.

We are not persuaded by that argument. The Examiner’s rationale does not rely on *Guarini* alone. *See In re Keller*, 642 F.2d 413, 426 (CCPA 1981) (“[O]ne cannot show non-obviousness by attacking references

individually where, as here, the rejections are based on combinations of references.”). As discussed above, the APA in view of Guarini renders obvious a donor wafer portion that is polished and oxidized, as required by claim 1. Guarini teaches polishing to reduce surface roughness and annealing a “low temperature oxide layer” specifically “to reduce the concentration of OH groups,” which the Examiner finds constitute ions. *See* Guarini ¶¶ 34, 37; Ans. 3. The “Background” section of the Appellant’s Specification indicates that “excess ions” in electronic circuitry was a known problem. Spec. ¶ 7 (“[E]xcess ions can interfere with operation of transistors.”). Moreover, Guarini expressly teaches the use of ozone as an oxidizing agent. *See* Guarini ¶ 36. The Appellant’s Specification teaches the use of ozone as a preferred oxidizing agent and states that “ozone . . . [is] particularly reactive and react[s] readily with hydrogen ions.” Spec. ¶ 33. Thus, Guarini addresses a problem similar to that addressed by the Appellant (undesirable roughness/excess ions in electronic components), and it does so in a way similar to that disclosed by the Appellant (oxidizing and polishing).

Given that the APA in view of Guarini renders obvious a donor wafer portion that is polished and oxidized using an oxidizing agent that is preferred by the Appellant, and that Guarini teaches reduction of ion concentration, the Examiner reasonably concludes that a person of ordinary skill in the art would have expected the donor wafer portion of the 3DIC of the combined prior art to possess the properties recited by claim 1, including being “substantially free of ions introduced to the donor wafer portion during an ion cutting procedure.” The Appellant’s limited argument fails to show otherwise. *See In re Best*, 562 F.2d 1252, 1255 (CCPA 1977) (“Where, as here, the claimed and prior art products are identical or

substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product.”).

On the record before us, we are not persuaded of reversible error in the Examiner’s rejection of claim 1.

**Claim 23.**

Claim 23 depends from claim 1 and further recites “wherein the polished oxidized portion substantially free of ions comprises a portion with at least a fifty percent reduction of an original implantation of ions introduced to the donor wafer portion during the ion cutting procedure.”<sup>4</sup>

The Examiner finds that a person of ordinary skill in the art would have expected the APA as modified by Guarini to meet the limitation of claim 23. *See* Final Act. 6.

The Appellant argues that “there is no evidence in record” supporting the Examiner’s position, and that “[t]he failure to show how much Guarini reduces ion concentration means that the Patent Office has not shown the claim element, and the claim is non-obvious.”

That argument is unpersuasive for the reason discussed above with respect to claim 1. *See Best*, 562 F.2d at 1255; *see also See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–19 (2007) (“[T]he [obviousness] analysis

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<sup>4</sup> In the event of further prosecution of the application on appeal, the Examiner and Appellant may wish to consider whether claim 23 differs in scope from claim 1. *See, e.g.*, Spec. ¶ 32 (suggesting that the term “substantially free of ions,” which appears in claim 1, refers to a reduction of ions by at least fifty percent relative to the original implantation).

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need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”). We affirm the Examiner’s rejection of claim 23.

#### CONCLUSION

We AFFIRM the Examiner’s rejections of claims 1–11, 21, and 23.

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

AFFIRMED