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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SHUNPEI YAMAZAKI, MASASHI TSUBUKU, and HIROMICHI GODO

Appeal 2019-004567
Application 12/880,286
Technology Center 2800

Before N. WHITNEY WILSON, DEBRA L. DENNETT, and LILAN REN, *Administrative Patent Judges.*

REN, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 9, 12, 13, 16, 24, and 25. *See* Final Act. 2. We have jurisdiction under 35 U.S.C. § 6(b). A hearing was held July 22, 2020.

We AFFIRM.

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[1] We use the word Appellant to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as "Semiconductor Energy Laboratory Co., Ltd." Appeal Br. 3.

CLAIMED SUBJECT MATTER

The claims are directed to a semiconductor device and method for manufacturing the device. Spec. ¶ 1. Claim 9, reproduced below, is illustrative of the claimed subject matter:

> 9. A semiconductor device comprising a transistor, the transistor comprising:
>
> a gate electrode layer over a substrate having an insulating surface, the gate electrode layer comprising a material selected from the group consisting of Al, Cr, Cu, Ta, Ti, Mo, W, and an alloy thereof;
>
> a gate insulating layer over the gate electrode layer, the gate insulating layer comprising silicon, nitrogen and oxygen;
>
> an oxide semiconductor layer over the gate insulating layer, the oxide semiconductor layer comprising indium, gallium, zinc and oxygen;
>
> a source electrode layer and a drain electrode layer over the oxide semiconductor layer, each of the source electrode layer and the drain electrode layer comprising a metal selected from the group consisting of Al, Cr, Cu, Ta, Ti, Mo, Wand an alloy thereof; and
>
> a protective insulating layer in contact with a part of the oxide semiconductor layer, the source electrode layer, and the drain electrode layer,
>
> wherein the protective insulating layer comprises silicon, oxygen and nitrogen,
>
> wherein an amount of change in threshold voltage is less than or equal to 3 V in a temperature range of -25 °C to 150 °C,
>
> wherein a channel length of the transistor is 3 μm to 10 μm inclusive, and wherein a thickness of the oxide semiconductor layer is 10 nm to 50 nm inclusive.

Claims Appendix (Appeal Br. 21).

REFERENCES

The prior art references relied upon by the Examiner are:

Name	Reference	Date
Ofuji	WO 2008/139940 Al	Nov. 20, 2008
Matsunaga	WO 2008/126883 Al	Oct. 23, 2008
Kim	US 2009/0321732 A1	Dec. 31, 2009

REJECTION

Claims 9, 12, 13, 16, 24, and 25 are rejected under pre–AIA 35 U.S.C. § 103(a) as unpatentable over Matsunaga in view of Ofuji and further in view of Kim. Final Act. 2.

OPINION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of the arguments and evidence produced thereon. *Cf. Ex parte Frye*, 2010 WL 889747, *4 (BPAI 2010) (precedential) (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) ("[I]t has long been the Board's practice to require an applicant to identify the alleged error in the examiner's rejections.")). After having considered the evidence presented in this Appeal and each of Appellant's contentions, we are not persuaded that reversible error has been identified, and we affirm

the Examiner's § 103(a) rejection for the reasons expressed in the Final Office Action and the Answer. We add the following primarily for emphasis.

Claim 9[2]

In rejecting claim 9, the Examiner finds that the combined prior art teaches or suggests semiconductor device having the recited structures. Final Act. 2–6. Based on a rationale to combine and the finding that the combined prior art teaches or suggests "all the claimed structural, material composition and dimensional/numerical limitations," the Examiner finds that the combined prior art device would exhibit the recited parameter, i.e., "an amount of change in threshold voltage [which] is less than or equal to 3 V in a temperature range of -25 °C to 150 °C". *Id.* at 3–7.

Appellant does not structurally distinguish the prior art, nor does Appellant address the Examiner's rationale to combine. Appellant instead argues that the recited voltage threshold parameter is not taught or suggested. Appeal Br. 10–11 (arguing that "there appears to be insufficient articulated evidence as to why Kim's alleged threshold voltage . . . was combinable with and achievable in the modified combination of Matsunaga, Ofuji and Kim").

> Where . . . the claimed and prior art products are identical or substantially identical . . . 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. Whether the rejection is based on 'inherency' under 35 U.S.C. § 102, on 'prima facie obviousness' under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products.

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[2] Appellant does not separately argue for the rejection of claims 12, 13, 16, 24, 25. *See* Appeal Br. 8–17. These claims stand or fall together. *See id.*; *see also* 37 C.F.R. § 41.37(c)(1)(vii).

In re Best, 562 F.2d 1252, 1255 (CCPA 1977) (citations and footnote omitted).

In this case, Appellant's arguments, based on the assertion that "there is NO evidence of record to support" the recited threshold voltage (Appeal Br. 11), do not rebut the Examiner's finding that structural identity results in identity of properties exhibited by the structures. "From the standpoint of patent law, a compound and all of its properties are inseparable; they are one and the same thing." *In re Papesch*, 315 F.2d 381, 391 (CCPA 1963). Appellant's argument is unpersuasive of error.

Appellant's argument that the prior art teachings are not combinable because the Examiner "fails to address predictability" (Appeal Br. 12) is not persuasive because it does not address the Examiner's rationale in support of the rejection. For example, the Examiner explains that a skilled artisan would have combined Matsunaga with Ofuji for multiple reasons. Final Act. 4–5 (listing these reasons with citations to the references). The Examiner further provides reasons that a skilled artisan would have combined Matsunaga and Kim as well as Matsunaga, Ofuji, and Kim. *See id.* at 6–7 (listing these reasons with citations to the references). Appellant's argument does not address these findings. *See* Appeal Br. 10–16. Moreover, it is well-established that "[o]bviousness does not require absolute predictability of success. . . . For obviousness under § 103, all that is required is a reasonable expectation of success." *In re O'Farrell*, 853 F.2d 894, 903–04 (Fed. Cir. 1988). Appellant's argument lacks evidence as to why a skilled artisan would consider the art of combining various structures of a semiconductor unpredictable and is unpersuasive of error. *See* Appeal Br. 12, 13–14 (arguing only that Kim's teaching "cast[s] doubt as to the predictability of

further unguided manipulation of layer materials, dimensions, formation techniques, etc. on threshold voltage stability" without addressing the teachings of Matsunaga and Ofuji).

Appellant's argument that the Examiner reversibly erred in extrapolating the voltage data in Kim is unpersuasive because it does not structurally distinguish the prior art. *See* Appeal Br. 12–13. As noted *supra*, "[w]here . . . the claimed and prior art products are identical or substantially identical . . . 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." *Best*, 562 F.2d at 1254. Moreover, "[i]t is elementary that the mere recitation of a newly discovered function or property, inherently possessed by things in the prior art, does not cause a claim drawn to those things to distinguish over the prior art." *Id.* "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990). Appellant's argument based on the assertion that Kim does not teach or suggest the recited threshold voltage is therefore unpersuasive of error. Appellant's argument is unpersuasive also because it attacks the references individually – namely, Kim – without addressing Matsunaga and Ofuji. *See id.* "Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references." *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) ("Merck") (citing *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("Keller")).

Moreover, Appellant argues that "a comparison between FIG. 5A of Kim using one material (i.e., AIO) and FIG. 58 using a different material (i.e., SiO) appear to show a large variation in threshold voltage change" (Appeal Br. 13) but does not provide evidence showing that such purported

"large variation" is solely based on the material used. Appellant also does not provide evidence that a skilled artisan would have considered the variation unpredictable. *See In re O'Farrell*, 853 F.2d at 903–04. Moreover, Appellant's argument that Kim shows "a large variation in threshold voltage change" under certain conditions also does not show that the recited threshold voltage is unexpected. Appeal Br. 13.

Appellant's arguments that the "Examiner's Expanded Theories Appear Flawed and Not Germane" (Appeal Br. 14–15) are not persuasive of error for the same reason that the arguments do not structurally distinguish the prior art. Appellant's arguments regarding the Examiner's discussion of best mode (Appeal Br. 15–16) are likewise unpersuasive of error for lack of structural distinction.

Lastly, Appellant argues that the Examiner reversibly erred in finding that the recited threshold voltage characteristic is inherent. Appeal Br. 16. Appellant, however, does not elaborate on why the Examiner erred, nor does Appellant present evidence showing that the combined prior art structure—despite the structural identity—would have exhibited a different threshold voltage characteristic. *See Best*, 562 F.2d 1254 ("Where . . . the claimed and prior art products are identical or substantially identical . . . 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."). Such a blanket assertion that inherency has not been established is not persuasive of error.

CONCLUSION

The Examiner's rejection is affirmed.

More specifically,

DECISION SUMMARY

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
9, 12, 13, 16, 24, 25	103(a)	Matsunaga, Ofuji, Kim	9, 12, 13, 16, 24, 25	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED