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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HELMUT HAGLEITNER and
SAPTHARISHI SRIRAM

Appeal 2015-005960
Application 13/414,286
Technology Center 2800

Before BRADLEY R. GARRIS, WESLEY B. DERRICK, and
DEBRA L. DENNETT, *Administrative Patent Judges*.

DENNETT, *Administrative Patent Judge*.

DECISION ON APPEAL¹

STATEMENT OF THE CASE

Appellants² appeal under 35 U.S.C. § 134 from a rejection of claims 1, 4, and 10–14. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ In our Opinion below, we refer to the Final Action mailed March 11, 2014 (“Final Act.”), the Appeal Brief filed August 13, 2014 (“App. Br.”), the Examiner’s Answer mailed March 26, 2015 (“Ans.”), and the Reply Brief filed May 26, 2015 (“Reply Br.”).

² Appellants identify Cree, Inc. as the real party in interest (App. Br. 1).

The claims are directed to semiconductor devices comprising a Schottky contact. Claim 1, reproduced below with the disputed term highlighted, is illustrative of the claimed subject matter:

1. A semiconductor device comprising:
 - a semiconductor body;
 - a Schottky contact comprising:
 - a Schottky layer comprising a first metal and formed on the semiconductor body;
 - a first diffusion barrier layer formed from a portion of the Schottky layer and comprising a silicide of the first metal and formed on at least a portion of the Schottky layer;*** and
 - a third layer comprising a second metal and formed on the first diffusion barrier layer.

App. Br. 9 (Claims App'x).

REFERENCES

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Ando et al. (“Ando”)	US 2005/0151255 A1	July 14, 2005
Nanjo et al. (“Nanjo”)	US 8,035,130 B2	Oct. 11, 2011

REJECTIONS

Claims 1, 4, and 10–14 stand rejected under 35 U.S.C §103(a) as being unpatentable over Nanjo in view of Ando.³ Final Act. 2.

³ Claims 2, 3, and 5–9 are objected to as being dependent upon a rejected base claim (claim 1). Final Act. 4. The Examiner finds the claims to be

OPINION

Claim 1 is the sole independent claim on appeal. Appellants argue the claims as a group, thus the dependent claims stand or fall with claim 1.

We sustain the 103(a) rejection for the reasons given in the prior Office Action and the Answer. We add the following:

The Examiner finds that Nanjo discloses a gate structure formed on a semiconductor layer having all the elements disclosed in Appellants' Specification, but does not

explicitly disclose a Schottky layer comprising a first metal and formed on the semiconductor body; a first diffusion barrier layer formed from a portion of the [S]chottky layer and comprising a silicide of the first metal and formed on at least a portion of the Schottky layer; and a third layer comprising a second metal and formed on the first diffusion barrier layer.

Final Act. 2. The Examiner finds that Ando discloses the above elements missing from Nanjo. *Id.* at 3. The Examiner contends that one of ordinary skill in the art at the time of the invention would have found it obvious to modify Nanjo with the teachings of Ando so a gate structure as in Ando is formed in order to have a heat resistant Schottky junction gate layer. *Id.*

Appellants limit their argument to the limitation "a first diffusion barrier layer formed from a portion of the Schottky layer and comprising a silicide of the first metal and formed on at least a portion of the Schottky layer." App. Br. 4–5. The Examiner contends that the limitation describes a product-by-process. Final Act. 5; Ans. 3.

allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. *Id.*

Appellants dispute that “a first diffusion barrier layer formed from a portion of the Schottky layer and comprising a silicide of the first metal and formed on at least a portion of the Schottky layer” is product-by-process language. App. Br. 5. Appellants direct us to Figures 2 and 3 of the application, reproduced below, as support for this position.

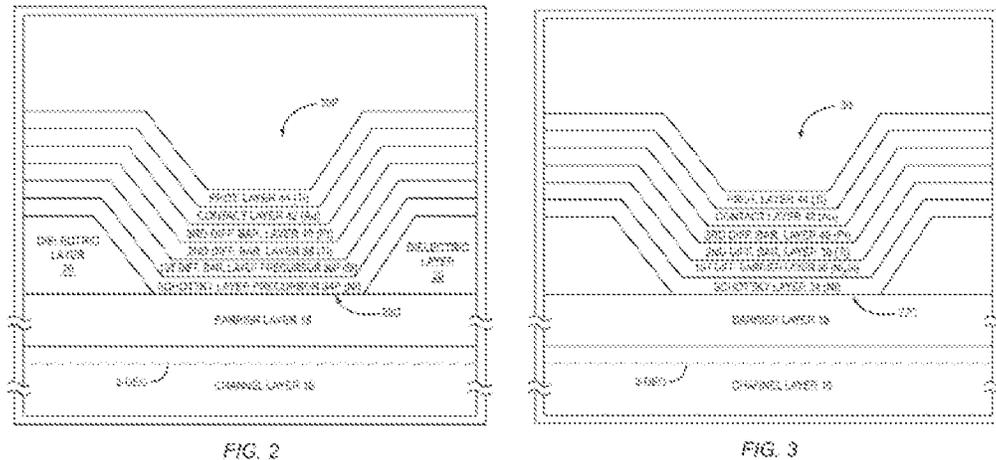


Figure 2 of the application illustrates a Schottky gate contact precursor according to one embodiment of the disclosure. Spec. ¶ 13. Figure 3 of the application illustrates a Schottky gate contact after the Schottky gate contact precursor is subjected to thermal annealing according to one embodiment of the disclosure. *Id.* ¶ 14.

According to Appellants, in Figure 2, a Schottky layer 34P that includes nickel is initially formed while a first diffusion barrier layer 36P, which includes silicon, is formed over the Schottky layer 34P. App. Br. 6. During an annealing process, a portion of the nickel in the Schottky layer 34P diffuses into the first diffusion barrier layer 36P, resulting in the first diffusion barrier layer 36 including a portion of the Schottky layer 34, such that the first diffusion barrier layer 36 is formed from a portion of the Schottky layer 34. *Id.* Appellants contend that the structure shown in Figure 3 of the application is a Schottky gate contact 30 that forms a portion of a

semiconductor device claimed. *Id.* Appellants argue that the device illustrated in “Figure 3 is an end product where the first diffusion barrier layer 36 is formed from a portion of the Schottky layer 34, as shown by the notation Ni_xSi , where the Ni diffused from the Schottky layer 34.” *Id.*

The Examiner notes that claim 1 states three requirements for the first diffusion barrier: (1) it is “formed from a portion of the Schottky layer”; (2) it comprises “a silicide of the first metal”; and (3) it is “formed on at least a portion of the Schottky layer.” Ans. 3 (emphasis in original).

With regard to the first requirement, the Examiner contends that the phrase “formed from” is directed toward the process of making the Schottky layer, thus a product-by-process limitation. *Id.* The Examiner argues that Appellants have the burden of showing that the method language necessarily produces a structural difference. *Id.* at 3–4 (citing MPEP § 2113).

According to the Examiner, without such showing, the language “first diffusion barrier layer formed from a portion of the Schottky layer” only requires that the first diffusion barrier layer comprises at least one component which is also included within the Schottky layer. *Id.* at 4. The Examiner finds that Ando teaches a Schottky layer comprising a first metal (platinum) and a first diffusion barrier layer which also comprises the first metal of platinum. *Id.*

With regard to the second requirement, the Examiner finds that Ando teaches a first diffusion barrier is a platinum silicide, which is a silicide of the first metal layer (platinum). *Id.*

With regard to the third requirement, the Examiner finds that Ando teaches a first diffusion barrier layer is formed on the Schottky layer. *Id.*

The Examiner relies on the structure in Ando as teaching a Schottky layer comprising a first metal (platinum), a first diffusion barrier layer which comprises the silicide of the first metal (platinum silicide) which is formed on the Schottky layer. *Id.* The Examiner further argues that the “formed from” language of claim 1 is a product-by-process limitation which merely requires that the first diffusion barrier comprise the first metal. *Id.* at 5.

Appellants cite to MPEP § 2113 in stating the “structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made.” App. Br. 6–7. The *structure* implied by the process step here is a first diffusion barrier layer comprising a silicide of the first metal. The claim language does not imply that the process described in claim 1 results in a structure that differs from the prior art to which the Examiner directs us. Appellants provide no evidence that the platinum-silicide barrier layer taught by Ando differs from the first diffusion barrier layer of claim 1 wherein platinum is the first metal.

Appellants’ arguments lack persuasive merit. The fundamental rationale of the rejection presented in the Office Action and Answer is that the “formed from” language of claim 1 invokes a product-by-process limitation. The patentability of a patent with a product-by-process limitation depends on the product itself, and not on the method of production. *See In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985) (“If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.”); *see also SmithKline Beecham Corp. v. Apotex Corp.*,

439 F.3d 1312, 1315 (Fed. Cir. 2006) (“[O]nce a product is fully disclosed in the art, future claims to that same product are precluded, even if that product is claimed as made by a new process.”). Where, as here, the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to Appellants to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 799, 802 (Fed. Cir. 1983).

For the reasons stated above and given by the Examiner, we sustain the § 103(a) rejection of the appealed claims as unpatentable over Nanjo in view of Ando.

DECISION

For the above reasons, the Examiner’s rejection of claims 1, 4, and 10–14 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