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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ERIC GRAETZ

Appeal 2017-008673
Application 13/972,964
Technology Center 2800

Before KAREN M. HASTINGS, MONTÉ T. SQUIRE, and
JEFFREY R. SNAY, *Administrative Patent Judges*.

SNAY, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner’s decision rejecting claims 1–12 and 14–20.³ We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

¹ We cite to the Substitute Specification (“Spec.”) filed October 21, 2013; Final Office Action (“Final Act.”) dated July 13, 2015; Appellant’s Appeal Brief (“Br.”) dated January 7, 2016; and Examiner’s Answer (“Ans.”) dated November 28, 2016.

² Appellant is Applicant, Infineon Technologies AG, which is identified as the real party in interest. Br. 2.

³ Appellant canceled claim 13 after issuance of the Final Office Action.

BACKGROUND

The subject matter on appeal relates to semiconductor structures intended to reduce the amount of mobile charge below semiconductor devices. Spec. 1. Claims 1, 6, and 15—the independent claims on appeal—are reproduced from the Claims Appendix of the Appeal Brief as follows:

1. A semiconductor chip comprising:
 - a cured silicone rubber layer; and
 - a semiconductor layer comprising a semiconductor device element overlying said cured silicone rubber layer.

6. A semiconductor chip comprising:
 - a dielectric layer having a thickness of at least about 25 microns; and
 - a semiconductor layer comprising a semiconductor device element and overlying said dielectric layer, wherein the dielectric layer is thicker than the semiconductor layer and provides a mechanical carrier substrate to the semiconductor layer, wherein the dielectric layer comprises a cured silicone rubber layer.

15. A semiconductor chip comprising:
 - a device layer comprising an integrated circuit; and
 - a cured silicone rubber layer mechanically supporting the device layer, the cured silicon rubber layer having a thickness greater than a thickness of the device layer, wherein the semiconductor chip comprises a first major surface and an opposite second major surface, wherein an exposed surface of the device layer forms the first major surface of the semiconductor chip, wherein an exposed surface of the cured silicone rubber layer forms the second major surface of the semiconductor chip.

REJECTIONS

The Examiner maintains the following grounds of rejection:⁴

- I. Claims 1, 3–6, 8–12, 14, 15, and 17–20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Onozuka⁵ and Matsunaka.⁶
- II. Claims 2, 7, and 16 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Onozuka, Matsunaka, and Dozen.⁷

DISCUSSION

Rejection I

With regard to Rejection I, Appellant separately argues each of claims 1, 6, 14, and 15. *See* Br. 3–11. Each claim not separately argued stands or falls with the independent claim from which it depends. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Claim 1

The Examiner finds that Onozuka discloses a semiconductor chip comprising a semiconductor device over an adhesive layer, as is depicted in Onozuka's Figure 11A, reproduced below:

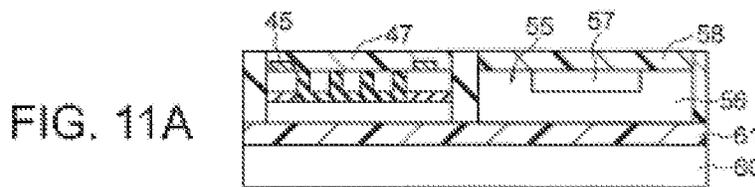


Figure 11A depicts a cross-sectional view of a semiconductor apparatus that includes a MEMS chip **50** and a CMOS chip **55** bonded to an

⁴ Final Act. 2–8; Ans. 3.

⁵ US 7,875,481 B2, issued January 25, 2011 (“Onozuka”).

⁶ US 7,725,068 B2, issued May 25, 2010 (“Matsunaka”).

⁷ US 7,785,933 B2, issued August 31, 2010 (“Dozen”).

adhesive layer **61**. Onozuka 4:22–24, 12:15–16. The adhesive layer bonds and integrates the different chips. *Id.* at 13:24–26. Onozuka states that the adhesive layer **61** is a polyimide thin film, but that other adhesives such as epoxy resin, acrylic resin, or silicone resin may be used. *Id.* at 12:17–22, 13:30–33.

Appellant argues that silicone resin, as taught by Onozuka, is not the same as silicone rubber, as claimed. Br. 4–7. The Examiner responds that Onozuka also identifies silicone rubber as a suitable adhesive material. Ans. 3 (citing Onozuka 7:63–64). There, Onozuka teaches that, “[w]hen attached onto a silicon substrate or a glass substrate, adhesive materials such as an acrylic material, a silicone rubber material, and a polyimide material, are found effective.” Onozuka 7:63–65. In light of the foregoing disclosures in Onozuka, we are not persuaded of error in the Examiner’s finding that one of ordinary skill would have had a reason to use silicone rubber for the adhesive layer **61** depicted in Figure 11A.

The Examiner acknowledges that Onozuka does not specify the disclosed silicone rubber adhesive being “cured.” Final Act. 3. However, the Examiner finds that Matsunaka teaches curing silicone rubber to control hardness of a silicone rubber adhesive, and that one of ordinary skill would have recognized such a property as beneficial in Onozuka’s adhesive layer. Final Act. 3 (citing Matsunaka 5:30–45, 6:50–54).

Appellant argues that Matsunaka’s teaching is made in the context of a silicon rubber coating on an electrophotographic machine’s fixing belt, and, as such, is not relevant to Onozuka’s semiconductor chip device. Appellant also argues that there would have been no reason to impart hardness to Onozuka’s adhesive because Onozuka teaches that the adhesive

layer is intended to absorb stress caused by thermal expansion of substrates. Br. 7–9. These arguments are not persuasive of reversible error. Both Onozuka and Matsunaka concern use of silicone rubber as an adhesive. The Examiner points to Matsunaka in this regard solely as evidence that it was known to cure silicone rubber adhesive. Ans. 3. Although Onozuka teaches that the adhesive’s elasticity serves to absorb thermal expansion forces (Onozuka 7:47–51), the reference also states that “[t]he ultimate purpose of the provision of the adhesive layers **59** and **61** is to bond and integrate different chips” (*id.* at 13:24–26). Indeed, Onozuka teaches that providing a sufficiently strong adhesive advantageously allows for the omission of a supporting substrate (*id.* at 12:22–28), and that baking is performed to “harden” the adhesive (*id.* at 13:6–7). On this appeal record, we are not persuaded of reversible error in the Examiner’s finding that one of ordinary skill would have had a reason to apply known curing techniques to provide Onozuka’s rubber adhesive with a hardness sufficient to provide the desired properties of bonding and supporting different chips.

For the foregoing reasons, we sustain Rejection I as applied to claim 1.

Claims 6, 14, and 15

Each of claims 6, 14, and 15 requires that the silicone rubber layer is thicker than the semiconductor device layer. The Examiner acknowledges that Onozuka’s disclosure of adhesive and semiconductor layer thicknesses of 5 and 100 microns, respectively, fails to meet this requirement of the claims. The Examiner points to Matsunaka’s teaching of a cured silicone rubber layer in the range of 100–500 microns as a reason to increase Onozuka’s adhesive layer thickness to a value within that range. Final Act.

4. However, as Appellant correctly points out, Matsunaka's disclosed rubber thickness is provided in the context of a belt used in a printer. Br. 10. The Examiner fails to articulate a meaningful reason as to why one of ordinary skill would have applied Matsunaka's rubber layer thickness to the adhesive layer in Onozuka's semiconductor device. Absent articulation of such a reason, we are persuaded that the Examiner fails to present evidence sufficient to support a conclusion of obviousness. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (“[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. . . . [I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.”).

Accordingly, Rejection I as applied to each of claims 6, 14, and 15 is not sustained.

Rejection II

Claims 2, 7, and 16 depend from independent claims 1, 6, and 15, respectively. Appellant does not present any argument against Rejection II apart from the arguments made in connection with Rejection I. *See* Br. 12. Accordingly, we sustain Rejection II as applied to claim 2 and reverse Rejection II as applied to claims 7 and 16 for the reasons given above in connection with the independent claims.

CONCLUSION

The Examiner's rejections of claims 1–5 under 35 U.S.C. § 103(a) are sustained.

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The Examiner's rejections of claims 6–12 and 14–20 under 35 U.S.C. § 103(a) are not sustained.

DECISION

The Examiner's decision is affirmed-in-part.

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-IN-PART