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RANKIN, HILL & CLARK LLP 38210 GLENN AVENUE WILLOUGHBY, OH 44094-7808			MILAKOVICH, NATHAN J	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NORIYOSHI SHIMIZU, WATARU KANEDA, and
AKIO ROKUGAWA

Appeal 2019-003207
Application 14/663,921
Technology Center 2800

Before MICHAEL P. COLAIANNI, JEFFREY B. ROBERTSON, and
JEFFREY R. SNAY, *Administrative Patent Judges*.

SNAY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1, 3, 6–14, and 19–28. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Shinko Electric Industries Co., Ltd. as the real party in interest. Appeal Br. 3.

BACKGROUND

The invention relates to a wiring board, such as for a semiconductor package. Spec. ¶¶ 1, 2. Claim 1 reads:

1. A wiring board comprising:
 - a core layer;
 - a first wiring layer formed on one surface of the core layer;
 - a first insulating layer formed on the one surface of the core layer so as to cover the first wiring layer;
 - a via wiring embedded in the first insulating layer, the via wiring being a metal layer filled in a via hole formed in the first insulating layer;
 - a second wiring layer formed on a first surface of the first insulating layer, the first surface being an opposite surface of a surface in contact with the core layer, the second wiring layer having a structure where an electrolytic plating layer is formed on a seed layer; and
 - a second insulating layer formed on the first surface of the first insulating layer so as to cover the second wiring layer, *the second insulating layer being thinner than the first insulating layer,*
 - wherein the first wiring layer comprises a pad and a plane layer provided around the pad,
 - one end surface of the via wiring is exposed from the first surface of the first insulating layer and flush with the first surface of the first insulating layer,
 - an entirety of the one end surface of the via wiring is directly bonded to the seed layer constituting the second wiring layer,
 - another end surface of the via wiring is directly bonded to the pad in the first insulating layer, and
 - the first surface of the first insulating layer and the one end surface of the via wiring are polished surfaces, and a roughness of the first surface of the first insulating layer is less than a roughness of an inner wall surface of the via hole formed in the first insulating layer.

Appeal Br. 22 (Claims Appendix) (emphasis provided to showcase a key recitation in dispute).

Independent claim 19 similarly recites a wiring board which includes, *inter alia*, a second insulating layer that is thinner than a first insulating layer. Each remaining claim on appeal depends from claim 1 or 19.

REJECTIONS

- I. Claim 23 stands rejected under 35 U.S.C. § 112(d) for failing to limit the subject matter of the claim from which it depends.
- II. Claims 1, 3, 6, 14, and 25–28 stand rejected under 35 U.S.C. § 103 as unpatentable over Shin,² Peters,³ Maeda,⁴ and Funaya.⁵
- III. Claims 7–11 stand rejected under 35 U.S.C. § 103 as unpatentable over Shin, Peters, Maeda, Funaya, and Mori.⁶
- IV. Claims 12 and 13 stand rejected under 35 U.S.C. § 103 as unpatentable over Shin, Peters, Maeda, Funaya, Mori, and Shim.⁷
- V. Claims 19–24 stand rejected under 35 U.S.C. § 103 as unpatentable over Shin, Peters, Maeda, Mori, and Shim.

OPINION

Rejection I: failure to satisfy 35 U.S.C. § 112(d)

The Examiner finds claim 23 fails to recite any feature not already present in its parent claim 19, and rejects claim 23 under 35 U.S.C. § 112(d) on that basis. Final Act. 8. Appellant presents no argument against the

² US 2014/0182889 A1, published July 3, 2014 (“Shin”).

³ US 6,521,530 B2, issued February 18, 2003 (“Peters”).

⁴ US 2014/0290997 A1, published October 2, 2014 (“Maeda”).

⁵ US 2011/0155433 A1, published June 30, 2011 (“Funaya”).

⁶ US 2012/0068359 A1, published March 22, 2012 (“Mori”).

⁷ US 2010/0224974 A1, published September 9, 2010 (“Shim”).

have provide one of ordinary skill with a reason to form Shin's insulating layer 140 thinner than insulating layer 120. Final Act. 13. Particularly, the Examiner finds Maeda teaches that forming a relatively thin upper insulating layer provides "reduced thermal coefficient of lower insulating layers so as to manufacture a multilayer wiring board with little warpage and excellent connection reliability." *Id.* (citing Maeda ¶¶ 37, 53).

Appellant contends modifying Shin to include a relatively thin upper insulating layer would have been contrary to Shin's teaching that second insulating layer 140 is configured to prevent warpage, and that Shin and Maeda, when read in their entireties, would not have lead one of ordinary skill in the art to modify Shin in the manner proposed by the Examiner. Appeal Br. 15.

Shin is silent regarding thickness of insulating layers 120, 140. However, Shin teaches insulating layer 140 "may be made of a material capable of decreasing warpage of the multilayered substrate 100." Shin ¶ 53. To that end, Shin teaches insulating layer 140 may exhibit a lesser thermal expansion rate relative to that of insulating layer 120. *Id.* That is, Shin states warpage is decreased when the upper (second) insulating layer is configured to have a lesser rate of thermal expansion. *Id.*

Maeda, on the other hand, states "the *lower* insulating layer **51** has a smaller thermal expansion coefficient than the thermal expansion coefficient of the upper insulating layer **52**. Maeda ¶ 37 (emphasis added). Maeda further states, "[t]he lower insulating layer **51** with the small thermal expansion coefficient is formed thicker than the upper insulating layer **52**, so as to lower the thermal expansion coefficient as the overall insulating layer." *Id.*

Reading the collective teachings of Shin and Maeda, as summarized above, Shin discloses upper insulating layer 140 is configured to exhibit the lesser thermal expansion rate, and Maeda offers a reason to provide a greater relative thickness for the insulating layer configured to exhibit the lesser rate of thermal expansion. The Examiner's opposite determination, that one skilled in the art would have had reason to provide Shin with a relatively thicker lower insulating layer 120, is not supported by a preponderance of the evidence presented.

For the foregoing reasons, we are persuaded the Examiner does not identify evidence sufficient to support the obviousness determination. Accordingly, Rejections II–V are not sustained.

CONCLUSION

The Examiner's decision rejecting claim 23 under 35 U.S.C. § 112(d) is affirmed.

The Examiner's decision rejecting claims 1, 3, 6–14, and 19–28 under 35 U.S.C. § 103 is reversed.

DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
23	112(d)		23	
1, 3, 6, 14, 25–28	103	Shin, Peters, Maeda, Funaya		1, 3, 6, 14, 25–28
7–11	103	Shin, Peters, Maeda, Funaya, Mori		7–11
12, 13	103	Shin, Peters, Maeda, Funaya, Mori, Shim		12, 13
19–24	103	Shin, Peters, Maeda, Mori, Shim		19–24
Overall outcome			23	1, 3, 6–14, 19–22, 24– 28

AFFIRMED-IN-PART