

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MAHESH SAMBASIVAM
and VASSOUDEVANE LEBONHEUR

Appeal No. 2005-2073
Application 10/033,854

ON BRIEF

Before THOMAS, HAIRSTON, and JERRY SMITH, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 1-20, which constitute all the claims in the application.

The disclosed invention pertains to a method of fabricating a microelectronic package.

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Representative claim 1 is reproduced as follows:

1. A method of fabricating a microelectronic package, comprising:

providing a substrate having a first surface, an opposing second surface, and a plurality of lands disposed on said first surface;

forming a through-hole extending from said substrate first surface to said substrate second surface;

providing a microelectronic die having an active surface, a back surface, and a plurality of pads disposed on said active surface in a corresponding relationship to said plurality of substrate lands;

electrically attaching said plurality of substrate lands to said plurality of corresponding microelectronic die pads with a plurality of conductive bumps,

disposing an underfill material through said through-hole such that said underfill material is dispersed by capillary action between said microelectronic die active surface and said substrate first surface.

The examiner relies on the following references:

Akram et al. (Akram)	5,766,982	June 16, 1998
Cha et al. (Cha)	6,242,798	June 05, 2001

The admitted prior art described in appellants' application.

Claims 1-20 stand rejected under 35 U.S.C. § 103(a). As evidence of obviousness the examiner offers the admitted prior art in combination with Akram and Cha.

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Rather than repeat the arguments of appellants or the examiner, we make reference to the brief and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejection advanced by the examiner and the evidence of obviousness relied upon by the examiner as support for the rejection. We have, likewise, reviewed and taken into consideration, in reaching our decision, the appellants' arguments set forth in the brief along with the examiner's rationale in support of the rejection and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in the claims on appeal. Accordingly, we affirm.

Appellants have indicated that for purposes of this appeal the claims will all stand or fall together as a single group [brief, page 6]. Consistent with this indication appellants have made no separate arguments with respect to any of the claims on appeal. Accordingly, all the claims before us will stand or fall

together. Note In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983). Therefore, we will consider the rejection against independent claim 1 as representative of all the claims on appeal.

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings by the

examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See Id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976). Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the brief have not been considered and are deemed to be waived [see 37 CFR § 41.37(c)(1)(vii)(2004)].

With respect to representative claim 1, the examiner finds that the admitted prior art teaches the claimed method except for the step of forming a through hole extending from the substrate first surface to the substrate second surface and the step of disposing the underfill material through the through hole. The examiner cites Akram as teaching a method of fabricating a microelectronic package in which underfill material is disposed through a through hole and dispersed by capillary action. The

examiner finds that it would have been obvious to the artisan to combine the teachings of Akram with the admitted prior art in order to prevent the underfill material from spreading beyond the sidewalls of the semiconductor device. Cha was cited by the examiner to meet a claim limitation which is not present in representative claim 1 [answer, pages 3-5].

Appellants argue that Akram teaches away from dispersing the underfill material by capillary action because it teaches tipping the assembly to get the underfill material to flow. Appellants also argue that there is no teaching or suggestion within the applied prior art to combine the references in a manner which would render the claimed invention obviousness. Although Cha is not necessary to reject representative claim 1, appellants argue that Cha also does not teach dispersing the epoxy material by capillary action and that Cha is from a non-analogous art [brief, pages 6-11].

The examiner responds that Akram does teach that the underfill material is dispersed by capillary action. The examiner reiterates that it would have been obvious to the artisan to combine the teachings of Akram with the method of the admitted prior art in order to prevent the underfill material from spreading beyond the sidewalls of the semiconductor device. The examiner asserts that when the teachings of the admitted

prior art and Akram are combined, the claimed invention results [answer, pages 6-10].

We will sustain the examiner's rejection of claims 1-20 based on the teachings of the admitted prior art and Akram. The admitted prior art teaches a dispensing needle for dispersing the underfill material in the gap formed by the die active surface and the substrate surface [application, Figure 13]. The assembly of Figure 13 appears to be situated horizontally. Akram teaches that underfilling a flip-chip oriented in the horizontal direction causes the underfill material to have bubbles, air pockets or voids [column 1, line 65 to column 2, line 1]. Akram solves this problem by applying the underfill material to the assembly while it is tilted in the vertical direction. Akram teaches that it was well known in the prior art for underfill material to be dispersed into the gap from the sides of the flip-chip or by way of a through hole [column 1, lines 45-58]. Akram also teaches these alternatives by the embodiments of Figures 1 and 2 and the embodiments of Figures 5-7. Thus, our first finding is that the artisan would have been motivated to combine the teachings of Akram with the admitted prior art in order to solve the underfill problem related to horizontal assemblies. Our second finding is that Akram teaches that the underfill

material can be dispersed into the gap through a through hole or from the edges of the flip-chip.

In our view, the background teachings of Akram that a through hole can be used to disperse the underfill material instead of dispersing the material from the edges of the flip-chip would have suggested modifying the admitted prior art to use the through hole form of dispersion. But even if Akram requires that the assembly be tilted, we are still of the view that the claimed invention would have been obvious to the artisan. Specifically, Akram teaches that the underfill material in the tilted assembly is dispersed by fluid pressure, capillary action and gravity [column 4, line 60 to column 5, line 4]. Thus, even though the assembly is tilted, Akram teaches that the underfill material is still at least partly dispersed by capillary action. Therefore, we agree with the examiner that not only would it have been obvious to the artisan to modify the admitted prior art with the teachings of Akram, but the modification taught by Akram does result in the invention of representative claim 1.

In summary, we have sustained the examiner's rejection of the claims on appeal. Therefore, the decision of the examiner rejecting claims 1-20 is affirmed.

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

AFFIRMED

JAMES D. THOMAS)	
Administrative Patent Judge)	
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KENNETH W. HAIRSTON)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
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