

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LOTHAR HENNEKEN and SILVAN HIPPCHEM

Appeal No. 2006-0264
Application No. 10/217,064

ON BRIEF

Before KIMLIN, PAK and WALTZ, Administrative Patent Judges.
KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-16.

Claim 1 is illustrative:

1. A method for depositing an adhesion-promoting layer on a spatially bounded metallic layer of a chip, comprising:

depositing the adhesion-promoting layer by at least one wet-chemical process using a multi-component process bath;

analyzing a concentration of an inhibitor of the multi-component process bath during the wet-chemical process in at least approximately continuous manner; and

adjusting the concentration of the inhibitor to a constant value, the adjusting of the inhibitor concentration being

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independent of adjusting of concentrations of other process-bath components.

The examiner relies upon the following references as evidence of obviousness:

Araki et al. (Araki)	4,353,933	Oct. 12, 1982
van der Putten	5,527,734	Jun. 18, 1996
Zirino et al. (Zirino)	4,058,446	Nov. 15, 1977
Fakler et al. (Fakler)	6,086,956	Jul. 11, 2000
Yamakawa et al. (Yamakawa)	4,970,571	Nov. 13, 1990
Ying et al. (Ying)	4,789,484	Dec. 6, 1988

Appellants' claimed invention is directed to a method for depositing an adhesion-promoting layer on the metallic layer of a chip. The adhesion-promoting layer is deposited by using a wet multi-component process bath which comprises an inhibitor, such as lead. The method analyzes the concentration of lead during the process and adjusts the concentration to a constant value. The adjustment is independent of adjustments to concentrations of other components of the bath. Appealed claim 10 additionally recites that the sequence of adding first, second and third regenerating solutions serves to decouple the regulation of the lead concentration from the regulation of the concentration of the other bath components.

Appealed claim 10 stands rejected under 35 U.S.C. § 112, second paragraph. Also, the appealed claims stand rejected under 35 U.S.C. § 103 as follows:

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(a) claims 1-5, 7 and 9-13 over van der Putten in view of Araki;

(b) claim 6 over van der Putten in view of Araki and Zirino;

(c) claim 8 over van der Putten in view of Araki and Fakler;
and

(d) claim 16 over van der Putten in view of Araki and Yamakawa.

We have thoroughly reviewed the respective positions of appellants and the examiner. In so doing, we agree with appellants that the examiner's § 112, second paragraph rejection is not sustainable. However, we fully concur with the examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the examiner's § 103 rejections for the reasons set forth in the Answer, which we incorporate herein, and we add the following for emphasis only.

We consider first the examiner's rejection of claim 10 under § 112, second paragraph. The examiner considers indefinite the claim 10 language that the regenerating "solutions are added to decouple a quantitative regulation of the process-bath lead concentration from a quantitative regulation of remaining

process-bath components." The examiner questions what is required of this step and "[i]s this limitation merely the inherent result of adding the regenerating solutions?" (page 3 of Answer, second paragraph). However, we agree with the appellants that the criticized claim language would be readily understood by one of ordinary skill in the art in light of the present specification. Clearly, appellants claim that the independent regulation of the lead concentration is the result of the sequential addition of the three regenerating solutions. The examiner has not given any reason to question "whether more is required" (id.). We note the examiner's statement that the appealed claims are treated as if the independent regulation of the lead concentration is the inherent result of the sequential addition of the regenerating solutions, and appellants do not take issue with the examiner's interpretation.

We now turn to the examiner's § 103 rejections. As explained by the examiner, van der Putten, like appellants, discloses a method for depositing an adhesion-promoting layer on a spatially bounded aluminum metallic layer of a chip by a wet-chemical plating process using a multi-component bath that includes the claimed components, including a lead stabilizer. As acknowledged by the examiner, van der Putten does not expressly

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teach analyzing the concentration of a lead inhibitor and adjusting its concentration during the process. Significantly, however, van der Putten specifically teaches the following:

An embodiment of the method according to the invention is characterized in that the concentration of the stabilizer is 0.1-1.5 mg per liter. Higher concentrations lead to a complete discontinuation of the metallization process. Lower concentrations lead to isotropic growth of the bond pads and, hence, to lateral overgrowth of the coating layer.

Column 2, third full paragraph. Accordingly, van der Putten provides a clear teaching of the importance of maintaining the lead concentration in a narrow concentration range. Hence, we have no doubt that it would have been obvious for one of ordinary skill in the art to monitor, or analyze, the lead concentration of the plating bath throughout the process and adjust it accordingly to keep the concentration within the disclosed range. In our view, the disclosure of Araki is hardly necessary for arriving at the legal conclusion that the claimed analyzing and adjusting of the lead concentration would have been obvious over the disclosure of van der Putten. However, Araki provides additional evidence for the obviousness conclusion. Araki explicitly teaches the continuous measurement and adjusting of the consumable components of an electroless plating bath that includes, inter alia, lead as a stabilizer. Araki, at column 9,

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lines 51 et seq., includes the lead stabilizer as a consumable component that is monitored and added with a replenishing solution.

Appellants contend that Araki shows the measurement of the metal value in the bath, i.e., nickel, and nowhere does the reference make mention of "analyzing the concentration of an inhibitor in the bath, or of analyzing the concentration of each component in the bath" (page 4 of Brief, last paragraph). However, as explained above, Araki expressly discloses analyzing and adjusting at least one of the consumable ingredients in the bath, which includes lead among others (see Abstract, column 5, lines 42 et seq., and column 9, lines 49 et seq.). Also, inasmuch as Araki discloses that "the plating bath is always maintained at a substantially constant concentration by the replenishment" (column 11, lines 4-5), it follows that the concentration of the lead stabilizer is maintained at a constant level through measurement and adjustment.

Appealed claim 10 additionally calls for the sequential addition of three separate regenerating solutions which decouples the regulation of a lead concentration from the regulation of the remaining bath components. As for the sequential addition of the three regenerating solutions, the examiner has properly explained

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that it is generally a matter of prima facie obviousness for one of ordinary skill in the art to alter the order of addition of ingredients to a processing bath or composition. See In re Burhans, 154 F.2d 690, 692, 69 USPQ 330, 332 (CCPA 1946). Araki discloses the use of multiple regenerating solutions, and appellants have not provided a convincing argument, let alone the requisite objective evidence, that the particular order of adding the regenerating components leads to an unexpected result. As for decoupling the regulation of the lead concentration from the regulation of the other bath components, we agree with the examiner that Araki suggests as much by teaching that a plurality of reservoirs may be used for the consumable components of the processing bath. The use of separate reservoirs would allow for the independent analysis and addition of separate components, and appellants have pointed to no teaching in the prior art that requires the regulation of the lead concentration to be coupled to the regulation of the other bath components.

Concerning appellants' argument with respect to claim 2 that "the Examiner has not provided any support" (page 6 of Brief, fifth paragraph) for the assertion that the succinic acid of van der Putten accelerates the deposition of the adhesion-promoting layer, appellants have not addressed the examiner's citation of

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Ying '484 as "evidence that succinic acid functions as an accelerator in electroless nickel plating solutions" (page 5 of Answer, penultimate paragraph).

We do not understand appellants' argument that "[t]he Examiner has not provided a single reference that discloses or suggests a solution containing lead (II) ions" (page 7 of Brief, sixth paragraph). As pointed out by the examiner, Araki, in the table at the top of column 12, discloses such a lead ion as a stabilizer.

Regarding claim 15, appellants maintain that "nowhere does van der Putten disclose or suggest a layer that includes a nickel layer and a superjacent gold layer" (page 9 of Brief, last paragraph). However, as noted by the examiner, van der Putten teaches an adhesion-promoting layer made of a nickel bump having a superjacent gold layer. Furthermore, appellants' specification acknowledges that a gold layer precipitated on a nickel layer by a wet process was known in the art (page 2 of specification, lines 8 et seq.).

As for the remaining arguments of appellants with respect to separate claims, we refer to the Examiner's Answer.

As a final point, we note that appellants base no argument upon objective evidence of nonobviousness, such as unexpected

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results, which would serve to rebut the inference of obviousness established by the applied prior art.

In conclusion, the examiner's § 112, second paragraph rejection is reversed. Based on the foregoing and the reasons well-stated by the examiner, the examiner's § 103 rejections are sustained. Consequently, the examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (effective Sep. 13, 2004; 69 Fed. Reg. 49960 (Aug. 12, 2004); 1286 Off. Gaz. Pat. Office 21 (Sep. 7, 2004)).

AFFIRMED

EDWARD C. KIMLIN)	
Administrative Patent Judge)	
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CHUNG K. PAK)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
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