

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DANIEL JOSELL, THOMAS P. MOFFAT,
and DANIEL WHEELER

Appeal 2007-4493
Application 10/444,060
Technology Center 1700

Decided: May 20, 2008

Before CATHERINE Q. TIMM, JEFFREY T. SMITH, and
LINDA M. GAUDETTE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the Examiner's non-final rejection of claims 1-4, 9-14, 17-18, 22-23, and 25-27. Although the action appealed from was a non-final rejection, we have jurisdiction pursuant to 35 U.S.C. §§ 6 and 134 since these claims have been twice presented and rejected. *See Ex parte Lemoine*, 46 USPQ2d 1420, 1423 (BPAI 1994).

We AFFIRM.

STATEMENT OF THE CASE

Appellants' invention generally relates to methods for void-free and seam-free plating of metal on substrates. (Spec. [0019].) Claim 1 is illustrative of the claimed methods:¹

1. A method for plating a metal conductor on a substrate, the substrate comprising at least one feature selected from the group consisting of a trench, groove, via, and recess, the method comprising in sequence, the steps of:

- (1) adsorbing a catalyst on the substrate; followed by
- (2) depositing the metal conductor on the surface of the substrate, while permitting the catalyst coverage to vary across said feature while depositing,
wherein the deposited metal is seam-free and void-free.

The Examiner relies upon the following references in rejecting the appealed claims:

Goosey	6,680,273 B2	Jan. 20, 2004
Imori	7,045,461 B2	May 18, 2006
Basol	6,534,116 B2	Mar. 18, 2003

- I. Claim 27 is rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.
- II. Claims 17-18, 23, and 25-27 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.
- III. Claims 1-2, 9-10, and 22-23 are rejected under 35 U.S.C. § 102(e) as being anticipated by Goosey.
- IV. Claims 3-4 and 11-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Goosey in view of Imori.

¹ Reproduced from Appendix A to Appellants' Supplemental Appeal Brief.

V. Claims 17, 18, and 25-27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Basol.

WRITTEN DESCRIPTION REJECTION
UNDER 35 U.S.C. § 112, FIRST PARAGRAPH

Claim 27 is rejected by the Examiner under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

Claim 27 reads as follows:

27. The method of claim 17, wherein the solution comprises catalyst in an amount less than 0.01 $\mu\text{mol/L}$.

The Examiner contends that Appellants' Specification does not disclose that the metal electrodepositing solution comprises catalyst solution in an amount less than 0.01 $\mu\text{mol/L}$, and, therefore, a claim limitation relating to such is new matter. (Ans. 5.) Appellants contend that each feature of claim 27 is fully supported by the originally filed Specification.

Specifically, Appellants argue:

However, the originally filed claims present catalyst ranges of no catalyst, 0 percent, (claim 12) and a lower limit of 0.01 $\mu\text{mol/L}$ (claim 4). The claims recite the range between these limits. Thus, the allegedly missing disclosure is part of the originally filed specification.

(Br. 6-7.)²

Correspondingly, the first issue before us is: Does the Specification as originally filed provide support for the claim 27 limitation "wherein the solution comprises catalyst in an amount less than 0.01 $\mu\text{mol/L}$ "? We answer this question in the negative.

² Our decision will make reference to Appellants' Supplemental Appeal Brief ("Br.", filed Jan. 11, 2007), and the Supplemental Examiner's Answer ("Ans.", mailed Apr. 4, 2007).

The following enumerated paragraphs pertain to disclosure from the originally filed Specification (including the originally filed claims):

1. The Specification describes a “Two-Step Process”. (Spec. [0022].)
2. “The first step of the Two-Step Process, is to derivatize a patterned wafer with a catalyst.” (Spec. [0023].)
3. In an exemplary embodiment, the first step of the process involves immersing a wafer in a solution containing a catalyst precursor. (Spec. [0023].)
4. “The second step of the Two-Step process involves electrodeposition of metal.” (Spec. [0026].)
5. In the exemplary embodiment, specimens produced in Step 1 are rinsed in distilled water, dried (Spec. [0023]) and transferred to an electrochemical cell containing an electrolyte (Spec. [0026]).
6. “Derivitization (Step 1) followed by metal deposition in a catalyst-free electrolyte (Step 2) allows the consumption of catalyst to be systematically studied.” (Spec. [0037].)
7. Independent claim 1 recites a two-step process.
8. Claim 2, which depends directly from claim 1, specifies that the first step of the claim 1 two-step process is an immersing step involving the use of *a catalyst-containing solution*.
9. Claim 4, which depends from claim 2, specifies that the catalyst is present in this *catalyst-containing solution* in an amount of between 0.01 and 10000 mol/L.

10. Claim 10, which depends directly from claim 1, specifies that the second step of the claim 1 two-step process is an electrolytic deposition step.
11. Claim 12, which depends from claim 10, specifies that the electrolytic depositions step is conducted in a catalyst free *electrolytic deposition solution*.
12. Claim 17 recites a two-step process. The second recited step requires “electrodepositing . . . from a solution, the solution being essentially catalyst-free”.

The “written description” requirement of 35 U.S.C. § 112, first paragraph, requires an applicant to convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention, *i.e.*, whatever is now claimed. *See Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991). Whether this rejection is for “lack of support,” “new matter,” or “lack of written description,” the requirement is the same. *See Vas-Cath*, 935 F.2d at 1560. The initial burden of presenting a *prima facie* case of unpatentability, on any ground, rests with the Examiner. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). “Thus, the burden placed on the examiner varies, depending upon what the applicant claims. If the applicant claims embodiments of the invention that are completely outside the scope of the specification, then the examiner or Board need only establish this fact to make out a *prima facie* case.” *In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996) (citation omitted).

Based on our review of the originally filed Specification (including the original claims), we are in agreement with the Examiner’s determination that claim 27 fails to meet the written description requirement of 35 U.S.C.

§ 112, first paragraph. It is readily apparent from the enumerated paragraphs above that the method of the invention involves two separate steps, each step involving the use of a different solution. The first solution, used in the first step of the inventive method, contains a catalyst (paragraphs 3 and 9, *supra*) while the second solution, used in the second step (i.e., the electrolytic deposition step) of the inventive method, is “essentially catalyst free” or “catalyst free” (paragraphs 6, 11 and 12, *supra*). In claim 17, the term “solution” is used in connection with the second step of the inventive method, i.e., claim 17 and dependent claim 27 refer to the second solution, or the electrolytic deposition solution. As explained by the Examiner:

[C]laim 12 is talking about *the electrolytic deposition solution* and claim 4 is talking about *the catalyst-containing solution*. These are two different solutions used in two different method steps. The amount of catalyst in these solution[s] cannot be used in place of the other because Applicants [do not describe] that in the specification. Therefore, the limitation recited in claim 27 contains new matter.

(Ans. 16-17 (emphasis in original).)

In other words, Appellants cannot properly rely on the claim 4 limitation relating to catalyst content in the first solution (i.e., the catalyst-containing solution) to support the claim 27 limitation relating to catalyst content in the second solution (i.e., the electrolytic deposition solution). (Ans. 16-17.)

The rejection of claim 27 for failing to fulfill the written description requirement of § 112, first paragraph, is therefore sustained.

INDEFINITENESS REJECTIONS
UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

Claims 17-18, 23, and 25-27 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner points out several antecedent basis errors in claims 17, 18, 23, and 27. (Ans. 4-5.) The

Examiner further rejects claim 23 on the basis that the term “changes” is indefinite. (Ans. 5.) Appellants argue that claims 17-18, 23, and 25-27 have clear meaning as evidenced by the Specification and the claims. (Br. 4-6.)

Claims 17, 18, 23, and 27 read as follows:³

17. A method for plating a metal on a substrate, the substrate comprising at least one feature selected from the group consisting of a trench, groove, via, and recess, the method comprising in sequence, the steps of:

- (1) providing the substrate,
- (2) initially adsorbing a catalyst on the substrate and thereafter,
- (3) electrodepositing the metal on the surface of the substrate from a solution, the solution being essentially free of catalyst, whereby coverage of the catalyst originally present on said substrate changes and remains on the surface of deposited metal, and

wherein the deposited metal is seam-free and void-free.

18. The method of claim 17, wherein the solution is free of catalyst.

23. The method of claim 22, whereby during said depositing step, surface coverage of said catalyst changes during metal deposition depending upon geometry of said feature.

27. The method of claim 17, wherein the solution comprises catalyst in an amount less than 0.01 $\mu\text{mol/L}$.

The Examiner rejects claims 17-18, 23, and 25-27 on the basis that the following terms or phrases are indefinite:

- 1) In claim 17, “being essentially free of catalyst” (Ans. 4, 16-17);
- 2) Also in claim 17, “the catalyst originally present on said substrate” (Ans. 4, 17);

³ Reproduced from Appendix A to Appellants’ Supplemental Appeal Brief.

- 3) Additionally in claim 17, “the deposited metal” (Ans. 4);
- 4) In claim 18, “free of catalyst” (Ans. 5);
- 5) In claim 23 “surface coverage of said catalyst” (Ans. 5);
- 6) Also in claim 23, “changes.” (Ans. 5); and,
- 7) In claim 27, “comprises catalyst.” (Ans. 5.)

As such, the overarching indefiniteness issue before us is: Did the Examiner reversibly err in finding that claims 17-18, 23, and 25-27 are indefinite? In accordance with our analysis of the seven sub-issues below, we answer this question in the negative for claims 17-18 and 25-27, and in the affirmative for claim 23.

The following findings of fact (“FF”) are relevant to our consideration of the seven indefiniteness issues presented:

1. Line 5 of instant claim 17 recites “initially adsorbing a catalyst.”
2. Line 7 of instant claim 17 recites the term “catalyst” twice, *i.e.*, “solution being essentially free of catalyst, whereby coverage of the catalyst originally present on” (emphasis added).
3. Paragraph [0023] of the Specification indicates that “[t]hroughout the specification and claims, the term catalyst is intended to include catalyst precursors, as well as the catalysts themselves.”
4. Paragraph [0023] further specifies “[t]he catalyst can also be a compound or a molecule including a functional group for tethering the molecule to the substrate”

5. Claim 5 as originally filed in the Specification indicates the catalyst is selected from the group consisting of SPS, MPSA, KSeCN and mixtures. (Spec. 13.)
6. Paragraph [0029] of the Specification recites both “[t]he coverage on the certain surfaces” and “catalyst coverage.”

Claim 17: “being essentially free of catalyst”

The Examiner contends that while “it appears” that the catalyst in the phrase “being essentially free of catalyst” is the same as the adsorbed catalyst positively recited earlier in claim 17, “it is unclear that it is.” (Ans. 5; see Ans. 16-17.) Appellants respond that “the invention, as described throughout the specification and claims, only describes the invention as being used with *one* catalyst,” and that interpreting otherwise would be “unreasonable.” (Br. 7.)

As such, the first sub-issue presented is: Has the Examiner reasonably interpreted the term “catalyst” in the phrase “essentially free of catalyst” to potentially be of a broader scope than the term “catalyst” recited earlier in the claim, thus rendering the claim indefinite? We answer this question in the affirmative.

The Specification of a patent application “shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.” 35 U.S.C. § 112. A claim must conform to the invention as set forth in the remainder of the Specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description. 37 C.F.R. § 1.75(d)(1). Antecedent basis must be laid for each recited

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element in a claim, typically, by introducing each element with the indefinite article (“a” or “an”). *See Slimfold Mfg. Co. v. Kincaid Properties, Inc.*, 626 F. Supp 493, 495 (N.D. Ga. 1985), *aff’d*, 810 F.2d 1113 (Fed. Cir. 1987) (*citing* P. Rosenberg, *2 Patent Law Fundamentals* § 14.06 (2d. Ed. 1984)). Subsequent mention of an element is to be modified by the definite article (“the”) or by “said” or “the said,” thereby making the latter mention(s) of the element unequivocally referable to its earlier recitation. *See id.*

Failure to provide explicit antecedent basis for terms does not always render a claim indefinite. If the scope of a claim would be reasonably ascertainable by those skilled in the art, then the claim is not indefinite. *Energizer Holdings Inc. v. Int’l Trade Comm’n*, 435 F.3d 1366, 1370-71 (Fed. Cir. 2006).

We note that “an analysis of claim indefiniteness under § 112 ¶ 2 is ‘inextricably intertwined with claim construction.’” *Energizer Holdings*, 435 F.3d at 1368 (quoting *Atmel Corp. v. Information Storage Devices, Inc.*, 198 F.3d 1374, 1379 (Fed. Cir. 1999)). Although the claims are interpreted in light of the Specification, limitations from the Specification are not read into the claims. *See In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). Claim language should be read in light of the Specification as it would be understood by one of ordinary skill in the art, keeping in mind that broad claim terms should not be limited solely on the basis of Specification passages. *In re Bigio*, 381 F.3d 1320, 1324 (Fed. Cir. 2004).

Moreover, the USPTO in issuing patents is not required to interpret claims in the same manner as judges who, post-issuance, operate under the assumption the patent is valid. *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997). 35 U.S.C. § 112, second paragraph “puts the burden of precise claim

drafting squarely on the applicant.” *Id.* at 1056; *see also Halliburton Energy Servs. v. M-L LLC*, 514 F.3d 1244, 1255 (Fed. Cir. 2008) (noting that “the patent drafter is in the best position to resolve the ambiguity in the patent claims, and it is highly desirable that patent examiners demand that applicants do so in appropriate circumstances so that the patent can be amended during prosecution rather than attempting to resolve the ambiguity in litigation”). Correspondingly, even though indefiniteness in claim language is of semantic origin, it is not rendered unobjectionable simply because it could have been corrected. *See In re Hammack*, 427 F.2d 1384, 1388 n.5 (CCPA 1970).

In this case, the first instance of “catalyst” in claim 17 is properly preceded by the indefinite modifier “a” (*see* FF 1). However, the second instance of “catalyst” is not preceded by “the,” “said,” or “the said” (*see* FF 2), and thus does not unequivocally refer to its earlier recitation. Like the Examiner (*see* Ans. 18), we determine that there exists significant ambiguity as to the scope of the second instance of “catalyst.” For example, does the second instance of “catalyst” refer to the same catalyst referred to earlier in the claim, or to a different catalyst or catalyst mixture?

Appellants argue that “the invention, as described throughout the specification and claims, only describes the invention as being used with one catalyst.” (Br. 7.) We find this statement unpersuasive, *inter alia*, because, not only does the Specification suggest using more than one catalyst (*see* FF 5), limitations from the Specification are not read into the claims. *See In re Van Geuns*, 988 F.2d at 1184. In fact, if Appellants’ intent is to claim just one catalyst, then claim 17, in failing to provide antecedent basis for “catalyst,” fails to comply with 35 U.S.C. § 112, ¶ 2 because Appellants are

not claiming what they insist in their Brief is the actual invention. *See In re Collier*, 397 F.2d 1003, 1005 (CCPA 1968) (holding a claim violated 35 U.S.C. § 112, ¶ 2 because, what Appellants insisted was being claimed, in fact, was not claimed).

Claim 17: “the catalyst originally present on said substrate”

The second sub-issue presented is: Did the Examiner reversibly err in determining that the limitation “the catalyst originally present on said substrate” renders claim 17 indefinite? For nearly identical reasons to that expanded *supra*, we answer this question in the negative. The limitation at issue clearly lacks antecedent basis, as claim 17 fails to recite a catalyst “originally present” on the substrate, *i.e.*, prior to the adsorbing step.

Claim 17: “the deposited metal”

The third sub-issue presented is: Did the Examiner reversibly err in determining that the limitation “the deposited metal” renders claim 17 indefinite? We answer this question in the affirmative.

Appellants argue that “the deposited metal” has proper antecedent basis based upon the recitation of the process step of “electrodepositing the metal” in line 6 of the claim. (Br. 5.) We agree that the scope of the phrase “the deposited metal” is readily ascertainable by those skilled in the art because there is only a single prior recited step of depositing, and the metal deposited is necessarily from that step.

In sum, we concur in the Examiner’s determination that the language “being essentially free of catalyst” and “the catalyst originally present on said substrate” renders claim 17 indefinite, but conclude that the Examiner reversibly erred in finding claim 17 indefinite on the basis of the limitation

“the deposited metal”. We therefore affirm the decision of the Examiner rejecting claim 17 under 35 U.S.C. § 112, second paragraph.

Claim 18: “free of catalyst”

The fourth sub-issue presented is: Did the Examiner reversibly err in determining that the limitation “free of catalyst” renders claim 18 indefinite? We answer this question in the negative.

In the same manner that the limitation “being essentially free of catalyst” in claim 17 renders the claim indefinite (expanded *supra*), so does the limitation “free of catalyst.” As pointed out by the Examiner, the term “catalyst” in claim 18 is potentially open to being another catalyst than that recited in claim 17, line 5. (Ans. 19.) Appellants counter that “[b]readth of a claim is not to be equated with indefiniteness.” (Ans. 7-8.) Such argument is not persuasive, as the Examiner is not objecting to the breadth of the claim, but rather, to indefiniteness in the intended scope of the term “catalyst.”

Therefore, in addition to concluding that claim 18 was properly rejected under 35 U.S.C. § 112, second paragraph, due to its dependency from claim 17, we also affirm the decision of the Examiner to reject claim 18 on the basis that the language “free of catalyst” renders the claim indefinite.

Claim 23: “surface coverage of said catalyst”

The fifth sub-issue presented is: Did the Examiner reversibly err in determining that the limitation “surface coverage of said catalyst” renders claim 23 indefinite? We answer this question in the affirmative.

As suggested by Appellants, we conclude that the “surface coverage of said catalyst” recited in claim 23 refers to the “catalyst coverage” in claim

1. (Ans. 8.) We further note that the terms “catalyst coverage” and “[t]he coverage on the certain surfaces” appear to be used interchangeably in the Specification (*see* FF 6).

Claim 23: “changes”

The sixth sub-issue presented is: Did the Examiner reversibly err in determining that the limitation “changes” renders claim 23 indefinite? We answer this question in the negative.

In the rejection, the Examiner concludes that the term “changes” in claim 23 and the term “vary” in claim 1 appear to have the same meaning, but that it is “unclear” whether these terms do have the same meaning.

(Ans. 6.) Appellants respond by arguing:

The Office Action also erroneously asserts the claim does not explain if “changes” of claim 23 is the same as “vary” of claim 1. As described throughout the specification and numerous times during the prosecution, according to claim 1, during the recited process during the act of depositing, the coverage varies across the feature, i.e., coverage varies from the adsorbed state (*see* Fig. 1). During deposition, claim 23 specifies that surface coverage changes across the feature, e.g., becomes more concentrated in the (bottom) corners of the via, but less concentrated at the convex corners, where the feature meets the surface. This is clear from the specification and particularly points out the invention.

(Br. 8.) We are not persuaded by this argument because Appellants fail to explain the relationship between the terms “vary” and “changes” in the context of the claims. Appellants’ response (*see* above) suggests that the scope of these terms is readily ascertainable from the Specification. However, Appellants have not specifically identified those portions of the Specification from which the meanings of “vary” and “changes” may be ascertained. Appellants have neither provided explicit definitions for these

terms nor definitively stated whether they have the same or different meanings. Therefore, we view Appellants' arguments as nonresponsive to the Examiner's determination that the term "changes" is indefinite (Ans. 6).

In sum, we concur in the Examiner's determination that the term "changes" renders claim 23 indefinite, but conclude that the Examiner reversibly erred in finding claim 23 indefinite on the basis of the limitation "surface coverage of said catalyst". We therefore affirm the decision of the Examiner rejecting claim 23 under 35 U.S.C. § 112, second paragraph.

Claim 27: "comprises catalyst"

The seventh sub-issue presented is: Did the Examiner reversibly err in determining that the limitation "comprises catalyst" renders claim 27 indefinite? For the same rationale as expanded on for claim 18, *supra*, we answer this question in the negative.⁴

Therefore, in addition to concluding that claim 27 was properly rejected under 35 U.S.C. § 112, second paragraph, due to its dependency from claim 17, we also affirm the decision of the Examiner to reject claim 27 on the basis that the language "comprises catalyst" renders the claim indefinite.

For the foregoing reasons, we affirm the decision of the Examiner rejecting claims 17, 18, 23, and 25-27 under 35 U.S.C. § 112, second paragraph.

⁴ We also note that Appellants argue claims 18 and 27 as a group, suggesting that the indefiniteness issue presented for the two claims is identical. Correspondingly, we find that claim 27 stands or falls with representative claim 18, discussed *supra*. 37 C.F.R. § 41.37(c)(1)(vii).

ANTICIPATION REJECTION UNDER 35 U.S.C. § 102(e)

Appellants argue claims 1-2, 9-10, and 22 as a group, and separately argue claim 23. We select representative claims 1 and 23 to decide the appeal as to this ground of rejection. 37 C.F.R. § 41.37(c)(1)(vii).

Appellants contend that Goosey fails to anticipate claim 1, because Goosey does not disclose “permitting the catalyst coverage to vary across [a surface] feature while depositing [metal].” (Br. 8-9.) Appellants argue, more specifically:

As described throughout the present specification and presented during prosecution, the coverage of the catalyst during deposition on the substrate varies, i.e., is non-uniform. In contrast, while Goosey et al. teaches to apply a film that covers a substantial portion of the substrate, but there is no disclosure that such a film results in varying coverage of the catalyst.

The Examiner finds that since Goosey discloses surface coverage of less than 100% (>95%, *see* col. 5, ll. 9-17), there is variation in coverage of the substrate, *i.e.*, varied coverage which would inherently extend to a surface feature. (*See* Ans. 20-21.) The Examiner reasons that because the >95% coverage remains on the surface of the substrate during the deposition step of Goosey (*see* col. 6, ll. 63-66), varied coverage across surface features is permitted during a depositing step. (*See* Ans. 21.) The Examiner further finds that Goosey teaches apertures and surface features present in the substrate to be coated (*see* col. 6, ll. 63-66), and it would be natural for catalyst to be deposited as shown in Appellants’ Figure 1. (Ans. 22.)

Based on the contentions of the Examiner and the Appellants, the issue presented is: Have Appellants identified reversible error in the

Examiner's determination that Goosey discloses, expressly or inherently, the limitation of allowing catalyst coverage to vary across a surface feature when metal is deposited? We answer this question in the negative.

The following additional findings of fact ("FF") were relevant to our consideration of this issue:

7. Goosey discloses applying a catalyst composition to a substrate so as to form a film covering >95% of the surface area of the substrate. (Col. 5, ll. 11-15.)
8. Goosey discloses drying the film to provide a uniform inactive catalytic film and then subsequently activating the catalyst prior to electroless plating. (Col. 5, ll. 18-20.)
9. Goosey teaches contacting the substrate containing the activated catalyst with an electroless plating bath at a temperature and for a time sufficient to deposit the desired metal layer. (Col. 6, ll. 49-51.) According to Goosey, "the substrates may be plated until any apertures or surface features present in the substrates are substantially filled or completely filled by the electroless metal deposit." (Col. 6, ll. 63-66.)
10. Goosey states: "[a]s electroless deposition tends to be conformal, it is preferred that the electroless metal deposit does not completely fill the apertures. Thus, it is preferred that the electroless deposit partially fills the apertures and then the substrate is removed from the electroless bath and plated electrolytically." (Col. 7, ll. 1-6.)
11. According to the Specification, superconformal film growth may be quantitatively described by a curvature-enhanced

accelerator coverage (CEAC) mechanism. (Spec. [0016].) “The CEAC mechanism is described in Superconformal Electrodeposition Using Derivatized Substrates, *Electrochemical and Solid-State Letters*, 5 (12) C 110-C 112 (2002).” (Spec. [0017].)

12. The Specification states that immediately following the first step, i.e., electrode derivatization (Spec. [0023]), “the catalyst 10 is uniformly scattered across the entire surface of the feature. (Spec. [0029].)
13. The Specification states that “[a]ccording to the CEAC mechanism, as the local area changes during the electroplating, the local catalyst coverage can either increase [sic] or decrease depending on the local geometry.” (Spec. [0029].)

“[A] prior art reference may anticipate when the claim limitations not expressly found in that reference are nonetheless inherent in it. ‘Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates.’” *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349 (Fed. Cir. 2002) (citations omitted).

Where the Examiner establishes a “reasonable assertion of inherency” under 35 U.S.C. § 102 that a claimed process is identical to a process disclosed by the prior art, the burden is properly shifted to the applicant to prove that the process of the prior art does not necessarily possess the characteristic relied on by applicant to differentiate a claim from the prior art. *In re Best*, 562 F.2d 1252, 1254-55 (CCPA 1977); *see also In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990).

We find that Goosey discloses a method which is substantially identical to Appellants' claimed process. Therefore, the Examiner reasonably found that Goosey's process would inherently permit catalyst coverage to vary across a feature during the electrodeposition step. Like Appellants, Goosey discloses a process in which a catalyst composition is applied to a substrate, followed by uniform scattering of the catalyst across the surface feature. (*Compare* FF 7, 8 *with* FF 12.) The substrate containing the activated catalyst is then contacted with an electroless plating bath at a temperature and for a time sufficient to deposit the desired metal layer. (FF 9.) Goosey does not specifically state that catalyst coverage is allowed to vary during electrodeposition. However, Goosey does disclose that electrodeposition tends to be conformal. (FF 10.) According to Appellants' Specification, it was known in the art at the time of the invention that during electrodeposition, superconformal film growth proceeds by a known mechanism, i.e., such film growth could be quantitatively described by a curvature-enhanced accelerator coverage (CEAC) mechanism. (FF 11.) Given the similarity in the processes of Goosey and Appellants, it appears that film growth during electrodeposition in Goosey's process would likewise proceed via the CEAC mechanism. In other words, during electrodeposition in Goosey's process, catalyst coverage would necessarily vary across the feature during film growth in the manner claimed in Appellants' claim 1.

Therefore, the burden to establish a patentable distinction between the claimed process and Goosey's process was properly shifted to Appellants. Appellants have not presented persuasive arguments or evidence to meet this burden. In particular, Appellants have not explained why, given the noted

similarities in process steps, Goosey's electroless plating step would not inherently result in Appellants' claimed step of "depositing metal on the surface of the substrate, while permitting catalyst coverage to vary across said feature during said depositing" (claim 1).

Turning to claim 23, which depends from claim 1, Appellants argue that "[t]here is no discussion of any change in surface coverage of the catalyst during the process of Goosey et al." (Br. 9.) However, we are in agreement with the Examiner's finding that Goosey appears to inherently disclose a process which meets the limitations of claim 23, based on Goosey's statement that "[a]s electroless deposition tends to be conformal, it is preferred that the electroless metal deposit does not completely fill the apertures" (FF 10). (Ans. 8.) In any event, we are in agreement with the Examiner's interpretation of the claim 23 limitation "surface coverage of said catalyst changes during metal deposition depending upon geometry of said feature" as requiring *no change* in surface coverage of the catalyst. (Ans. 21 (emphasis added).) Because "changes" as recited in claim 23 "depend[] upon the geometry of [a] feature," it follows that a geometry could result in no change in surface coverage of a catalyst whatsoever. (*See* Ans. 21.)

In view of the foregoing, we sustain the Examiner's § 102(e) rejection of claim 1, as well as the rejection of claims 2, 9-10, and 22-23 dependent thereon.

OBVIOUSNESS REJECTIONS UNDER 35 U.S.C. § 103(a)

Claims 3-4 and 11-14

The Examiner maintains a rejection of claims 3-4 and 11-14 under 35 U.S.C. § 103(a) as unpatentable over Goosey in view of Imori. (Ans. 9-10 and 22-24.)

The Examiner found that both Goosey and Imori disclose methods for plating a metal on a substrate. (Ans. 9 and 23.) The Examiner determined that it would have been obvious to have incorporated various features from Imori's method into Goosey's method to thereby achieve the invention as recited in claims 3-4 and 11-14. (Ans. 10.) Appellants contend that the Examiner failed to establish a *prima facie* case of obviousness because: 1) Imori fails to cure the deficiencies of Goosey with respect to independent claim 1, from which claims 3-4 and 11-14 depend; 2) the Examiner fails to allege that the references disclose or suggest the limitation added by claim 4; 3) the Examiner fails to particularly point out where the limitations recited in claims 11-14 are taught or rendered obvious by the references; and 4) the Examiner fails to provide motivation for modifying the process of Goosey to include the features of claims 11-14. (Br. 9.)

Correspondingly, the first obviousness issue presented is: Did Appellants identify reversible error in the Examiner's rejection of claims 3-4 and 11-14 under § 103? We answer this question in the negative.

A claimed invention is unpatentable if the differences between it and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. § 103. "The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1739 (2007). The question to be asked is "whether the improvement is more

than the predictable use of prior art elements according to their established functions.” *Id.*

Contrary to Appellants’ contention, we find that the Examiner provided a well reasoned basis for concluding that the invention as claimed in claims 3-4 and 11-14 would have been obvious to one of ordinary skill in the art at the time of the invention based on the combined teachings of Goosey and Imori. Appellants’ arguments include general assertions that the Examiner’s rejection is incomplete or insufficient. However, Appellants do not directly address the facts and reasons relied upon by the Examiner in rejecting claims 3-4 and 11-14. Having concluded that the Examiner established a *prima facie* showing of obviousness for the reasons well-stated in the Answer (*see* Answer 9-10 and 22-24), we are not persuaded by Appellants’ arguments.

We sustain the Examiner’s § 103(a) rejection of claims 3-4 and 11-14 over Goosey in view of Imori for the reasons well-stated in the Answer. *See In re Ahlert*, 424 F.2d 1088, 1091-92 (CCPA 1970).

Claims 17-18 and 25-27

The Examiner maintains a rejection of claims 17-18 and 25-27 under 35 U.S.C. § 103(a) as unpatentable over Basol. (Ans. 10-14 and 24-25.)

Appellants, in their Appeal Brief, argue claims 17-18 and 25-27 as a group. We select representative claim 17 to decide the appeal as to claims 17-18 and 25-27. 37 C.F.R. § 41.37(c)(1)(vii).

Appellants contend that the Examiner fails to make a *prima facie* case of obviousness because Basol’s electro deposition solution is not “essentially free of catalyst” as required in independent claim 17. (Br. 9-10.)

Thus the second obviousness issue presented is: Does Basol teach or render obvious a solution essentially free of catalyst as recited in independent claim 17?

We are unable to answer the above question. This is because there are ambiguities and inconsistencies in the claims that render the claims indefinite. *See* Indefiniteness Rejections, *supra*. Review of the rejection under 35 U.S.C. § 103(a) would require considerable speculation as to the scope of the claims. Such speculation would not be appropriate. *In re Steele*, 305 F.2d 859, 862 (CCPA 1962) (“[W]e do not think a rejection under 35 U.S.C. § 103 should be based on such speculations and assumptions.”). We, therefore, procedurally reverse the rejection of claims 17-18 and 25-27 under 35 U.S.C. § 103(a). We emphasize that this is a technical reversal of the rejection under 35 U.S.C. § 103(a), and not a reversal based upon the merits of the rejection.

ORDER

The decision of the Examiner rejecting claim 27 under 35 U.S.C. § 112, first paragraph, is affirmed.

The decision of the Examiner rejecting claims 17-18, 23, and 25-27 under 35 U.S.C. § 112, second paragraph, is affirmed.

The decision of the Examiner rejecting claims 1-2, 9-10, and 22-23 under 35 U.S.C. §102(b) as anticipated by Goosey is affirmed.

The decision of the Examiner rejecting claims 3-4 and 11-14 under 35 U.S.C. § 103(a) as unpatentable over Goosey in view of Imori is affirmed.

The decision of the Examiner rejecting claims 17-18 and 25-27 under 35 U.S.C. § 103(a) as unpatentable over Basol is reversed.

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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

JEFFREY T. SMITH, *Administrative Patent Judge*, concurring-in-part and dissenting-in-part:

I concur with the panel's decision to affirm the Examiner's rejection of claim 27 under 35 U.S.C. § 112, first paragraph; the rejection of claims 1-2, 9-10, and 22-23 under 35 U.S.C. §102(b) as anticipated by Goosey; the rejection of claims 3-4 and 11-14 under 35 U.S.C. § 103(a) as unpatentable over Goosey in view of Imori. I also agree with the reversal of the rejection of claims 17-18 and 25-27 under 35 U.S.C. § 103(a) as unpatentable over Basol.⁵ However, I respectfully dissent from the majority's decision to affirm the rejection of claims 17-18, 23, and 25-27 under 35 U.S.C. § 112, second paragraph, as indefinite.

I begin with the § 112, second paragraph rejection. The issue presented is: Has the Examiner established that the subject matter of claims 17-18, 23, and 25-27 does not meet the requirements of 35 U.S.C. § 112, second paragraph? I answer this question in the negative.

The Examiner contends that the subject matter of claims 17-18, 23, and 25-27 is indefinite. Specifically the Examiner states (Ans. 5-6):

Claims 17-18, 23 and 25-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 17

line 7, it appears that the "catalyst" is the same as the adsorbed catalyst recited in claim 17, line 5. However, it is unclear if it is.

⁵ My reasoning for this rejection appears below.

lines 7-8, "the catalyst originally present on said substrate" lacks antecedent basis.

lines 8-9, it appears that the "deposited metal" is the same as the electrodeposited metal recited in claim 17, line 6. However, it is unclear if it is.

Claim 18

line 2, it appears that the "catalyst" is the same as that recited in claim 17, line 7. However, it is unclear if it is.

Claim 23

line 2, it appears that the "surface coverage of said catalyst" is the same as the catalyst coverage recited in claim 1, lines 5-6. However, it is unclear if it is. If it is not, then what is the relationship between the surface coverage of said catalyst and the catalyst coverage?

line 2, it appears that the "changes" is the same as the vary recited in claim 1, lines 6. However, it is unclear if it is. If it is not, then what is the relationship between the changes and the vary?

Claim 27

line 2, it appears that the "catalyst" is the same as that recited in claim 17, line 7. However, it is unclear if it is. If it is, then it is suggested that the word -- the -- be inserted after the word "comprises".

“The legal standard for definiteness [under the second paragraph of 35 U.S.C. § 112] is whether a claim reasonably apprises those of skill in the art of its scope.” *In re Warmerdam*, 33 F.3d 1354, 1361 (Fed. Cir. 1994). The inquiry is to determine whether the claim sets out and circumscribes a particular area with a reasonable degree of precision and particularity. The definiteness of the language employed in a claim must be analyzed not in a vacuum, but in light of the teachings of the particular application. *In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971). Claim 17 states:

17. A method for plating a metal on a substrate, the substrate comprising at least one feature selected from the group consisting of a trench, groove, via, and recess, the method comprising in sequence, the steps of:

(1) providing the substrate,

(2) initially adsorbing a catalyst on the substrate and thereafter,

(3) electrodepositing the metal on the surface of the substrate from a solution, the solution being essentially free of catalyst, whereby coverage of the catalyst originally present on said substrate changes and remains on the surface of deposited metal, and

wherein the deposited metal is seam-free and void-free.

After consideration of the present record, I determine that a person of ordinary skill in the art would have realized that the claimed method comprising in sequence, the steps of: initially adsorbing a catalyst onto a substrate and thereafter, electrodepositing metal on the surface of the substrate from a solution. The claimed invention describes the solution utilized in the electrodeposition step as “being essentially free of catalyst”.⁶ After the electrodeposition step, the claimed invention describes the coverage of the catalysts, provided on the substrate after the adsorbing step, as “changes and remains on the surface of deposited metal”. Consequently, I would reverse the Examiner's rejection under 35 U.S.C. § 112, second paragraph.

Regarding claims 18, 23, and 25-27, I determine for reasons similar to those set forth above and in the Brief, 7-8, that claims 18, 23, and 25-27 reasonably apprise those of skill in the art of their scope. Consequently, I would reverse the Examiner's rejection under 35 U.S.C. § 112, second paragraph.

⁶ This would have been understood to be any catalyst.

Now turning to the prior art rejection, the Examiner rejected claims 17-18 and 25-27 under 35 U.S.C. § 103(a) as unpatentable over Basol.

The Examiner contends that Basol teaches an electrolyte solution with at least one additive disposed therein. The Examiner contends that the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because the electrolyte solution of Basol is essentially catalyst-free because "essentially catalyst-free" is a relative amount. (Ans. 11-12.)

In my opinion, the present record lacks sufficient evidence to establish unpatentability under § 103. As properly stated by Appellants (App. Br. 10), "the process of Basol requires the inclusion of the additive, i.e., catalyst, in the electrodeposition solution. As a result, the solution of Basol is neither 'essentially free of catalyst' (wherein catalyst is present, at most, at an impurity level), or free of catalyst (wherein no catalyst is present at all)". As Basol neither teaches nor suggests removing essentially all or all of the additive from the solution, I agree with Appellants that no prima facie case of obviousness has been made. Therefore, I would reverse this rejection.

Concurring-In-Part and Dissenting-In-Part

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PL initials:

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