

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SYMRISE AG AND SYMRISE INC.

PETITIONER,

v.

INOLEX INVESTMENT CORPORATION,

PATENT OWNER.

IPR2023-01035
Patent 10,995,048

**SUR-REPLY TO PATENT OWNER'S REVISED NON-CONTINGENT
MOTION TO AMEND**

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Exhibit 1002	Declaration of Dr. Douglass F. Taber
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Exhibit 1024	U.S. Patent No. 7,795,484 (“Koivusalmi”)
Exhibit 1025	U.S. Patent No. 4,234,752 (“Wu”)
Exhibit 1026	German Patent DE3915493 (“Voeste”) (translation)
Exhibit 1027	N.P Makgoba et al “ <i>Silication of - γ -alumina catalyst during the dehydration of linear primary alcohols,</i> ” Applied Catalysis A: General 297 (2006) 145-150 (“Makgoba”)
Exhibit 1028	W.G. Appleby et al. “ <i>Vapor Phase Dehydration of 1-Heptanol over Activated Alumina,</i> ” J. AM. CHEM. SOC. 66: 1938-1939, 1944 (“Appleby”)
Exhibit 1029	V. I. Komarewsky et al. “ <i>Catalytic Dehydration of 1-Hexanol and 1-Octanol,</i> ” J. AM. CHEM. SOC. 67: 557-558, 1945 (“Komarewsky”)
Exhibit 1030	L. G. Wade, Jr. Organic Chemistry, Chapters 7 and 8 (8th Ed. 2013) (“Wade”)
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Exhibit 1033	W. E. Schiegl and J. C. Vogel “ <i>Deuterium Content of Organic Matter,</i> ” EARTH AND PLANETARY SCIENCE LETTERS 7:303-313, 1970 (“Schiegl”)
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Exhibit 1042	G. G. Cortez <i>et al.</i> “ <i>Study of the Poisoning of γ-Al₂O₃ by Alkali Metals Addition,</i> ” J. Chem. Tech. Biotechnol., 53:177-180, 1992 (“Cortez”)
Exhibit 1043	P. Berteau and B. Belmon “ <i>Modified Aluminas : Relationship Between Activity in 1-Butanol Dehydration and Acidity Measured by NH₃ TPD,</i> ” Catalysis Today, 5:121-137, 1989 (“Berteau”)
Exhibit 1044	EP 2 990 395 B1 to (“Takamura”)
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I. Introduction

Patent Owner (“PO”) presents conflicting arguments in their Reply. With respect to the prior art, PO argues that a POSITA would not infer any obvious teachings beyond what is explicitly disclosed in the reference’s examples. With respect to estoppel and §112, PO relies entirely on teachings a POSITA would allegedly infer when reading the ’048 Patent. PO’s approach is the reverse of what the law requires, which permits obviousness rejections to rely on teachings outside the express disclosure but not §112 support. *Ariad Pharmaceuticals, Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (en banc) (“[A] description that merely renders the invention obvious does not satisfy the requirement” of §112).

PO’s Reply fails to rebut the unpatentability of the revised substitute claims as obvious over the prior art as explained in Petitioner’s Opposition to the Revised Motion to Amend (“Opp. to RMTA”). Moreover, none of PO’s arguments demonstrate substitute claims 29-44 satisfy the written description or definiteness requirements of 35 U.S.C. §112. Lastly, PO has not overcome Petitioner’s showing that PO is estopped from obtaining substitute claims 29-44. As such, the Board should not enter any of the proposed amendments.

II. Substitute Claims 29-44 are Obvious over the Prior Art

A. Substitute Claims are Obvious over Wright ’451

Petitioner has repeatedly pointed out how Wright ’451 renders the revised substitute claims obvious. *See e.g.*, Opp. to MTA at 13-18; Opp. to RMTA at 12-15.

This includes PO's acknowledgment that the features of the revised substitute claims are taught by Wright '451. RMTA at 18-19. Nevertheless, PO now argues that the specific ranges are not disclosed or suggested by Wright '451. Reply at 10-11. However, this argument requires PO to provide evidence of unexpected results to overcome the prima facie obviousness of overlapping ranges, which PO has failed to do. *See* Opp to RMTA at 5-11.

First, PO argues that its unexpected results are unrebutted. Reply at 11. However, Petitioner put forward six pages of rebuttal, showing that the results relied upon by PO are misinterpretations and fall in line with expectations based on the prior art of record. To maintain this argument, PO now argues that the prior art Wright '451 has better results over its entire range than the '048 Patent because the catalyst claimed in the '048 Patent is worse than the Wright '451 catalyst at 500 °C. Reply at 11-12 (citing Ex. 2010 at ¶114 admitting Wright '451 achieves "high conversion, high regioselectivity and long TOS" at higher calcination temperatures). PO cites to no cases supporting its argument that the unexpected result evidencing non-obviousness can be an unexpectedly worse result than the prior art.

Nonetheless, PO's arguments relying on unexpected worse results at only 500 °C necessarily concede that there are no unexpected results over the entire claimed range of calcination temperatures as required to overcome the presumption of obvious. *In re Peterson*, 315 F.3d 1325, 1331 (Fed. Cir. 2003) (rebuttal must provide

evidence of “unexpected results for the entire claimed range”). Indeed, Dr. Wright confirms in his Third Declaration that the results from the ’048 patent and the Wright ’451 are the same from 400 °C to 480 °C, which is consistent with his previous argument that only the “ceiling” is unexpected. Ex. 2010 at ¶7; Ex. 2006 at ¶131. If the results are the same for the unclaimed 400 °C as for the claimed 440 °C, then there can be no evidence of unexpected results over the entire temperature range claimed in the revised substitute claims.

PO also makes new arguments about unexpected results not made in the RMTA and that should not be considered by the Board. Reply at 11. Yet, even if considered, they are not persuasive. First, PO argues that the unexpected results are relative to the prior art’s use of “silanized catalysts,” but since Wright ’451 is not limited to silanized catalysts, this argument is irrelevant. Reply at 12; Paper 16 at 11-12. Second, PO argues that a POSITA would not have appreciated the improved results of using a calcium-promoted γ -alumina catalyst with Wright ’451. Reply at 12 (citing Ex. 2010 at ¶122). This is undercut by Dr. Wright’s admission that “a POSITA reading Wright ’451 would understand that a higher conversion and regioselectivity could be obtained by treating a γ -alumina catalyst with a calcium promoter followed by calcination compared to treatment with an alkali metal hydroxide.” Ex. 2010 at ¶95. As such, a POSITA would have expected a calcium-promoted γ -alumina catalyst to achieve superior results when used with the method

taught by Wright '451. Accordingly, Dr. Wright confirms that the results obtained from the teachings of Wright '451 were expected rather than unexpected.

PO also fails to address or identify how this teaching of Wright '451 impacts the POSITA's knowledge as it relates to other prior art of record. For example, Wu teaches an alkali metal hydroxide-based catalyst that achieves 97.7% regioselectivity and conversion in excess of 93.4%. Opp. to MTA at 21-22. As Dr. Wright admits, a POSITA would expect to improve on these results using the teachings of Wright '451. Ex. 2010 at ¶95. This is further evidence that the results are expected.

PO further argues that the results are unexpected because there is no reason to modify Wright '451's teachings. Reply at 11. However, Wright '451 explicitly contemplates the claimed ranges, and the results are consistent throughout the prior art cited in this proceeding. Opp. to RMTA at 8.

Also, regarding unexpected results, PO argues that Dr. Wright "credibly rebuts" Petitioner's arguments. Reply at 11. However, no such rebuttal is present. PO merely rehashes the previous arguments without addressing how the conversion of the starting alcohol remains constant and that the regioselectivity is consistent at various calcination temperatures. RMTA Opp. at 5-11; Ex 1040 at 24:8-17. Finally, PO submits new, untimely evidence of long felt need and failure of others. Even if this evidence were considered on the merits, PO provides no nexus between the claimed features and the alleged long felt need and failure of others. *Fox Factory*,

Inc. v. SRAM, LLC, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (there must be a “legally and factually sufficient connection” – i.e., a nexus – “between the evidence and the patented invention.”). Furthermore, PO improperly incorporates any alleged evidence from Dr. Wright’s Declaration, which circumvents the page limit.

Accordingly, the revised substitute claims are obvious over Wright ’451.

B. Substitute Claims 29-44 are Obvious over De Bruyn in view of Takamura

PO does not dispute that De Bruyn in view of Takamura teaches every limitation of the revised substitute claims. Reply at 10. Instead, PO argues that there is insufficient reason to combine De Bruyn and Takamura. Reply at 10. However, PO improperly relies on the bodily incorporation of the catalysts taught by the two references rather than the teachings of each reference to a POSITA. Reply at 10. De Bruyn teaches a calcium-modified γ -alumina catalyst and how to run the dehydration reaction. Ex. 1008 at [0037], [0053], [0068]-[0071], [0081]-[0083]; Ex. 1046 at ¶74; Paper 16 at 13-14. As such, the catalyst relied on in the rejection is expressly taught by De Bruyn. Ex. 1008 at [0037].

The teachings of Takamura provide details in a section called “Preparation Method of Oxide-supported Solid Catalyst” that discusses how to prepare a catalyst, e.g., promoter should be 1-3 wt% and to activate and maintain the modified catalyst, calcine it at 450 °C after impregnation. Ex. 1044 at [0054]-[0065]. De Bruyn’s calcium-modified catalysts are “known” in the art, and no further explanation is

required. Ex. 1008 at [0037]. Once the catalyst is known, a POSITA can optimize the reaction conditions. Ex. 1040 at 39:21-41:15. Petitioner combined De Bruyn with Takamura to make what is implied in De Bruyn explicit, namely, how the disclosed calcium-modified catalyst is prepared. This does not require any hindsight, but instead relies on the express teachings of the art. Opp. to RMTA at 16.

III. Claims 29-44 are unpatentable under 35 U.S.C. §112

A. No Written Description Support for Substitute Claims 29-44

Claim 29: “is produced in a conversion of at least 95% % [sic] and has a bio-1-alkene regioselectivity of 95% to about 99% from a single-pass reaction after at least 20 hours time-on-stream”

PO has not carried its burden to show where the specification of the ‘048 patent indicates possession of “a conversion of at least 95% % [sic] and has a bio-1-alkene regioselectivity of 95% to about 99%...”. Ex. 1046 at ¶31. This limitation is expressly recited in substitute claim 29. Substitute claims 30-44 depend directly or indirectly on claim 29 and thus also recite this limitation via their dependency.

PO argues that one of the examples – that includes various additional steps – also includes a flow rate of 0.2 mL/min. Reply at 7 (citing Ex. 1001 at 27:20-35). However, the alleged support for this limitation fails for at least two reasons.

First, PO fails to address that the example does not achieve the claimed results for regioselectivity. Example 5 itself merely refers to “octene selectivity” of 96%. Ex. 1001 at 27:33-35. Example 5 provides no further information on how much of

the octene is 1-octene and PO provides no evidence that this represents a 1-octene regioselectivity of 95% to 99%. Example 5 also fails to provide any conversion data and only indicates a chemical yield of less than 95%. Ex. 1001 at 27:20-35. Without additional data on regioselectivity and conversion, Example 5 cannot provide written description support for the claims.

Second, the PO provides no evidence that the inventor possessed multiple flow rates that achieved the claimed results. Instead, PO argues that a POSITA knows that flow rates can be changed along with temperature. Reply at 7. However, knowing that flow rate can be changed and knowing how the changes in the flow rate will impact the results are two different things. There is no guidance in the '048 Patent for a POSITA to know what flow rates beyond those expressly disclosed would have worked for the alleged invention.

PO also argues that a POSITA could calculate the WHSV for Example 5 to demonstrate possession of the invention. Reply at 7; Ex. 2010 at ¶¶63-64. However, PO does not limit the claim to a single flow rate or WHSV and provides no evidence that the specification supports multiple flow rates or WHSVs, let alone identify written description that discloses how a change in flow rate or WHSVs impacts the conversion and regioselectivity percentages of a reaction. This single example is not representative of a broader range for all flow rates and cannot show possession of all flow rates covered by the revised substitute claims. In fact, the inventor of the

'048 Patent, Dr. Wright, disputes that lab-scale implementations directly correlate to industrial-scale applications. Ex. 1040 at 113:15-116:3, 125:3-9. Thus, to the extent that higher flow rates are relevant, the inventor's own testimony demonstrates that he did not possess the alleged invention at the flow rates encompassed by the claims.

Finally, an argument improperly incorporated by reference from Dr. Wright's declaration suggests that because some prior art references can render obvious the claims, they support PO's argument that Example 5 alone shows possession by the inventors. Ex. 2010 at ¶64. However, Dr. Wright misunderstands the test for written description. PO needs to show possession of the full scope of the claims, which they have failed to do. *Ariad Pharma.*, 598 F.3d at 1352 (“[A] description that merely renders the invention obvious does not satisfy the requirement” of §112). Since Dr. Wright relies on the test for obviousness, not written description, his testimony on this point should be given little, if any, weight.

PO failed to meet its burden to show that the inventors were in possession of the full scope of the claims, and PO provides no evidence that the single example shows possession of the full range of flow rates covered by the claims. The claims are unpatentable under 35 U.S.C. §112 for lack of written description support.

B. Substitute Claims 29-44 are Indefinite

Substitute Claims 29, says in part “...dehydrating a bio-1-alcohol by heating the bio-1-alcohol in a continuous flow reactor at a temperature of 240 °C to 360 °C

with a calcium-promoted γ -alumina catalyst...”. This phrase is indefinite under 35 U.S.C. §112(b). This limitation is expressly recited in substitute claim 29. Substitute claims 30-44 depend directly or indirectly on claim 29 and thus also recite this limitation via their dependency.

In its Reply, PO agrees that the POSITA can read the specification to include both interpretations provided by Petitioner. *See* Reply at 8-9. However, PO and Dr. Wright make the argument that the claim should implicitly be construed to mean “the continuous flow reactor be heated at a temperature within the specified range. *Id.* at 8; Ex. 2010 at 75. PO’s attempt to rewrite the claim to provide definiteness on what is heated is improper. The claim states “heating the bio-1-alcohol”—not heating the reactor. The claim can, therefore, include both interpretations of the claim as argued by Petitioner. *See* Opp. at 4-5 (The second interpretation is that the 1-alcohol is heated at 240 °C to 360 °C).

PO also argues that other claims, e.g., claims 35, 38, 41, and 44, are “nearly identical” and not identified as indefinite. Ex. 2010 at ¶72. However, these claims are not “nearly identical” as PO suggests and support claim 29 being indefinite. The dependent claims show that when PO wants to claim a specific heating temperature for the reactor, it knows how to do so using the language recited in those claims. PO fails to address the differences in claim language between claim 29 and claims 35, 38, 41 and 44, which confirm indefiniteness. By limiting the reactor temperature but

not the temperature of the alcohol, claim 29 becomes impossible to operate. A reactor temperature of 315 °C to 350 °C (e.g., Claim 35) would prevent the alcohol in claim 29 from being heated to 360 °C as claimed. Accordingly, rather than the dependent claims creating certainty, as argued by PO, the dependent claims cause further problems with the independent claim.

The fact that PO provides an implicit construction of claims 29-44 that changes the wording is evidence that the claims, as currently drafted, are indefinite. PO chose language that does not reasonably inform a POSITA of the scope of claims 29-44 and these claims are thus unpatentable.

IV. The Substitute Claims are Subject to Estoppel

PO has alleged multiple times that, in their view, a POSITA is only capable of using the explicit examples provided in a reference and cannot infer anything beyond what is actually written. For example, in Ex. 2010 at ¶116 Dr. Wright says:

As I have testified, the relatively low level of education and experience held by such a POSITA would not permit him or her to make inferences beyond the examples and most preferred embodiments of *Wright '451*.

While Petitioner disagrees with this assessment of a POSITA as explained in its previous reply, but if the Board accepts PO's argument that a POSITA is unable to take any teachings outside of the examples explicitly disclosed, then PO's arguments are subject to estoppel. This is because when PO disclaimed a method to obtain 95-99% regioselectivity, that disclaimer encompassed the singular example disclosed

in the specification to obtain that 95-99% regioselectivity. In other words, if a POSITA is unable to make any “inferences beyond the examples” expressly disclosed, as Dr. Wright opines, then there is no method or process in the ’048 Patent to obtain 95-99% regioselectivity other than what was previously disclaimed.

Furthermore, in the Opp. to RMTA, Petitioner also pointed out that the identified differences are not patentably distinct over what was disclaimed. Opposition at 20-22. Initially, the disclaimed claims of the ’803 patent have to be considered in light of the specification. *Gen. Foods Corp. v. Studiengesellschaft Kohle mbH*, 972 F.2d 1272, 1280 (Fed. Cir. 1992) (step one is determining what is claimed). Then, it is determined if the differences to the revised substitute claims are patentably distinct. *Amgen Inc. v. Hoffman–La Roche Ltd.*, 580 F.3d 1340, 1361 (Fed.Cir. 2009). Rather than providing an argument, PO merely states that Petitioner’s evidence is inadequate. No patentable distinctions are identified, and the evidence in the records shows any differences are not patentably distinct. Opp. to RMTA at 20-22. This is consistent with a recently issued Federal Circuit opinion that IPR estoppel should have a “practical effect.” *SoftView LLC v. Apple Inc.*, 108 F.4th 1366, 1373 (Fed. Cir. 2024). The practical effect of PO’s disclaimer is that PO cannot recapture the disclaimed 95-99% regioselectivity by claiming the obvious steps of the singular example that achieves 95-99% regioselectivity.

Therefore, under PO’s assessment of the POSITA where a POSITA cannot

infer any teachings beyond the expressly provided examples, they have disclaimed the subject matter of the revised substitute claims.

V. Substitute Claims 29-44 are Procedurally Improper

PO obfuscates rather than addresses the procedural issues with the revised substitute claims. PO states that they have “consistently identified Dr. Wright’s prior work with silanized γ -alumina catalysts.” Reply at 6. However, Dr. Wright’s work is not limited to “silanized γ -alumina catalysts.” Further, if PO had “consistently identified” the previous work, then they would never have filed the original MTA that included claims that they now admit were rendered obvious by Dr. Wright’s previous patents. PO hides behind Dr. Wright’s subjective understanding of what his previous patents disclosed. Ex. 2010 at ¶¶97-98. However, the inventor’s subjective understanding of the prior art does not remove PO’s objective duty to disclose pertinent prior art. Based on PO’s and Dr. Wright’s omissions of Dr. Wright’s previous work, the Board should not consider PO’s or Dr. Wright’s arguments in favor of the revised substitute claims being patentable.

VI. CONCLUSION

Accordingly, revised substitute claims 29-44 of the ’048 Patent are not patentable, and Petitioner requests the RMTA be denied. The revised substitute claims are not patentable over the prior art, have no written description, are indefinite, and PO is estopped from arguing otherwise.

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CERTIFICATE OF SERVICE UNDER 37 CFR §42.6(e)(4)

The undersigned hereby certifies that a copy of the accompanying Sur-Reply to Patent Owner's Revised Non-contingent Motion to Amend is being served via email directed to the following email addresses provided in Patent Owner's mandatory notices:

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