

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AIR PRODUCTS and CHEMICALS, INC.
Petitioner,

v.

EVONIK OPERATIONS GMBH and EVONIK CORPORATION,
Patent Owner.

Case IPR2024-00611
U.S. Patent No. 10,471,380 B2

PATENT OWNER'S SUR-REPLY

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	PETITIONER’S REPLY SAYS NOTHING ABOUT GROUND II.....	1
III.	PETITIONER’S REPLY AS TO GROUND I CONFIRMS THAT IT FAILED TO MEET ITS BURDEN	2
A.	The Ungerank Patent Is Not Prior Art.....	2
B.	The Reply Fails To Demonstrate That A POSITA Would Have Been Motivated To Combine Scholz With The Ungerank Patent	5
1.	The Reply’s New Obviousness Theory Is Untimely And Should Be Disregarded.....	5
2.	The Reply’s New Theory Lacks Merit	7
C.	The Reply’s Arguments In Response To The Additional Defects The POR Identified In Ground I Lack Merit.....	12
1.	The Reply Fails To Demonstrate A Reasonable Expectation Of Success In Combining UCE1 With Scholz Figure 7	12
2.	The Reply Fails To Demonstrate That Scholz Teaches Limitation 1.f.ii	14
a.	The Reply Does Not Dispute The Correct Claim Constructions	14
b.	The Reply Fails To Demonstrate That Scholz Teaches Limitation 1.f.ii.....	14
3.	The Reply Fails To Demonstrate Any Problem Or Design Pressures That Would Have Led To The Claimed Solution	16
4.	The Reply Fails To Establish Why A POSITA Would Start With UCE1.....	18
D.	The Reply Fails To Meet Petitioner’s Burden With Respect To Dependent Claims 9 And 12 For Additional Reasons	21
1.	Claim 9.....	21
2.	Claim 12.....	22
IV.	PETITIONER’S ATTACK ON DR. GEISE’S CREDENTIALS IS IRRELEVANT AND MERITLESS.....	23
V.	CONCLUSION.....	25

TABLE OF AUTHORITIES

<i>Acceleration Bay, LLC v. Activision Blizzard Inc.</i> , 908 F.3d 765 (Fed. Cir. 2018)	7
<i>Adidas AG v. Nike, Inc.</i> , 963 F.3d 1355 (Fed. Cir. 2020)	9
<i>Cuozzo Speed Techs. v. Com. for Intell. Prop.</i> , 579 U.S. 261 (2016).....	4
<i>Echelon Fitness Multimedia, LLC v. Peloton Interactive, Inc.</i> , No. IPR2020-01186, 2022 WL 320411 (P.T.A.B. Jan. 25, 2022)	24
<i>Grunenthal GMBH v. Alkem Lab’ys Ltd.</i> , 919 F.3d 1333 (Fed. Cir. 2019)	13
<i>Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.</i> , 821 F.3d 1359 (Fed. Cir. 2016)	7
<i>KSR Int’l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007).....	18
<i>L.A. Biomedical Rsch. Inst. at Harbor-UCLA Med. Ctr. v. Eli Lilly & Co.</i> , 849 F.3d 1049 (Fed. Cir. 2017).....	8
<i>Medichem, S.A. v. Rolabo, S.L.</i> , 437 F.3d 1157 (Fed. Cir. 2006)	13
<i>Netflix, Inc. v. Avago Techs. Int’l Sales Pte. Ltd.</i> , No. IPR2021-01298, 2023 WL 1779866 (P.T.A.B. Feb. 6, 2023)	10
<i>Palo Alto Networks, Inc. v. Centripetal Networks, Inc.</i> , No. IPR2021-01153, 2022 WL 212245 (P.T.A.B. Jan. 24, 2022)	3
<i>Quanergy Sys., Inc. v. Velodyne Lidar USA, Inc.</i> , 24 F.4th 1406 (Fed. Cir. 2022)	8
<i>Robert Bosch LLC v. Westport Fuel Sys. Canada Inc.</i> , No. IPR2023- 00292, 2025 WL 383270 (P.T.A.B. Feb. 3, 2025)	10

<i>Samsung Elecs. Am., Inc. v. Prisua Eng’g Corp.</i> , 948 F.3d 1342 (Fed. Cir. 2020)	4
<i>SAS Inst., Inc. v. Iancu</i> , 584 U.S. 357 (2018).....	4
<i>Titanium Metals Corp. of Am. v. Banner</i> , 778 F.2d 775 (Fed. Cir. 1985)	21
Statutes	
35 U.S.C § 102(a)(1).....	3
35 U.S.C. § 102(a)(2).....	3
35 U.S.C. § 311(b)	1, 2, 4
35 U.S.C. § 313.....	4
35 U.S.C. § 315(b)	3
Administrative Procedure Act.....	4
Other Authorities	
37 C.F.R. § 42.107	4
37 C.F.R. § 42.23(b)	7
Appeal Board Consolidated Trial Practice Guide at 74 (Nov. 2019) (available at https://www.uspto.gov/TrialPracticeGuideConsolidated).....	7

I. INTRODUCTION

As detailed in the Patent Owner Response (“POR”), the trial has revealed numerous fatal defects in both grounds. Rather than defend the Corrected Petition, in reply Petitioner (1) abandons Ground II; (2) argues that an alleged “waiver” permits the Board to exceed its statutory authority under 35 U.S.C. § 311(b); and (3) pivots to a new obviousness theory for Ground I in which a POSITA’s “intuition” would (incorrectly) tell him or her that the retentate stage membrane of Ungerank Comparative Example 1 (“UCE1”) is larger than the feed stream stage membrane and look to Scholz’s Figure 7 only as confirmation of that hunch.

Patent Owner’s failure to respond regarding Ground II means it has effectively conceded the patentability of at least claims 6, 8, and 10, which are not challenged in Ground I. As to Ground I, Section 311(b) defines the scope of the IPR and is not waivable; Petitioner’s failure to rely on prior art is dispositive. On the merits, Petitioner’s new obviousness theory should be disregarded as untimely and speculative, and it is incorrect. Nor does the reply persuasively respond to the numerous other defects raised in the POR. The Board should find that Petitioner has failed to meet its burden with respect to all challenged claims.

II. PETITIONER’S REPLY SAYS NOTHING ABOUT GROUND II

The POR identified numerous defects in Ground II, which relies on Scholz alone, including that (1) Scholz does not render the “recycle volume” limitation 1.f.i

obvious; (2) Scholz does not teach “capacity” limitation 1.f.ii; and (3) for additional reasons, Petitioner failed to meet its burden with respect to dependent claims 8, 9, 10, 12, and 17. POR, 59-69. Neither the Reply nor the supplemental declaration of Petitioner’s expert, Dr. Baker, addressing Ground II, conceding Ground II’s failure. *See* EX2018-Baker-May-Dep., 12:24-13:5 (“Q. Now, in your supplemental declaration, you don’t offer any opinion that the Scholz article alone renders the claims of the Priske patent obvious, correct? A. I don’t do that. That’s true.”). Accordingly, because Ground I does not challenge claims 6, 8, and 10, the Board should find that Petitioner has failed to meet its burden as to those claims, and should also find that Petitioner has failed to meet its burden with respect to any challenged claim on the basis of Ground II.

III. PETITIONER’S REPLY AS TO GROUND I CONFIRMS THAT IT FAILED TO MEET ITS BURDEN

A. The Ungerank Patent Is Not Prior Art

The POR demonstrated that the Ungerank patent relied on in Ground I, AP1006, is not prior art. POR, 29-30. Thus, the Board has no statutory authority to cancel any claims on the basis of Ground I under 35 U.S.C. § 311(b). In reply, Petitioner argues that (1) “the corrected Petition relies on the disclosure in AP1038 as prior art” (Rep., 9), and (2) Patent Owner “waived” this issue by agreeing to Petitioner’s request to correct the petition and by not raising the issue in its preliminary response (Rep., 10). Both arguments are wrong.

First, the Corrected Petition does not “rel[y] on the disclosure of AP1038”; Ground I cites to AP1006 dozens of times, and never to AP1038. Dr. Baker has never considered AP1038, much less offered any testimony about it. EX2009-Baker-Dec.-Dep., 44:13-45:18; EX2018-Baker-May-Dep., 12:18-23. Unsurprisingly, therefore, the Board instituted this IPR on AP1006, not AP1038, and never cited the latter.¹ Inst. Dec., 7.

Indeed, Petitioner could not have changed the basis for Ground I in its Corrected Petition, which was filed on May 1, 2024, 68 days **after** Petitioner was barred under 35 U.S.C. § 315(b).² POR, 29-30.

Second, this issue is not waivable. Congress limited the scope of IPR to cover challenges raised “only on the basis of prior art consisting of patents or printed publications.” 35 U.S.C. § 311(b). Neither the Board nor a petitioner has the ability

¹ Even if the Board had understood Petitioner to be relying on AP1038, Petitioner’s blanket citation to the entirety of AP1038 would not suffice. *See, e.g., Palo Alto Networks, Inc. v. Centripetal Networks, Inc.*, No. IPR2021-01153, 2022 WL 212245, at *7 (P.T.A.B. Jan. 24, 2022) (“[a] brief must make all arguments accessible to the judges, rather than ask them to play archaeologist with the record.”) (quoting *DeSilva v. DiLeonardi*, 181 F.3d 865, 867 (7th Cir. 1999)).

² Petitioner’s argument that by citing non-prior art it “provided much more specific citations in support of its arguments” (Rep., 10) is of no moment, because none of those citations is to prior art. Further, Petitioner implies the sole reason for the corrected Petition was to change the citation to AP1038. Rep., 9-10. In fact, the original petition incorrectly asserted the Ungerank patent was prior art under 35 U.S.C. §102(a)(2). POR, 29 n.8. The Corrected Petition instead asserts incorrectly that “portions” of AP-1006 are prior art under 35 U.S.C. §102(a)(1) because they were published in AP-1038. Cor. Pet., 3.

to expand the scope of IPR to include challenges not filed “on the basis of prior art.” See *SAS Inst., Inc. v. Iancu*, 584 U.S. 357, 371 (2018) (agreeing “that the Director exceeded his statutory authority by limiting the review to fewer than all of the claims SAS challenged”); *Cuozzo Speed Techs. v. Com. for Intell. Prop.*, 579 U.S. 261, 275 (2016) (“the Administrative Procedure Act ... enables reviewing courts to ‘set aside agency action’ that is ... ‘in excess of statutory jurisdiction’”) (quoting 5 U.S.C. § 706(2)); see also, e.g., *Samsung Elecs. Am., Inc. v. Prisia Eng’g Corp.*, 948 F.3d 1342, 1353 (Fed. Cir. 2020) (“It would not be proper for the Board to cancel claims on a ground that is unavailable in an IPR.”).

Moreover, Patent Owner did not engage in any conduct that would constitute a “waiver.” By agreeing to Petitioner’s request to file a Corrected Petition, Patent Owner did not agree with any arguments made in the Corrected Petition (nor did Petitioner ask it to do so). Likewise, Patent Owner was not obligated to make all possible arguments in its Preliminary Response; Patent Owner is not **required** to submit any Preliminary Response. See 35 U.S.C. § 313; 37 C.F.R. § 42.107. Here, whether the Board would institute the Corrected Petition did not hinge on the prior art status of AP1006 because (now abandoned) Ground II did not rely upon that reference.

Due to Petitioner’s failure to timely identify prior art, the Board lacks statutory authority to reach the merits of Ground I.

B. The Reply Fails To Demonstrate That A POSITA Would Have Been Motivated To Combine Scholz With The Ungerank Patent

As to the merits, the POR showed that the Corrected Petition fails to establish that a POSITA would have been motivated to combine UCE1 with Scholz Figure 7 because (1) contrary to Petitioner’s obviousness theory, UCE1 is functionally complete, and (2) Petitioner’s hindsight-driven approach—mixing and matching details of UCE1 and Scholz—is logically and legally unfounded. POR, 41-47. Effectively conceding that the POR is correct, in reply Petitioner switches to a new obviousness theory, but its new theory is both procedurally improper and substantively incorrect.

1. The Reply’s New Obviousness Theory Is Untimely And Should Be Disregarded

Ground I of the Corrected Petition asserted that UCE1 taught all limitations of claim 1 *except* the membrane capacity limitations. *E.g.*, Cor. Pet., 18 (UCE1 “discloses every limitation in claim 1 except for element [1f.ii]”). With respect to membrane capacity, the Corrected Petition contended that UCE1 was silent, and thus a POSITA would need to look elsewhere to understand the membranes’ capacity ratios. *Id.* (UCE1 “does not provide details on the membranes’ areas (or their ratios)”); *see also id.*, 23. The Corrected Petition contended that the membrane capacity limitations were taught solely in Scholz Figure 7. *Id.*, 29.

The POR demonstrated—based on both the documentary evidence and the admissions of Petitioner’s expert—that Petitioner’s theory failed because UCE1 is **not** silent as to membrane surface area ratios, but instead states that “[e]ach stage consisted of a hollow fiber membrane module consisting of hollow polyimide fibers from UBE (NMB01 A type).” AP1006, 10:25-27. A POSITA would understand that the use of the same module in each stage means equal membrane surface areas—i.e., area ratios of 1:1. POR, 41-43. Thus, contrary to the Corrected Petition’s assertion, there was nothing missing from UCE1 and no reason for a POSITA to turn to Figure 7 of Scholz. *Id.*

Attempting to remedy its failure to account for the text of Ungerank, in reply Petitioner asserts that a POSITA would have disregarded UCE1’s express disclosure, and would have instead had the “intuition” that the second-stage membrane (the “retentate separation stage” of the challenged claims) in UCE1 is larger than the first-stage membrane (the “feed stream separation stage” in the challenged claims). Rep., 19. Petitioner thus abandons its theory that a combination with Scholz Figure 7 is necessary at all, arguing in essence that Ungerank inherently discloses all limitations of claim 1 (despite its express language to the contrary). According to the new theory, a POSITA would have looked to Scholz’s Figure 7 merely as confirmatory of that “intuition.” Rep., 19-20; EX2018-Baker-May-Dep. 24:7-25:25.

Because the Reply asserts “an entirely new rationale to explain why one of skill in the art would have been motivated to combine” the asserted prior art, it is impermissible and should be disregarded in its entirety. *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1370 (Fed. Cir. 2016) (“the Board did not err in refusing the reply brief as improper under 37 C.F.R. § 42.23(b)”). See Appeal Board Consolidated Trial Practice Guide at 74 (Nov. 2019) (available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>) (“CTPG”) 74 (“[A] reply or sur-reply that raises a new issue or belatedly presents evidence may not be considered.”); *id.* (“‘Respond,’ in the context of 37 C.F.R. § 42.23(b), does not mean proceed in a new direction with a new approach.”); see also *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 775 (Fed. Cir. 2018) (the Board did not err in refusing to consider portions of a reply declaration “rais[ing] a new obviousness argument ... that could have been made in the petition”).

2. The Reply’s New Theory Lacks Merit

Even were the Board to consider this new theory, it is without merit. **First**, Petitioner’s new argument is irreconcilable with the documentary evidence. Petitioner’s new argument (based entirely on the say-so of Dr. Baker in his Supplemental Declaration³ (AP1041)) is that a POSITA would disbelieve the text in

³ Dr. Baker’s naked assertion that a POSITA would have an “intuition” that CE1 already met the limitations of the challenged claim should also be disregarded as

Ungerank describing that each stage uses an identical membrane module and would instead “intuit[]” that that the retentate stage membrane has a larger capacity than the feed stream stage membrane. Rep., 19. However, Petitioner and its expert also admit that “Reference Example 1” in Priske-’380 is **the same** as UCE1. AP1041, ¶11; EX2018-Baker-May-Dep., 29:21-25 (“Q. And so you understand that reference example one in the Priske ’380 patent is Ungerank’s comparative example one, correct? A. That’s my belief, yes.”). As Priske-’380 itself expressly states, the retentate and feed stream stage membranes in UCE1 have the **identical** capacities. See AP1001-Priske-’380, 6:22-29 (In “WO 2012/000727 [i.e., the Ungerank application], ... all separation stages have identical membrane capacities.”); *id.*, AP1001-Priske-’380, 16:28-32 (“The Comparative-Example of WO 2012/000727 A1 was reproduced. Characteristics of this example are: ... Identical membrane capacities in all three separation stages”). On cross examination, Dr. Baker conceded that his “intuition” theory was contradicted in Priske-’380 itself. See EX2018-Baker-May-Dep., 31:5-10 (“Q. So that’s contrary to the intuition you had

speculative and unsupported. See *L.A. Biomedical Rsch. Inst. at Harbor-UCLA Med. Ctr. v. Eli Lilly & Co.*, 849 F.3d 1049, 1065-66 (Fed. Cir. 2017) (“[L]egal determinations of obviousness ... should be based on evidence rather than on mere speculation or conjecture.”) (citing *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1290 (Fed. Cir. 2006)); see also *Quanergy Sys., Inc. v. Velodyne Lidar USA, Inc.*, 24 F.4th 1406, 1417 (Fed. Cir. 2022) (“The Board acted within its discretion when it chose not to credit” “incomplete, unspecific, and ultimately conclusory” expert testimony.).

..., correct? A. Yes.”). Thus, the Reply’s new obviousness theory fails because it is contradicted by the express disclosures of Ungerank and Priske-’380.

Second, there is no reason that a POSITA familiar with UCE1 would look to Scholz Figure 7. Figure 7 includes two systems, of which Figure 7(a) is more than 10 times as profitable as 7(b) (AP1007-Scholz), but the system of Figure 7(a) has **worse** performance than UCE1 itself. UCE1 achieves higher recovery and purity of both carbon dioxide and methane than Scholz Figure 7(a). EX2018-Baker-May-Dep., 45:21-47:24 (“Q. So the methane recovery using Scholz’s Figure 7A would be lower than the methane recovery just using comparative example one of Ungerank as it already exists, correct? A. Yes.”). Petitioner has offered no explanation for why a POSITA would modify UCE1 to make it perform even worse than it already does. *See Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (“The obviousness inquiry does not merely ask whether a skilled artisan could combine the references, but instead asks whether ‘they would have been motivated to do so.’”).

Third, both UCE1 (as explained above) and Scholz refute Dr. Baker’s “intuition.” Scholz Figure 5 achieves 96% methane purity (the same purity as 7(a) and 7(b)) with a total retentate stage membrane area **lower** than the total feed stream

stage membrane area.⁴ See AP1007-Scholz, Figs. 5, 7; see also AP1041-Baker-Supp.-Dec, ¶30. Thus, Dr. Baker’s assertion that a POSITA would have concluded that the retentate separation stage membrane in UCE1 must have a larger capacity than the feed stream separation stage membrane because of the purity levels achieved cannot be reconciled even with Petitioner’s own prior art, and should not be credited. See *Robert Bosch LLC v. Westport Fuel Sys. Canada Inc.*, No. IPR2023-00292, 2025 WL 383270, at *9 (P.T.A.B. Feb. 3, 2025) (rejecting ground where petitioner’s “expert contradicts, indeed, utterly ignores, [the prior art’s] express teaching”); *Netflix, Inc. v. Avago Techs. Int’l Sales Pte. Ltd.*, No. IPR2021-01298, 2023 WL 1779866, at *16 (P.T.A.B. Feb. 6, 2023) (“we assign little to no weight to the cited [expert] testimony because it ... is contradicted by [the prior art’s] express disclosure”).

Fourth, a POSITA would not confirm an “intuition” regarding the membrane capacity ratios of UCE1 using Scholz Figure 7 for additional reasons. The two systems use different membrane materials (UCE1 uses polyimide, whereas Figure 7 of Scholz uses cellulose acetate), such that “their permeances may be different.” See EX2018-Baker-May-Dep., 50:5-51:7. Neither the Corrected Petition nor Reply

⁴ Contrary to Petitioner’s assertion that in Scholz Figures 5, 7, and 8, “each membrane is a different size” (Rep., 22), Scholz expressly states that its simulations assume a **fixed** module size and scale total area by varying the **number** of modules used. AP-1007-Scholz, 6.

account for that incongruency. Further, Scholz’s model is not a general-purpose teaching tool; it is a highly tailored optimization built on assumptions materially different from UCE1. Rep., 17 (“Scholz ... makes assumptions such as isothermal operation and ideal gases that are not as realistic as UCE1”). Applying a single design parameter—such as a relative membrane area—from Scholz’s optimized system to UCE1 without adjusting for these differences would defy Scholz’s own design logic. AP1007-Scholz, 1 (rule-of-thumb heuristics result in “suboptimal separation processes”). Dr. Baker admitted he did not test what the result would be of using the Scholz area ratios in Ungerank.⁵ EX2018-Baker-May-Dep., 47:25-48:22. Petitioner offers no explanation for why a POSITA would do what Scholz discourages.

* * *

The reply’s refrain that Scholz is offers “the cheapest sort of research” (Rep., 20, 21, 22) simply ignores all of the above. The absence of a consistent rationale, the speculative invocation of “intuition,” and the failure to meaningfully grapple with the design-specific nature of both references all point to the same conclusion: Petitioner’s combination fails because it is driven by hindsight reconstruction of the

⁵ Dr. Baker refused to answer whether he performed any simulations in preparing his supplemental declaration, on the basis of privilege. Any simulation testing he did must not have been consistent with his opinions; no simulation evidence is presented. See EX2018-Baker-May-Dep., 13:10-14:4.

challenged claims. *See, e.g., Hamilton Beach Brands, Inc. v. f'real Foods, LLC*, 908 F.3d 1328, 1342 (Fed. Cir. 2018) (affirming nonobviousness where the proposed combination relies “on the claim as a roadmap for selecting and modifying the teachings” of the prior art).

**C. The Reply’s Arguments In Response To The Additional Defects
The POR Identified In Ground I Lack Merit**

**1. The Reply Fails To Demonstrate A Reasonable Expectation
Of Success In Combining UCE1 With Scholz Figure 7**

The POR demonstrated that the Corrected Petition fails to establish a reasonable expectation of success because (1) Petitioner’s analysis is legally defective in focusing on the viability of “a design” rather than on the claimed invention; (2) to incorporate Scholz Figure 7’s teachings into the UCE1 system a POSITA would have had to modify numerous parameters, with unpredictable results; (3) the scale, assumptions, and constraints of UCE1 differ from those of Scholz; and (4) Scholz does not account for real-world conditions. POR, 47-53. In reply, Petitioner (1) argues that as a legal matter, reasonable expectation of success does not require evaluation of the actual proposed combination; and (2) suggests that reasonable expectation of success can be inferred here from finite options. Rep., 23-25. Petitioner is incorrect.

First, the requirement of “a reasonable expectation of successfully achieving the claimed invention” is a distinct requirement from motivation to combine. POR,

48 (citing *Eli Lilly & Co. v. Teva Pharms. Int'l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021)). Nevertheless, Petitioner argues that evaluating a combination of references does not necessitate consideration of whether and how their teachings would actually be combined. Rep., 23-24. Petitioner's cited cases do not support that position. In *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, the Board and Federal Circuit were persuaded that "simple" modifications would provide advantages while avoiding disadvantages. 825 F.3d 1373, 1381 (Fed. Cir. 2016). *In re Etter* does not discuss reasonable expectation of success at all. See 756 F.2d 852 (Fed. Cir. 1985).

Second, Petitioner's attempted reliance on three finite options for the relative sizes of membrane stages (larger, equal, or smaller) (Rep., 24) ignores the complex interplay of factors such as gas composition, temperature variations, and pressure differentials. POR, 47-53. For example, Scholz's Figures 7(a) and 7(b) demonstrate that a seemingly slight change in methane recovery—from 98.7% to 99.5%—substantially impacts profitability and feasibility. POR, 63. Dr. Baker acknowledged that Scholz's model operates under idealized conditions not reflective of UCE1. POR, 53. By ignoring these complexities, Petitioner fails to address the fact that "to have a reasonable expectation of success, one must be motivated to do more than merely to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result[.]" *Medichem, S.A. v. Rolabo, S.L.*,

437 F.3d 1157, 1165 (Fed. Cir. 2006) (vacating obviousness rejection); *Grunenthal GMBH v. Alkem Lab'ys Ltd.*, 919 F.3d 1333, 1344 (Fed. Cir. 2019) (affirming non-obviousness where the prior art did “not provide any guidance as to how the different solvents, varying temperatures, rates of agitation, or other variables ... should be manipulated”).

2. The Reply Fails To Demonstrate That Scholz Teaches Limitation 1.f.ii

a. The Reply Does Not Dispute The Correct Claim Constructions

The POR explained that “capacity” and “standard conditions as defined in the description” must be construed as they are defined in the specification of Priske-’380. POR, 27-28. In reply, Petitioner does not dispute that because the applicant acted as his own lexicographer, these two limitations must be construed and cannot be given “plain meaning” interpretations as the Petition does. Rep., 6; Cor. Pet., 4. Patent Owner’s constructions should be adopted.

b. The Reply Fails To Demonstrate That Scholz Teaches Limitation 1.f.ii

The POR explained that, having ignored the required constructions of “capacity” and “under standard conditions as defined by the specification,” Petitioner failed to demonstrate that Figure 7 of Scholz discloses limitation 1.f.ii. POR, 27-28 (claim construction); 30-34 (Scholz Fig. 7 does not disclose limitation 1.f.ii). In reply, Petitioner seeks to downplay its failure by arguing that the prior art

teaches limitation 1.f.ii even under the proper claim construction identified in the POR. Rep., 6-10.

That is incorrect. Petitioner points to no disclosure in Scholz—or in either of Dr. Baker’s two declarations—that establishes the nitrogen permeance of the Scholz Figure 7 membranes under the claimed “standard conditions.” Nor does Petitioner identify any nitrogen permeance values at all, let alone values that reflect nitrogen Grade 4.8 at the specified conditions. EX2008-Geise-Decl., ¶68.

Petitioner’s theory that identical permeance values can be presumed—and thus “cancel out”—is unsupported. Petitioner’s expert, Dr. Baker, admitted he applied a definition of “capacity” based on surface area alone, not the required product of surface area and nitrogen permeance under standard conditions. EX2009-Baker-Dec.-Dep., 82:22–83:15. Neither of Dr. Baker’s declarations describes any attempt to assess or compare permeance values for nitrogen (Grade 4.8) in either stage of Scholz. EX2008-Geise-Decl., ¶68.

Moreover, Petitioner has offered no evidence that the cellulose acetate membranes in Scholz Figure 7 are identical in all relevant respects—including thickness, processing, and structure—such that nitrogen permeance would necessarily be equal. As Dr. Geise explains, and Dr. Baker does not dispute, even membranes made of the same material can exhibit differing permeance for CO₂ than for nitrogen. EX2008-Geise-Decl., ¶¶69-70.

Finally, Petitioner has not shown that Scholz expressly or inherently discloses the use of Grade 4.8 nitrogen or any measurements under the claim-specified conditions, or otherwise argue that such conditions would have been obvious. Accordingly, Petitioner has failed to demonstrate that Scholz teaches limitation 1.f.ii.

3. The Reply Fails To Demonstrate Any Problem Or Design Pressures That Would Have Led To The Claimed Solution

The POR explained that even if the combination of Ungerank and Scholz taught all claim limitations (which it does not), Petitioner identified no problem known in the art that would have led a POSITA to the claimed invention because (1) Petitioner's own proffered identification of a market need for lower-selectivity membranes is factually unsupported; and (2) Priske-'380 is directed to a "new problem" that nothing in the prior art addresses. POR, 34-39. In the reply, Petitioner merely reiterates various aspects of its position. Rep., 34-39. That position remains meritless for the reasons given in the POR:

- Petitioner never explains why trade-offs between higher- and lower-selectivity membranes supposedly would have led a POSITA to the Priske-'380 ***invention as claimed***, and does not address the fact that both Ungerank and Scholz teach against the use of lower-selectivity, lower-cost membranes. Rep., 11; POR, 34, 36-38.

- Petitioner again asserts that Dr. Baker “explained in 2012” that smaller membranes are desirable where “low-cost energy was readily available,” but fails to address the fact that the cited source *says nothing about the cost of energy*, and Dr. Baker offered no opinions regarding the cost of electricity. Rep., 12; POR, 35 (citing EX2009-Baker-Dec.-Dep., 164:4-7; EX2008-Geise Del., ¶74); EX2018-Baker-May-Dep., 13:6-9.
- Petitioner does not explain the relevance of the generalization that “some operators sought to minimize initial investment costs ... by using lower-selectivity membranes” to Priske-’380, which does not require lower-selectivity membranes. Rep., 12-13; POR, 38-39.
- Petitioner has put forth no analysis of the relative cost or profitability of a system as claimed in Priske-’380 to that of the combination of UCE1 and Scholz Figure 7. EX2018-Baker-May-Dep., 14:5-17.

Moreover, Petitioner concedes that the “new problem” underlying Priske-’380—how to optimize membrane gas-separation systems for low energy costs—would not have led a POSITA to consider the teachings of Ungerank or Scholz. Rep., 13-15; *see also* POR, 34-37. But Petitioner misapprehends the implications of that concession—Petitioner’s failure is not that the “new problem” is the *only* potential consideration that might, theoretically, have led a POSITA to the claimed

invention. Rather, Petitioner's asserted prior art does not address that new problem, and Petitioner has not identified any *other* "design need or market pressure to solve a problem" in the manner claimed in Priske-'380. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

4. The Reply Fails To Establish Why A POSITA Would Start With UCE1

The POR explained that a POSITA would not have looked to UCE1 as a starting point for numerous reasons, including that (1) Ungerank itself teaches that features of UCE1 are undesirable; (2) the system of UCE1 is too small to be commercially useful; (3) UCE1 uses uncommon membranes; and (4) as Dr. Baker admitted, the system in Scholz Figure 7 shares the characteristics of UCE1 that Petitioner relies on. POR, 39-41. Petitioner presents five arguments to the contrary, but each is fatally flawed.

First, Petitioner's reference to Evonik's statement in a European opposition (Rep., 15-16) is misplaced. The European Patent Office's "closest prior art" framework is not the same as *KSR*'s obviousness inquiry, and Petitioner's identification of Evonik's statement in the European opposition is hardly the "gotcha" moment that the Reply attempts to make it out to be: Priske-'380 itself discusses UCE1 repeatedly and uses it as "Reference Example 1." But, as discussed above and contrary to the obviousness theory in the Corrected Petition, Priske-'380 does not use UCE1 as a "starting point" that is simply missing some details; it instead

fundamentally changes UCE1 so that it achieves radically different results. *See, e.g.*, AP1001-Priske-'380, 16:38-40 (“[T] he reference example differs from the present invention in that the membrane capacities are identical in all three stages.”); *id.* at 44-45 (“Reference example 1 was adopted ***in an inventive manner*** ...”). Moreover, pointing to the inventive aspect of the challenged patent as the basis for obviousness is the archetype of impermissible hindsight reconstruction.

Second, Dr. Baker’s rationalization that “there were no ‘absolute’ definitions of lower-selectivity and higher-selectivity” (Rep., 16) contradicts Ungerank’s own description of its membranes as having “moderate” selectivity (AP1006, 10:66-67), and undermines Petitioner’s (incorrect) characterization of the problem to be solved as the purported need for lower-selectivity, lower-cost membranes.

Third, Petitioner takes issue with Patent Owner’s assertion that UCE1’s polyimide membranes “were uncommon” because Dr. Baker testified that they had “‘a small fraction of the market’”. Rep., 16. But “uncommon” and “a small fraction of the market” are entirely consistent. The question is not whether polyimide membranes were commercially ***available***, but whether a POSITA would have started from an example that included such membranes, and then modify it to achieve the claimed invention. POR, 40-41.

Fourth, Petitioner disputes that Ungerank itself would direct a POSITA away from UCE1 toward its own superior alternatives because “UCE1 has extensive

details.” Rep., 17. But Petitioner never explains how “extensive details” overcome Ungerank’s own description of UCE1 as undesirable. POR, 39.

Fifth, Petitioner complains that Patent Owner “never identifies the specific laws or regulations it refers to” in citing UCE1’s 1% methane in the third permeate stream as a reason it would not have been an appropriate starting point. Rep., 17-18; POR, 39. But Ungerank itself states that “minimiz[ing] methane loss into the atmosphere” is necessary to “satisfy various legislators,” prompting a design target of less than 0.5% methane. AP1006, 12:62–66. Every Ungerank example after Example 1 meets this standard; UCE1 does not. The methane loss in UCE1—1.0%—is expressly taught as undesirable. AP1006, 9:44-54.

Petitioner’s Reply contains a new argument that “it is routine and inexpensive to decrease small amounts of organic compounds,” in an attempt to negate the import of UCE1’s failure to meet its own goals of minimizing methane loss. Yet, as Dr. Baker acknowledged, Ungerank itself teaches that meeting the methane purity requirement is economically important, describing a “particular advantage[]” of its process that the third permeate stream “can ... be released into the atmosphere ... without any need for further treatment of the gas by a catalytic postcombustion.” AP1006, 9:35-54; EX2018-Baker-May-Dep., 18:25-19:13 (Ungerank “says if you ... do, in fact, build the system with very low methane content in the CO₂, you can avoid” the need for postcombustion techniques).

Sixth, Petitioner disputes that UCE1 has limited commercial relevance because the crude gas flow rate in Priske-'380's examples is similar to that of UCE1, and because Dr. Baker testified that UCE1 is a “‘functionally complete’ ‘operative system.’” Rep., 18. But as Dr. Baker conceded, UCE1 is a “bench-level” design (EX2009-Baker-Dec.-Dep, 127:4–11) for which “any type of commercial membrane modules would have been far too large” (EX1041, ¶ 23).

D. The Reply Fails To Meet Petitioner's Burden With Respect To Dependent Claims 9 And 12 For Additional Reasons

1. Claim 9

The POR explained that Petitioner's combination of UCE1 and Scholz Figure 7 does not render the recycle volume requirement of claim 9 obvious for the additional reasons that (1) neither UCE1 nor Scholz Figure 7 discloses a recycle volume of 65-85% as claimed; (2) UCE1's rate of 86.7% is not so close as to render the range obvious; and (3) the mere possibility of simulating different recycle volumes does not explain why a POSITA would have targeted the claimed range. POR, 54-56.

In Reply, Petitioner mischaracterizes Patent Owner's discussion of *Titanium Metals*. The art there ranged between 0.01% and 0.16% from the claims, one to two orders of magnitude closer than here—and critically, the art there spanned both ends of the claimed range. *See Titanium Metals Corp. of Am. v. Banner*, 778 F.2d 775, 783 (Fed. Cir. 1985) (“[t]he proportions are so close that prima facie one skilled in

the art would have expected them to have the same properties”). Here, the alleged art is 10 to 100 times further from the claimed range, and the differences would result in a different process. See EX2008-Geise-Decl., ¶ 106.⁶ Further, even assuming the difference between 85% and 86.7% would “not typically cause substantial differences,” Petitioner’s analysis says nothing about the obviousness of the claimed *range* of 65-85%.

2. Claim 12

The POR explained that the Corrected Petition does not satisfy Petitioner’s burden with respect to claim 12 for the additional reason that Petitioner’s evidence does not show that the membranes in the feed stream stage of UCE1 have “a pure gas selectivity for CO₂/CH₄ of from 20 to 100” as claimed. POR, 57-58. Instead, the data Petitioner relied on was “for a different membrane material and not for the exact feed stream composition in UCE1.” Rep., 26-27. Petitioner does not dispute these facts.

Instead, Petitioner now argues, for the first time, that two references not previously identified—Bhatti (AP1048) and Staudt-Bickel (AP1049)—teach this limitation. These references were not cited in the original Petition, and their introduction at this stage constitutes an improper attempt to remedy deficiencies in

⁶ Contrary to Petitioner’s assertion (Rep., 26), Dr. Geise is a POSITA. See *infra* Section IV.

the Petition's prima facie case. *See supra* Section III.B.1 (citing, among other things, 37 C.F.R. § 42.23(b) and *Intelligent Bio-Systems*, 821 F.3d at 1369).

Moreover, Petitioner has not provided any motivation for a skilled artisan to combine the teachings of Bhatti and/or Staudt-Bickel with Ungerank. Nor do these references provide the necessary correlation between mixed-gas and pure-gas selectivity for the specific conditions of UCE1. The data in Bhatti and Staudt-Bickel pertain to different membrane materials and testing conditions, and do not address UCE1's specific feed stream composition of 61.2% CO₂.

IV. PETITIONER'S ATTACK ON DR. GEISE'S CREDENTIALS IS IRRELEVANT AND MERITLESS

Petitioner's criticism that Patent Owner's expert, Dr. Geise, lacks experience in biogas separations is both irrelevant and meritless. Rep., 2-3. Neither Petitioner nor Dr. Baker asserts error in any opinion Dr. Geise offered, much less contends that Dr. Geise was incorrect regarding any aspect of the science of gas permeability. *See, e.g.*, EX2018-Baker-May-Dep., 12:12-17 ("Q: So you agree that you reviewed Dr. Geise's declaration, but your supplemental declaration doesn't identify any errors that he made in that declaration, correct? A. That's correct, I guess.").

Further, Dr. Geise does satisfy the agreed definition of a POSITA.⁷ Dr. Geise has a Master's degree and a Ph.D. in chemical engineering, meeting the educational requirement. And as of 2014, Dr. Geise had more than three years of work experience in gas and liquid membrane separation systems, and had taught those topics for years. *See, e.g.*, EX2008-Geise-Decl., [0017]; EX1039-Geise-Dep., 80:9-15, 218:13-219:20.

Petitioner's primary criticism of Dr. Geise's expertise is that he has not done any research specifically on "biogas membrane separations." Rep., 2-3. But Petitioner's own proposed (and agreed) definition of a POSITA requires three years of work experience in membrane gas-separation systems "**not limited to**[]" biogas separation." In addition, as Dr. Baker agreed, Piske-'380 "is more general than just biogas," and independent claim 1 is "not limited to biogas." EX2018-Baker-May-Dep., 57:6-24. In other words, Petitioner's complaint is that Dr. Geise does not have experience that Petitioner elected **not** to require and that does not correspond to any requirement of Piske-'380. That complaint self-evidently lacks merit and, in any event, "there is no requirement of a perfect match between a declarant's experience

⁷ Petitioner proposed that POSITA must hold a "master's degree." By Petitioner's logic regarding Dr. Geise, Dr. Baker cannot testify from the perspective of a POSITA, as he has not earned a master's degree. EX2009-Baker-Dep., 38:11-20.

and the relevant field.” *Echelon Fitness Multimedia, LLC v. Peloton Interactive, Inc.*, No. IPR2020-01186, 2022 WL 320411, at *6 (P.T.A.B. Jan. 25, 2022).

V. CONCLUSION

For these reasons, the Board should find that Petitioner has failed to prove, by a preponderance of the evidence, that any of the challenged claims of Priske-’380 is unpatentable, and should confirm the patentability of all challenged claims.

Respectfully submitted,

Date: May 13, 2025

By: /Philip Y. Braginsky/
Philip Y. Braginsky
Reg. No. 40,527

PATENT OWNER'S UPDATED TABLE OF EXHIBITS

Exhibit No.	Description
2001	Expert Declaration of Dr. Markus Ungerank
2002	Curriculum Vitae of Dr. Markus Ungerank
2003	Linde Engineering – Membrane Plants
2004	Anderson, Case Study – Membrane CO2 Removal From Natural Gas
2005	Expunged
2006	Declaration of Janet Linn
2007	Declaration of Gregory H. Lantier
2008	Geise Declaration
2009	Baker Deposition Transcript
2010	White, L. S. <i>Evolution of Natural Gas Treatment with Membrane Systems</i> , Membrane Gas Separation, Freeman, B., Yampolskii, Y. Eds.; John Wiley & Sons, Ltd, 2010.
2011	Matteucci et al., <i>Transport of Gases and Vapors in Glassy and Rubbery Polymers</i> , Materials Science of Membranes for Gas and Vapor Separation, 2006; pp 1-47.
2012	Robeson, L. M., <i>The upper bound revisited</i> , Journal of Membrane Science (2008) 320, 390-400.
2013	Freeman, B. D., <i>Basis of permeability/selectivity tradeoff relations in polymeric gas separation membranes</i> , Macromolecules 1999, 32 (2), 375-380.
2014	Puleo et al., <i>The effect of degree of acetylation on gas sorption and transport behavior in cellulose acetate</i> , Journal of Membrane Science, 47, 301-332, 1989.
2015	He et al., <i>Theoretical study on concentration polarization in gas separation membrane processes</i> , Journal of Membrane Science, 153, 243-258, 1999.
2016	Expunged
2017	Declaration of Jason H. Liss
2018	Second Baker Deposition Transcript

CERTIFICATE OF WORD COUNT UNDER 37 C.F.R. § 42.24(d)

I hereby certify that the foregoing Patent Owner's Sur-Reply contains 5,595 words as measured by the word processing software used to prepare the document, in compliance with 37 C.F.R. § 42.24(d), excluding the parts exempted from the word count by 37 C.F.R. § 42.24(c).

By: /Philip Y. Braginsky/
Philip Y. Braginsky
Reg. No. 40,527

CERTIFICATE OF SERVICE

I hereby certify that on May 13, 2025, I caused a true and correct copy of the following documents:

- Patent Owner's Sur-Reply
- Certificate of Word Count Under 37 C.F.R. § 42.24(d)
- Patent Owner's Updated Exhibit List
- Exhibit EX2018

to be served via e-mail, as consented to by Petitioner, upon the following:

IPR55766-0003IP1@fr.com

By: /Philip Y. Braginsky/
Philip Y. Braginsky
Reg. No. 40,527