

IPR2024-00887
Patent 11,050,097

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

URT UMWELT UND RECYCLINGTECHNIK GMBH

Petitioner,

v.

DUESENFELD GMBH

Patent Owner.

Inter Partes Review No. IPR2024-00887
U.S. Patent No. 11,050,097

PATENT OWNER SUR-REPLY

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**PATENT OWNER’S EXHIBIT LIST
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Ex. 2003	DE 102012024876 A1 to Electrocyling GmbH (“Electrocyling”) (German)
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Ex. 2006	Gao Liu <i>et al.</i> , <i>Binder Interactions in the Electrodes of the Lithium-ion Batteries</i> , TFUG Conference, February 17, 2009
Ex. 2007	WO 2010/149611 A1 to LiMotive Company Ltd. (“LiMotive”) (German)
Ex. 2008	WO 2010/149611 A1 to LiMotive Company Ltd. (“LiMotive”) (English)
Ex. 2009	Certification of Translation of the LiMotive Patent
Ex. 2010	Declaration of Vani Dantam in support of Patent Owner’s Preliminary Response to the Petition
Ex. 2011	U.S. Patent No. 7,198,865 to Sloop (“Ecobat”)
Ex. 2012	Kinergy Corporation, <i>Transferring Heat with a Vibratory Bed Dryer</i> (2013) [https://web.archive.org/web/20131015131016/https://kinergy.com/uploads/documents/Transferring%20Heat%20with%20a%20Vibrating%20Fluidized%20Bed%20KDVFB-1.pdf]
Ex. 2013	MEWA User Manual (German)
Ex. 2014	MEWA User Manual (English)
Ex. 2015	Certification of Translation of the MEWA User Manual

Ex. 2016	Cross-flow hogger image [https://www.cutmetall.com/us/innovative-cross-flow-hogger-chain-head-set-p47892/] (last visited on August 17, 2024)
Ex. 2017	Commercial Air Filtration System Manual
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Ex. 2020	J. West, Special Communication from the American Physiological Society, <i>Barometric Pressure on to Mt. Everest: New Data and Physiological Significance</i> at 1063 (1999) (Downloaded from journals.physiology.org/journal/jappl (075.061.098.021) on August 7, 2024)
Ex. 2021	Duesenfeld GmbH Website – Recycling (https://www.duesenfeld.com/recycling_en.html) [https://perma.cc/3CG6-BDU9]
Ex. 2022	Ascend Technology Inc. Press Release
Ex. 2023	<i>Ascend Element, Inc.’s Answer to Complaint</i> , Case No. 1-23-cv-01194 (D. Del.)
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Ex. 2026	Sinothermo website available at: https://www.sinothermo.com/product-category/ https://www.sinothermo.com/news/different-types-of-convection-dryers/ https://www.sinothermo.com/products/ribbon-conical-vacuum-dryer.
Ex. 2027	V-ECO Series Rotary Shredders Brochure by Vecoplan

Ex. 2028	Amos Manufacturing Dual Shaft Shredders Brochure
Ex. 2029	Amos Manufacturing Quad Shaft Shredders Brochure
Ex. 2030	N. Somsuk et al., <i>Design and Development of a Rotary Airlock Valve for using in Continuous Pyrolysis Process to Improve Performance</i> , 2010 International Conference on Manufacturing Science and Technology (ICMST 2010)
Ex. 2031	<i>Duesenfeld GmbH v. Ascend Elements, Inc.</i> , No. 1:23-cv-01194-JFM (D. Del. Oct. 30, 2024), ECF No. 62
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Ex. 2039	[Reserved]
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Ex. 2043	Certification from Braunschweig State Trade Supervisory Office to Duesenfeld (German) [PROTECTIVE ORDER MATERIAL]
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Ex. 2052	Press Release: <i>Andritz and Duesenfeld sign cooperation agreement for battery recycling</i> , dated February 10, 2025
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Ex. 2061	Transcript of Volker Spies Deposition, Volume I, dated June 13, 2025
Ex. 2062	Transcript of Volker Spies Deposition, Volume II, dated June 16, 2025

I. INTRODUCTION

Petitioner's expert testified he was not "aware of any prior art that recognized that you could inactivate shredded battery material by vacuum drying alone." Ex. 2061 at 95:18-96:3. This confirms that the '097 patent broke from the prior art, which had used additives to suppress the toxic components of batteries, or had attempted to remove the hazards before processing the batteries. Ex. 2025 at ¶¶50-56. Patent Owner developed a surprisingly clean, efficient and easy way to treat potentially dangerous batteries. *Id.* at ¶¶172-174.

Petitioner's Reply relies on a construction that contradicts rulings of this Board and of the District Court. There is no basis to equate the separate claim terms "drying" and "inactivating." Thus, Petitioner's challenge as to Claim 12 and its dependent claims falls away, because LithoRec does not disclose a "drying device configured to inactivate the comminuted material." Moreover, Petitioner cannot show that LithoRec meets the "vacuum installation" limitation.

Petitioner fails to provide evidence to overcome the Board's preliminary ruling on Claim 1 and its dependent claims. Those claims have 300 hPa limitations undisclosed in LithoRec. Petitioner cannot show that DIN 28400 or Perry would be combined with LithoRec to teach all elements.

II. CLAIM CONSTRUCTION

Petitioner's claim construction position is wrong and diverges from the District Court's Order and from the Board's preliminary ruling in the co-pending IPR. Ex. 2031; IPR2024-00948, Paper 10, at 12.

A. Inactivate/inactivated

Petitioner's position on the "inactivate"/"inactivated" terms violates multiple canons of claim construction. Petitioner urges this Board to collapse the meaning of "drying" and "inactivat[ing]." Reply at 2-3. However, the use of different terms generally connotes different meanings. *See, e.g., Comaper Corp. v. Antec*, 596 F.3d 1343, 1348 (Fed. Cir. Petitioner relies on *Bancorp Services v. Hartford Life Ins.*, 359 F.3d 1367, 1373 (Fed. Cir. 2004). But *Bancorp* merely held that a claim term could be equated with related terms in the specification for purposes of Section 112 specification support. *Id.* *Bancorp* does **not** hold that two different claim terms can mean the same thing. Here, the specification is explicit that inactivating is the **result** of drying. Ex. 1001 at 8:54-55 ("The drying of the comminuted material results in inactivated comminuted material 42.').

Petitioner also attempts to establish a "lexicographic definition" of inactivat[ing], ignoring the standard required to overcome the "heavy presumption" of ordinary meaning. *CCS Fitness, Inc. v Brunswick Corp.*, 288 F.3d

1359, 1366-67 (Fed. Cir. 2002). Petitioner identifies nothing to establish a lexicographic definition.

Petitioner’s dictionary defines “inactive” as “not readily participating in chemical reactions.” Ex. 1028. But when asked if “that reactivity is still present” when “you dry the material just a little bit,” Mr. Spies confirmed the battery is still reactive. Ex. 2061 at 29:17-22 (“so drying just a little bit, it does not help you too much. It’s not safe – a safe status.”); 30:3-5 (Q: “So if you don’t dry the material long enough, it is still potentially unsafe?” A: “Yes.”); *id.* at 31:1-7 (“The problem is that they may not be dried enough, not be dry enough, so – and the final moisture you need to have in order to have a safe product is not guaranteed.”). Indeed, Mr. Spies testified that he *didn’t know* whether removing a small percentage of electrolyte would inactivate battery material. Ex. 2061 at 45:23-46:9 (“I don’t know whether . . . it’s sufficient, let’s say, to remove a small percentage of electrolytes to become inactive or not working properly.”). Thus, Petitioner’s expert declined to testify that “drying” and “inactivating” are synonymous.

Patent Owner is not seeking to read “safe for transport” into the claims. Rather, the “ordinary meaning” of “inactivat[ing]” controls, and this ordinary meaning would be understood to be “rendered safe for transport.” POR at 9-10. The specification is clear that this characteristic properly explains the ordinary meaning of inactivating. POR at 9-10.

B. Drying device configured to inactivate comminuted material

This term was already construed by the District Court. Ex. 2031. Petitioner wrongly seeks to splinter its construction among the proceedings by collapsing the meaning of “drying” and “inactivat[ing],” *supra*.

C. Drying the comminuted material

This term was already construed by the District Court. Ex. 2031. Petitioner does not explain why the phrase “in the conducting salt” matters to this IPR. The Board commonly declines to construe terms unless that proposal directly impacts the proceedings, as it should here. *Unified Patents LLC v. Velos Media, LLC*, No. IPR2020-00352, 2021 WL 2692168, at *4.

III. CLAIM 12 AND ITS DEPENDENT CLAIMS [GROUNDS 3 & 4]

A. LithoRec does not disclose a “vacuum installation”

Petitioner cannot identify in LithoRec a “vacuum installation ... configured to generate a vacuum in the drying device.” Petitioner cites the prosecution history. Ex. 1002 at 157 (“A pump that draws air may cause displacement of air but does not alone produce anything that might be qualify [sic] as a ‘vacuum.’”). This cited passage reinforces that the “fan” disclosed in LithoRec does not amount to a “vacuum installation.” POR at 21.

Mr. Spies admitted that LithoRec does not disclose a vacuum installation. Ex. 2061 at 61:13-17 (responding, when asked if LithoRec discloses a vacuum installation: “Not to the best of my memory, no.”).

Petitioner’s position is that “there is no doubt that LithoRec discloses a ‘vacuum installation,’” because LithoRec contemplates the possibility of using vacuum. Reply at 7 (citing Ex. 1016 at 226 (“speaks in favor of drying under vacuum”)). But Petitioner asserts anticipation, and there is no disclosure of a vacuum installation. Petition at 47 (“LithoRec is silent regarding the device that produces the vacuum for the dryer.”). For anticipation, there must be an express or inherent disclosure of the device. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co., Ltd.*, 851 F.3d 1270, 1273 (Fed. Cir. 2017). *Nidec* forecloses Petitioner’s argument that a vacuum installation can be inferred. *Id.* at 1274-75 (“*Kennametal* does not permit the Board to fill in missing limitations simply because a skilled artisan would immediately envision them.”). A vacuum installation is not necessary to the system described – LithoRec has described a system with a cross-flow hogger and a vibratory fluidized bed dryer, neither of which operate under vacuum. Ex. 2061 at 49:3-23.

Petitioner falls back to a disclosure elsewhere in LithoRec of vacuum drying. Reply at 6 (citing Ex. 1016 at 98). That section concerns a laboratory-scale experiment on a “separator/electrode composite,” and does not disclose

drying comminuted material. *Id.*; Ex. 2061 at 39:7-18; 41:11-14. Petitioner’s attempt to rely on this passage to say that “it was known to use vacuum drying to evaporate electrolytes prior to the ’097 patent” does not satisfy anticipation.

Nidec, 851 F.3d at 1273. Moreover, Mr. Spies’ declaration should be disregarded on this point. Although he testified that he wrote his own declaration, he admitted that he had not read this portion of LithoRec in over a year. *Compare* Ex. 2061 at 32:7-33:4 (“I wrote my declaration.”) *with id.* at 34:25-35:7 (“Maybe a year ago,” ... “maybe, maybe longer” since reading this section).

LithoRec’s disclosed dryer operates with a blower, not under vacuum. Reply at 7; POR at 17; Ex. 2061 at 49:13-23. The claim language requires that the “vacuum installation ... generate a vacuum in the drying device.” Ex. 1001 at Claim 12. Petitioner argues that other dryers might work. Reply at 7. But that is not the question. Anticipation focuses on what is expressly or inherently disclosed by LithoRec, not what might be known to a person of skill. *Nidec*, 851 F.3d at 1273.

B. LithoRec does not disclose a device configured to inactivate the comminuted material

Petitioner’s attempt to satisfy the “inactivat[ing]” limitations falls short, both due to the claim construction issues discussed above, as well as under the exacting standards for anticipation.

For anticipation, Petition must show that LithoRec expressly or inherently discloses a device configured to inactivate comminuted material. *Nidec*, 851 F.3d at 1273. But the most that Petitioner can muster is to repeat LithoRec’s aspiration to eliminate “the potential hazard of flammable solvents.” Reply at 8-9 (citing Ex. 1016 at 226). The claim language that Petitioner must satisfy is “an inactivation device comprising a drying device configured to inactivate the comminuted material.” Ex. 1001 at Claim 12. Petitioner identifies no disclosure of anything “configured” to inactivate battery material, expressly or inherently. Mr. Spies’ deposition confirms that merely removing some solvent does not result in inactivation. Ex. 2061 at 29:17-22; 30:3-5; 31:1-7; 45:23-46:9; *see also* Ex. 1028 (Petitioner’s dictionary definition of “inactive”).

Petitioner pivots to say that other devices, undisclosed in LithoRec, might work. Reply at 9-10 (“Furthermore, many dryers (including continuous dryers) were operable under vacuum at the time of the invention (*e.g.*, Draiswerke K-TR series dryer)....”). But the question is what LithoRec expressly or inherently discloses, not whether other dryers might have existed. *Nidec*, 851 F.3d at 1273. Petitioner gives no operating specifications on the drying capability of these additional dryers. Ex. 1023 at ¶¶36-37. Paragraphs 36-37 of Mr. Spies’ Reply declaration should be stricken for failure to present this evidence in the Petition.

CTPG at 73; *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016).

Petitioner cannot refute that LithoRec's drying process is not necessarily configured to result in inactivated material, as would be required for inherent anticipation. *Agilent Technologies, Inc. v. Affymetrix, Inc.*, 567 F.3d 1366, 1383 (Fed. Cir. 2009). No controls are disclosed in LithoRec to ensure inactivation of the battery material. Ex. 2025 at ¶¶117-120. And Mr. Spies admitted that the LithoRec process would not necessarily inactivate the battery material. Ex. 2061 at 29:17-22; 30:3-5; 31:4-7.

C. Petitioner fails to carry its burden to show that LithoRec is an enabling disclosure

Petitioner does not dispute that it has the burden to show that LithoRec is an enabling disclosure. *Elan Pharms., Inc. v. Mayo Found. For Med. Educ. & Research*, 346 F.3d 1051, 1054 (Fed. Cir. 2003); *Forest Lab'ys, Inc. v. Ivax Pharms., Inc.*, 438 F. Supp. 2d 479, 487 n.3 (D. Del. 2006), *aff'd*, 501 F.3d 1263 (Fed. Cir. 2007); 35 U.S.C. § 316(e). As a non-patent manuscript not considered by the examiner, there is no presumption of enablement. *In re Antor Media*, 689 F.3d 1282, 1288 (Fed. Cir. 2012); *Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1354 (Fed. Cir. 2003).

The Reply does not defend the disclosed embodiments as enabling the claims of the '097 patent. The vibratory fluidized bed dryer disclosed would not run under vacuum. Ex. 2025 at ¶¶95-99. Other convection dryers would not run under vacuum. Ex. 2025 at ¶¶99.1-99.3. The cross-flow hogger disclosed would not run under vacuum. Ex. 2025 at ¶¶107-108. Other “rotor shredders” do not run under vacuum. Ex. 2025 at ¶108.1. Mr. Spies admitted that none of the devices disclosed in LithoRec teach vacuum drying. Ex. 2061 at 49:3-52:13.

Mr. Spies' declaration on enablement is not credible. He plainly did not write his own declaration. Ex. 2061 at 32:7-33:4; 35:11-13. He had not read a cited portion from LithoRec in over a year. *Compare* Ex. 1023 at ¶¶8 & 20 *with* Ex. 2061 at 32:7-33:4 & 34:25-35-7. Despite declaring that he “confirmed with the Wayback machine” the public nature of documents, he testified he did not know what the “Wayback Machine” is. *Compare* Ex. 1023 at ¶63 *with* Ex. 2062 at 139:21-24. Despite opining about the terms “result-effective variables” and “outcome-effective variables,” he testified he did not know these terms. *Compare* Ex. 1023 at ¶53 & Ex. 1030 at ¶22 *with* Ex. 2062 at 138:8-139:8 (“I don’t know that term.”).

Mr. Spies recounted the hazards of battery recycling. Ex. 2061 at 10:25-19:12; 28:3-29:22 (recounting risks of “explosion,” “flammable substances,” “sparks,” “cancer,” “HF formation,” etc.). Accordingly, he agreed that “it’s

essential to design a system which is safe for operation, and you have to deeply look into that topic to design a safe system.” *Id.* at 11:5-7; *see also id.* at 12:8-16 (“[S]o it’s not the type of plant which is straightforward and easy.”). Of the ten-person technical team at Mr. Spies’ employer, all but one or two have a master’s degree or PhD. Ex. 2061 at 20:20-21:8; 58:15-59:25. A person with a bachelor’s degree would need “teamwork,” because “normally you don’t do it by yourself ... somebody else has a look at it.” *Id.* at 70:14-71:14; *see also id.* at 69:17 to 70:01 (““Q: How trivial is it to control for those hazards? A: . . . So they're all educated, university-educated persons, so it's not trivial, you need to know something about it for that, experience is necessary.”)

LithoRec reinforces this complexity. POR at 37. In 2015 there was a “high level of uncertainty” in obtaining batteries. Ex. 1016 at 8. Transporting them was hazardous. *Id.* at 33. Safety hazards, including potential explosions and deadly chemical by-products, complicated the work. *Id.* at 96. Not even the LithoRec authors could obtain the right equipment. *Id.* at 226.

The Reply does not dispute that the prior art uniformly taught a different approach – *i.e.*, that batteries needed to be detoxified before they could be comminuted. Ex. 2025, ¶¶50-56. Mr. Spies was not “aware of any prior art that recognized that you could inactivate shredded battery material by vacuum drying alone.” Ex. 2061 at 95:18-96:3.

Despite this evidence, Mr. Spies declares the problem is “trivial.” Ex. 1023 at ¶ 38 (“[A] person of ordinary skill would only have required minimal guidance to implement the claimed shredder and vacuum dryer system.”); *id.* at ¶47 (“[I]t would have been straightforward to implement LithoRec alone and/or in the various combinations set forth in the Petition”); *id.* at ¶48 (“[I]t would have been trivial to a POSITA to have implemented them.”); *id.* at ¶50 (“[T]hey would be expected parts of routine activities and would yielded [sic] exactly what was claimed.”). This is simply not credible. Rather, his testimony that teams of PhDs must “deeply look into that topic to design a safe system” is far more convincing. Ex. 2022 at 11:5-7. There is no basis to believe that a bachelor's degree holder, with a few years of experience in the field, reading just the sparse inferences from LithoRec about vacuum drying, would be enabled to practice the claimed invention. Ex. 1003 at ¶62.

D. Claim 13: The Reply fails to show an express or inherent disclosure that LithoRec would render electrochemical reactions impossible

The Reply cannot square the limited disclosures of LithoRec with its anticipation challenge to Claim 13 (“The battery processing installation according to claim 12, wherein the drying device is configured to dry the comminuted material until an electrolyte content in the comminuted material is so low that an electrochemical reaction is impossible.”). Ex. 1001, Claim 13. Petitioner relies

primarily on LithoRec’s aspirational goal of “eliminat[ing] the potential hazard of flammable solvents.” Reply at 15 (citing Ex. 1016 at 226). But as explained above, this statement of a goal does not expressly or inherently disclose a device “configured” to achieve this target.

Petitioner falls back on statements from the ’097 patent. Reply at 15. But that is improper. IPRs may be premised “only on the basis of prior art consisting of patents and printed publications,” not statements in the challenged patent. 35 U.S.C. § 311(b).

IV. CLAIM 1 AND ITS DEPENDENT CLAIMS [GROUNDS 1 & 2]

Petitioner’s Reply fails to overcome what the Board preliminarily ruled – LithoRec does not teach the 300 hPa limitation of independent Claim 1, and neither DIN 28400 nor Perry would have been combined with LithoRec to supply this teaching. And LithoRec is not enabled, *supra*.

A. Optimization is the wrong test

Petitioner asserts it would be obvious to “optimize” the claimed pressure range. But this is not a case where “the general conditions of a claim are disclosed in the prior art.” *E.I. DuPont de Nemours & Co. v Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018). Mr. Spies testified that he was not “aware of any prior art that recognized that you could inactivate shredded battery material by vacuum drying alone.” Ex. 2061 at 95:18-96:3. LithoRec does not recognize that

inactivation could be achieved by vacuum drying alone, *supra*. Rather, the prior art uniformly taught away from the claimed approach, using additives to neutralize the hazards, or removing the hazards, before comminuting the batteries. Ex. 2025 at ¶¶50-56. Thus, the “general conditions” of Patent Owner’s claim are not in the prior art – Patent Owner’s approach represents a fundamental break from what came before, demonstrating long-felt need and unexpected results. Ex. 2022 at ¶¶172-174. The ’097 patent was the first to recognize that batteries could be comminuted and that the hazards could be controlled simply by drying off the solvents under vacuum, which is safer, more efficient, and results in higher purity of recycled materials. *Id.* Patent Owner’s process allows for no HF release, particularly when processed at a temperature of 80°C or lower, as in Claim 9. Ex. 2051; Ex. 1001 at 3:9-14 & 5:7-8; Ex 2025 at ¶174. LithoRec envisioned scrubbing would be needed to control HF formation, and budgeted for these costs, which are not incurred under the claimed invention. Ex. 1016 at 190; Ex. 2051. These unexpected results of HF suppression in the ’097 patent, which are different in kind (not just in degree) confirm the non-obviousness of all claims. *Allergan, Inc. v. Sandoz Inc.*, 796 F.3d 1293, 1306 (Fed. Cir. 2015); *Genetics Inst., LLC v. Novartis Vaccines & Diagnostics, Inc.*, 655 F.3d 1291, 1308–09 (Fed. Cir. 2011); *Application of Merch.*, 575 F.2d 865, 869-70 (C.C.P.A. 1978).

There is no prior art “range” of vacuum drying pressures, following comminution of the batteries, being optimized here. *ModernaTx, Inc. v. Arbutus Biopharma Corp.*, 18 F.4th 1364, 1370 (Fed. Cir. 2021) (“The Board correctly recognized that we have never before applied the presumption of obviousness for overlapping ranges in a case in which the prior art does not contain the express disclosure of a range.”); *Teva Pharms. v. Corcept Therapeutics*, 18 F.4th 1377, 1382 (Fed. Cir. 2021); *Regeneron Pharms. v. Mylan Pharms.*, 714 F.Supp.3d 652, 744 (N.D.W. Va. 2024). The prior art simply was not focused on using vacuum drying as the means to inactivate shredded battery material. Ex. 2061 at 91:21-96:3 (initially identifying Mitsubishi (Ex. 1032) and Uchida (Ex. 1026), and ultimately agreeing that he was “not aware of any prior art that recognized that you could inactivate shredded battery material by vacuum drying alone”).

B. LithoRec does not disclose the 300 hPa limitation, itself or in combination with the views of a POSITA

There is no dispute that LithoRec lacks a disclosure that vacuum drying should be conducted at a vacuum level of 300 hPa or stronger. Petitioner’s Reply posits without evidence that through “routine optimization” a POSITA would have “easily achieved” this claimed pressure range. Reply at 16.

Petitioner must establish its invalidity case through prior art patents and printed publications, and cannot fill in gaps with expert opinion. *K/S Himpp v.*

Hear-Wear Techs., LLC, 751 F.3d 1362, 1365 (Fed. Cir. 2014); *Unified Pats. Inc. v. Velos Media, LLC*, No. IPR2019-00883, 2019 WL 699079, at *5 (P.T.A.B. Nov. 15, 2019); PTAB Consolidated Trial Practice Guide (Nov. 2019) (“CTPG”) at 36. The 300 hPa limitation is not taught in LithoRec, and Petitioner’s gap-filling with the supposed knowledge of an expert is baseless.

Petitioner’s Reply rests on a conclusory paragraph from its expert. Ex. 1023, ¶39. But in professing how it would be “no trouble” to optimize LithoRec to achieve the 300 hPa limitation, Mr. Spies ignores fundamental challenges to the problem. *Id.* Mr. Spies ignores that LithoRec teaches using a continuous process. Ex. 1016 at 226. Nowhere does Mr. Spies explain how it would be “routine” to run a continuously operating dryer at 300 hPa, or how this would even be achieved. Indeed, LithoRec teaches putting a “Rotary valve” between the shredder and the dryer. Ex. 1016 at 230 (Fig. G-1). A Rotary valve is unsuitable to maintain such a high pressure differential, given how leaky these rotary valves are. Ex. 2030; Ex. 2025 at ¶118. Petitioner does not dispute the other complications identified by Patent Owner with operating a continuous process under vacuum. Ex. 2025 at ¶¶119-120.

Petitioner further asserts that a person of skill would have sought a pressure level to allow evaporation of solvent and minimize the release of hydrogen fluoride, and that this “could easily have been accomplished by finding a phase

diagram for the electrolyte and adjusting the settings of the drying device to achieve the removal of the electrolyte.” Reply at 18. But despite asserting that such diagrams “were widely available,” neither Petitioner nor its expert supply any such diagrams, or explain how a pressure of 300 hPa or lower would be known to achieve this goal. Reply at 18; Ex. 1023 at ¶53 (opining only that a “person of ordinary skill would have known to look for such data in publicly available phase diagrams, ignition data, and decomposition data associated with the type of electrolytes being dried.”). Petitioner concludes with the bald assertion that the claimed range (*i.e.*, 300 hPa or less) is merely a “workable setting” based on the “design specification for evaporating DMC” and to decrease the likelihood of the “release of hydrogen fluoride.” Reply at 18 (citing Ex. 1039, 15:15-16:13, 21:5-22:25; Ex. 1023, ¶39). But the cited evidence *nowhere mentions* the words DMC or hydrogen fluoride. *See id.* This attorney argument should be disregarded, and this belated “knowledge of a POSITA” stricken as untimely.

Petitioner asserts that “PO’s expert conceded this point” that routine optimization would have identified the claimed range of 300 hPa or less. Reply at 17; Ex. 1023 at ¶39 (citing Ex. 1039 at 16:22-17:10 & 15:15-20:2). But Mr. Dantam simply agreed with the assertion that “a standard part of making sure a dryer works is to optimize variables like time, temperature, and pressure.” Ex.

1039 at 16:7-13. Mr. Dantam said nothing about 300 hPa or lower being the range that would have been discovered through routine optimization.

C. LithoRec does not disclose a batch process

For the first time on Reply, Petitioner now says that LithoRec actually teaches a batch system. Reply at 7 & 20-21. This new argument is improper. CTPG at 73. More, there is no such disclosure. To the contrary, LithoRec states that “batch drying is not used,” and discourages batch drying. Ex. 1016 at 226 (“It is assumed that the necessary process steps (inerting, filling, drying, emptying) of a discontinuously operating dryer require a longer work cycle in total than the pre-shredder. For this reason, batch drying is not used.”).

Aside from saying that “batch drying is not used,” the only other statement identified by Petitioner about batch processing concerns the *shredder*, not the dryer. Reply at 21 (citing Ex. 1016 at 226). On the very same page as that remark, LithoRec specifically *counsels against* drying the comminuted material in batches. Ex. 1016 at 226.

In attempting to say that LithoRec’s disclosure (“batch drying is not used”) actually teaches batch processing, Petitioner cites inapposite caselaw. *Celeritas Techs. Ltd. v. Rockwell Int’l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998) explains that when a prior art reference discloses an invention, and disparages it, that disclosed invention can still be anticipatory. Here, by contrast, batch drying is not

disclosed. Likewise, *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) explains that when multiple embodiments are disclosed, and one is chosen, this does not detract from the disclosure of the non-chosen embodiments – but here, batch drying is not disclosed. LithoRec teaches away from batch drying. *Pozen Inc. v. Par Pharm., Inc.*, 696 F.3d 1151, 1164–65 (Fed. Cir. 2012) (“A reference teaches away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.”) (citation omitted); *see also Santarus, Inc. v. Par Pharmaceutical*, 694 F.3d 1344, 1354-55 (Fed. Cir. 2012) (“A reference ‘teaches away’ when it ‘suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.’”). By teaching that “batch drying is not used,” LithoRec discourages pursuing batch drying.

In its Preliminary Guidance, the Board preliminarily ruled that LithoRec does disclose a batch system, citing to *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021) and *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197-98 (Fed. Cir. 2014). However, neither *Intel* nor *PAR* addressed a situation where the prior art said that the disclosed subject matter is “not” performed a certain way, as here (*i.e.*, “batch drying is not used”).

A person of ordinary skill would understand LithoRec’s discouragement against batch drying. Petitioner does not dispute that continuous systems beneficially avoid the accumulation of hazardous material. Ex. 2025 at ¶115.1. Holding such accumulated materials in a bunker would run the “danger of explosion, evaporation of gases,” including as caused by friction from the screw that moves material into and out of the bunker. Ex. 2061 at 15:8-16:21. A continuous system minimizes these hazards by drying away the solvent immediately. Ex. 2025 at ¶115.1.

D. Petitioner fails to establish a combination with DIN 28400

Petitioner’s Reply cannot overcome the Board’s preliminary ruling that DIN 28400 lacks teachings to combine with LithoRec. DIN 28400 is simply a glossary, as the Board already noted. Paper 10, at 18; Ex. 1018. The most that Mr. Spies can say about DIN 28400 is that this glossary confirms that low vacuum ranges “were well known” that that these “low vacuum ranges overlap the claimed range of 0 to 300 hPa.” Ex. 1023 at ¶55. But DIN 28400 has no teachings about which vacuum levels would be appropriate to any particular application. Ex 2025 at ¶129. DIN 28400 contributes nothing to show that “the general conditions of a claim are disclosed in the prior art,” and so cannot be used to argue that the ’097 patent was simply “optimizing” known parameters. *E.I. DuPont*, 904 F.3d at 1006.

Nor does Mr. Spies dispute the genesis of the reference to “300 hPa” in DIN 28400. As explained by Mr. Dantam, this reference to “300 hPa” in DIN 28400 is a reference to the atmospheric pressure at the top of Mount Everest. Ex. 2025 at ¶135. This figure has nothing to do with the atmospheric conditions applicable to battery recycling centers. *Id.* at ¶136.

E. Petitioner fails to establish a combination with Perry

Petitioner’s Reply cannot overcome the Board’s preliminary finding that LithoRec would not have been combined with Perry to teach the claimed invention. The Board preliminarily rejected this combination, noting the cited portions of Perry concern a shelf vacuum dryer operating in a batch mode, whereas LithoRec specifically teaches that “batch drying is not used.” Paper 10 at 21 (citing Ex. 1006 at 12-44 & Ex. 1016 at 226).

Mr. Spies confirmed in deposition that Perry is simply inapplicable to the drying of shredded battery material. Ex. 2061 at 64:16-67:21. He explained that shredded battery material is dried in a drum dryer. *Id.* at 67:1-4. Drum dryers work by agitation of the material in the drum, to “keep the material moving.” *Id.* at 67:6-11. He explained the “disadvantage of the shelf dryer where materials just lying on the shelf,” *id.*, and explained that with heat transfer from the shelves and by the distribution of the items on the shelves, “air moves over the shelves and takes away the moisture.” *Id.* at 65:19-24. Noting the differences between these

kinds of dryers, Mr. Spies explained that the designer of a dryer for battery recycling would **not** look to teachings from vacuum-shelf dryers. *Id.* at 67:18-21 (Q: “But when you design a dryer for battery recycling to dry shredded battery material, do you look to teachings from vacuum-shelf dryers?” A. “Normally not, no, no.”).

In light of this testimony, Petitioner has no evidence that Perry can be combined with LithoRec, even if LithoRec is found to disclose a batch process.

F. Claims 2 and 7

In contesting claims 2 and 7, Petitioner falls back on statements from the ’097 patent. Reply at 22-23 (citing Ex. 1001). But that is improper. IPRs may be premised “only on the basis of prior art consisting of patents and printed publications.” 35 U.S.C. § 311(b).

Nor do the cited statements from LithoRec establish invalidity of these claims. The passage of LithoRec concerning distillation of electrolytes from a “separator/electrode composite” does not involve comminuted material, as claimed. Reply at 23 (citing Ex. 1016 at 98). And Petitioner has failed to establish a connection to making electrochemical reactions impossible, or preventing the formation of flammable or explosive gas mixtures.

G. Claim 9 [Ground 2]

In challenging Claim 9, which recites “wherein drying occurs at a temperature of less than 80°C,” Petitioner’s Reply points to the Hanisch prior art.¹ However, as explained in Patent Owner’s Response, Petitioner fails to show that the low-temperature pre-dryer of Hanisch inactivates the comminuted material. POR at 51 (citing IPR2024-00948, Paper 10 at 13) (preliminarily finding that the Hanisch pre-dryer does not inactivate the comminuted material). In its Reply, Petitioner advances no additional arguments or evidence to show that Hanisch’s pre-dryer would inactivate the comminuted material. Thus, this missing element from Claim 1 is not supplied by Hanisch.

In arguing that “routine experimentation” would have yielded the 80°C limitation, Petitioner again cites no evidence. Despite referring to the “widely available phase diagrams” that supposedly would point to this temperature as being optimal, Petitioner supplies no such evidence. Reply at 24 (citing Ex. 1039, 15:15-16:13, 21:5-22:25; Ex. 1023 ¶¶53-54, 62). And Petitioner ignores that the prior art uniformly taught that the electrolyte solvents had to be removed before the

¹ The Reply cites “Ex. 1029, 6, 8.” That citation is to photos of dryers from Drais Mannheim, and has nothing to do with Hanisch. Patent Owner presumes that Petitioner meant to cite to Exhibit 1020.

batteries could be comminuted. Ex. 2025 at ¶¶50-55. Petitioner is engaged in prohibited hindsight reconstruction.

V. SECONDARY CONSIDERATIONS

Petitioner's Reply mischaracterizes the caselaw. Patent Owner demonstrated that its commercial facility in Wendeburg, Germany embodies claims of the '097 patent, including both independent claims 1 and 12, and has been commercially successful. *See* POR at 54-60 (citing Ex. 2040 & Ex. 2025 at ¶¶171-178). Petitioner's reply criticizes this evidence under an incorrect legal standard. Petitioner seems to be saying that the Wendeburg facility must run at *all* pressures covered by claim 1 (*i.e.*, from 0 hPa to 300 hPa), and *all* temperatures covered by dependent claim 9 (*i.e.*, all temperatures below 80°C). But this is not required. Petitioner's cited authority nowhere says that Duesenfeld's plant must operate across the entire range of claimed pressures and temperatures. *See Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373-74 (Fed. Cir. 2019).

For long-felt need, Patent Owner identified a collection of prior art references that show other entities trying to devise a solution for recycling lithium-ion batteries. Ex. 2025 at ¶¶50-55. Petitioner's Reply suggests that these other entities "previously solved" the problem at hand. Reply at 26. However, these other entities all added contaminants to the batteries, in attempting to detoxify the batteries before comminuting them. Ex. 2025 at ¶¶50-55. The problem at hand –

recycling the batteries by comminuting them straightaway and inactivating by vacuum drying alone – was only solved by the '097 patent. Ex. 2025 at ¶¶173-174.

Concerning unexpected results, Petitioner's Reply simply disagrees with Patent Owner's showing that the advances of the '097 patent over the prior art were unexpected. In particular, by avoiding the contaminants that the prior art assume were necessary, Patent Owner was able to achieve battery recycling at higher purity levels, with shorter drying times, and reduced need to dispose of toxic materials. Ex. 2025 at ¶174. Patent Owner's process allows for no hydrogen fluoride release, particularly when processed at a temperature of 80°C or lower, as in Claim 9. Ex. 2051; Ex. 1001 at 3:9-14 & 5:7-8; Ex. 2025 at ¶174. By contrast, LithoRec taught that HF would be produced, and accordingly budgeted for costs to control the HF. Ex. 1016 at 190. These unexpected results of HF suppression in the '097 patent, which are different in kind (not just in degree) confirm the non-obviousness of all claims. *Allergan*, 796 F.3d at 1306; *Genetics Inst.*, 655 F.3d at 1308–09; *Merchant*, 575 F.2d at 869-70.

As discussed above, it is proper for the Board to take these points into consideration. *Application of Merch.*, 575 F.2d at 869-70 (“We are aware of no law requiring that unexpected results relied upon for patentability be recited in the claims. . . .”); *Preemption Devices, Inc.*, 732 F.2d at 907; *see also In re Sullivan*,

498 F.3d 1345, 1353 (Fed. Cir. 2007) (“The issue here is not whether a claim recites a new use, but whether the subject matter of the claim possesses an unexpected use. That unexpected property is relevant, and thus the declarations describing it should have been considered by the Board.”).

For commercial success, Petitioner has properly shown that it generated profit through commercial exploitation of the invention of the '097 patent. Those profits arose from the Wendeburg plant, itself, as documented by the Declaration of Lydia Grote. Ex. 2040 at ¶9. Duesenfeld’s licenses of its European counterpart patents are additive to this baseline of commercial success established by the Wendeburg plant. Ex. 2040 at ¶¶10-12.

VI. CONCLUSION

For the foregoing reasons, as well as those submitted by Patent Owner in its Patent Owner Response, the Challenged Claims should be confirmed under 35 U.S.C. § 316.

Date: June 23, 2025

Respectfully submitted,

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WORD COUNT CERTIFICATION

Pursuant to 37 C.F.R. § 42.24(d), Patent Owner certifies that this Patent Owner Sur-Reply has a total of 5,594 words as counted by Microsoft Word, exclusive of the cover page, table of contents, table of authorities, under § 42.8, certificate of service, word count, appendix of exhibits or claim listing, and signature block (37 C.F.R. § 42.24(a)). The word count includes all other text, including headings, footnotes, and quotations. This is within the 14,000-word limit allowed under § 42.24(a)(1)(i).

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Patent 11,050,097

CERTIFICATE OF SERVICE

I hereby certify that on June 23, 2025, a true and correct copy of this Patent Owner Sur-Reply, including all accompanying attachments, and exhibits, has been served in its entirety via e-mail upon the following:

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