

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ascend Elements, Inc.,

Petitioner

v.

Duesenfeld GmbH,

Patent Owner.

IPR2024-00948
U.S. Patent No. 11,050,097

**PATENT OWNER'S REPLY TO PETITIONER'S OPPOSITION TO ITS
CONTINGENT MOTION TO AMEND**

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Duesenfeld GmbH (“Patent Owner”) submits this reply to Ascend Elements, Inc.’s Opposition to the motion to amend (“Opp”). The invention expressed in the proposed substitute claims is an elegant solution to problems in Lithium-ion battery recycling: the inactivation of battery material, with recovery of electrolyte solvents and salts, in a manner that does not generate Hydrogen Fluoride and renders the material safe for transport. *See* Patent Owner Response (“POR”), pp. 4-6, 55-57, EX2025, ¶¶58-61. Tellingly, the prior art references cited by Petitioner use complex alternative methods to deal with Hydrogen Fluoride generation—and none comes close to suggesting the ’097 patent’s solution. EX2022, ¶¶50-57, 66-74.

I. CLAIMS 22-31 ARE PATENTABLE

A. Ground 1: Petitioner has Failed to Carry its Burden with Respect to Hanisch and Dunagan.

Batch mode drying (all claims): Petitioner contends that Hanisch discloses a drying device operated in batch mode. Opp., 3-4. This is mistaken. Hanisch never discusses a drying *device* operated in batch mode, but rather only states “[t]he **method** according to invention is preferably performed as continual **process** and not in batches.” EX1004, 3:27-28 (Emph. Add.). Even if a statement about a batch *process* were equivalent to batch *drying*, the only disclosure of the “batch” process is an express statement *that it is not used*. Following this statement, Hanisch criticizes batch processes by noting that prior-art jet sieves operate in batches, but do not operate at commercial scales. EX1004, 3:29-33.

Petitioner’s cited cases are inapposite: most simply hold that the claimed element need not be the *best* possible choice among others in the prior art. *See, e.g., In re Fulton*, 391 F.3d 1195, 1196-98, 1200 (Fed. Cir. 2004). The present case, however, does not present merely a choice between different, equally-motivated prior art embodiments, but an actual teaching away. Hanisch’s criticism would guide a POSITA away from batch drying, which is what the law requires. *See In re Mouttet*, 686 F.3d 1322, 1333-34 (Fed. Cir. 2012). And even a teaching that might not quite be a “teaching away” is still relevant to obviousness. *See Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1363 (Fed. Cir. 2017). Petitioner’s citations to *Thorner* and *Control* are misleading—these cases address *claim interpretation*, not teachings away. *See Thorner v. Sony*, 669 F.3d 1362, 1364-67 (Fed. Cir. 2012); *Cont’l Cirs. v. Intel Corp.*, 915 F.3d 788, 796 (Fed. Cir. 2019).

Petitioner proposes modifying Hanisch to use batch drying *in some way*, but does not argue a sufficient motivation or any reasonable expectation of success. *See Eli Lilly & Co. v. Teva Pharms. Int’l GmbH*, 8 F.4th 1331, 1343-44 (Fed. Cir. 2021). Petitioner’s **motivation** argument amounts to arguing that a statement in Hanisch that a batch process *is not used* “implicitly acknowledges that its system **could** be run as a batch process.” Reply, 10 (Emph. Add.). Even if this argument were directed to *drying*, “[t]he 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.”” *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020)(Emph. Add.). Nor does the argument provide any reason *why* a POSITA would use a batch dryer, which would increase complexity and reduce throughput because of the time it takes to load and unload the dryer and purge the atmosphere of oxygen and water vapor. EX1004, 3:29-33; EX1031, ¶127; EX2061, 27:17-28:18. This is particularly true with a vacuum, because every time a batch dryer is opened to load or unload, the vacuum will need to be re-established, and precautions (e.g. a liquid nitrogen trap) would be needed for Hydrogen Fluoride. EX2061, 166:25-168:14. Petitioner also fails entirely to even *argue* that a POSITA would have had a **reasonable expectation of success** using batch drying in Hanisch, a failure that warrants rejecting the combination. *See Lilly*, 8 F.4th at 1343-44.

The failure of motivation and reasonable expectation of success is not a trivial oversight. This is a complex technology, *see, e.g.*, EX1004, 1:32-45, EX2022, ¶83, ¶¶185-187, ¶¶51-57, EX2061, 36:6-39:24, 41:15-25, 67:14-21, 121:11-124:11, in the presence of objective evidence of patentability (POR, pp. 55-62) in which even the prior art selected by the Petitioner evinces numerous different potential processes. POR, 25-30, 12-14; EX2022, ¶¶50-57, 66-74. Even small changes can have a great impact, *see e.g.*, EX2061, 34:10-19, 124:18-130:2, 138:22-139:9, 145:15-146:14, 147:15-148:12, 157:3-158:15, and Petitioner’s obviousness contention omits *every* detail beyond the word “batch”: Petitioner does not propose

a type of dryer, the modifications necessary to integrate it into Hanisch’s system (see, e.g., EX2022, ¶¶149-172), nor discuss the impact that would have on throughput, effectiveness at inactivation, safety, cost, maintenance, etc. Of course, Patent Owner cannot say exactly how Hanisch’s system might be impacted without knowing exactly what the changes to the process might be, but proposing realistic changes was the Petitioner’s burden, especially in a field as complex as this one. See *Medtronic, Inc. v. Teleflex Innovations S.A.R.L.*, 70 F.4th 1331, 1347 (Fed. Cir. 2023) (“The Board did not err in discounting modifications not presented in Medtronic’s petition as indicative of hindsight.”).

Drying at 300 hPa or less (all claims): Patent Owner refers to its arguments in the Patent Owner Response (“POR”, pp. 17-21, EX2022, ¶¶87-93, 145-146, 151-161), and related arguments in the sur-reply (“SR”) (pp. 6-12), as well as the reasoning of the Institution Decision (“ID”). ID, 15-16. For the substitute claims, Petitioner appears to assert only that Hanisch’s pre-dryer meets the claimed drying limitations. But Hanisch’s teaching regarding the pre-dryer—on the subject of vacuum—are insufficient to support obviousness. Hanisch states (and claims) that the *decomposition oven* can use a vacuum (EX1004, Abstract, 4:6-8, cl. 5-6). Hanisch never does this *for the pre-dryer*. At best, Petitioner must stitch together the statement about vacuum usage for the “heating” (3:5-6)—which does not mention pre-drying—with a statement about the pre-dryer using heat to achieve the

drying temperature (4:55-59)—a statement that does not mention vacuum. Nor is there any real basis to say that the pre-dryer *as-implemented* in Fig. 1 uses vacuum. EX2022, ¶¶151-161. On the whole, the reference to “heating” at 3:4-8 either relates to the decomposition oven alone, or is highly ambiguous—a quality that pervades Hanisch. EX2061, 92:20-93:10 (“I don’t think very much of anything in here described in detail of what it is.”). An (at best) unclear disclosure in the prior art cannot provide an express teaching to support obviousness. *See Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1361 (Fed. Cir. 2011) (“To render a claim obvious, prior art cannot be ‘vague’ and must collectively, although not explicitly, guide an artisan of ordinary skill towards a particular solution”). There is also no motivation to draw a *strong* vacuum in Hanisch, because this would take more time, be more difficult, and cost more. EX2061, 166:25-167:16; EX2022, ¶¶145-146.

Inactivating/inactivation device (all claims). Patent Owner refers to its arguments at POR, 14-17, SR, pp. 2-5. EX2022, ¶¶75-86. Although Petitioner does not assert that the high-temperature decomposition oven 44 of Hanisch is the claimed dryer, the Preliminary Guidance (“PG”) found that the “electrochemical reaction” limitations of claims 24, 28, 29 and (presumably) 31 were met by use of the *oven* 44 (PG, 10-11), despite the fact that claim 29 also requires a “temperature of 80 °C or less” while claim 31 also requires a temperature such that “almost no HF is produced”—which the PG found to be a “low temperature.” PG, 10-11.

Temperature such that almost no Hydrogen Fluoride is produced (claims 30-

31): Petitioner identifies no disclosures in Hanisch directed to Hydrogen Fluoride (HF). Nor does Petitioner identify any prior art, anywhere, that discloses a relationship between low temperatures and HF formation in an electrolyte drying process. Instead, Petitioner argues that a POSITA “would have been familiar with the concept that drying electrolyte at lower temperatures prevents the formation of HF.” Opp., 8-9. It identifies only the teachings ’097 patent itself, which is improper. Its expert opinion to this effect is mere *ipse dixit*. EX1003, ¶¶68, 114; EX1023, ¶¶45-47. The sole exhibit cited by its expert does not concern electrolyte evaporation, LiPF₆ decomposition or HF formation. *See* EX1005, 1:20-24, 2:2-27; EX2061, 141:9-143:23 (“Lain is trying to do something completely different here.”).

Instead—as the PG correctly noted (PG, 10-11)—Petitioner presents an inherency argument. Petitioner, however, does not meet the “high standard” for demonstrating inherency in an obviousness challenge because Petitioner does not demonstrate that Hanisch’s process, *especially as modified to use a batch dryer at a low pressure*, necessarily results in almost no HF, or that it is the natural result of *Hanisch’s modified process*—particularly in view of the fact that a stronger vacuum would be expected to draw *more* volatile components (including HF) into the vapor phase. EX2061 166:15-168:14, EX2022, ¶¶47, 123. *See PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195-96 (Fed. Cir. 2014).

B. Ground 2: Petitioner has Failed to Carry its Burden with Respect to Hanisch, Dunagan, Hayashi and Shin

Ground 2's relies extensively on Ground 1, which fails for the reasons above.

Petitioner's arguments specific to the additional references are addressed as follows:

Batch mode drying (all claims): Petitioner asserts that Hayashi and Shin both disclose 'batch' processes, and that they "would have been combined with the disclosures of Hanisch." Opp., 11. But Petitioner provides no detail on how this might be done. Each of Hayashi and Shin's processes are very different than that of Hanisch. See POR, 3-4, 28-30, 42-50, EX2022, ¶¶121-128, 148-172, 173-179. It is difficult to imagine how the drying techniques of Hayashi (immersing in an oil bath, opening a safety valve, injecting water to provoke HF formation, an attaching a pipe thereto for drying, EX2022, ¶¶121-125) or Shin (heating whole batteries, not under vacuum, at 470-550 °C until they rupture and produce toxic gas, EX2022, ¶¶126-128) *could* even be used with Hanisch in a way that practices the substitute claims. Petitioner fails to provide any explanation or analysis as to what the combination is, why a POSITA would be motivated to incorporate any "batch" elements of Hayashi or Shin's process into Hanisch, what would have to be changed in Hanisch to accommodate the new components, or whether a POSITA would have had a reasonable expectation of success in doing so. Petitioner cites to its Petition (§VIII.A.6) and Reply (§IV.A), but these sections contain no analysis as to why or how "the batch process of Hayashi [or Shin] would have been combined with the

disclosures of Hanisch” Opp., 11, much less how or why a POSITA would have modified Hanisch to use a batch *dryer*. Petitioner’s expert offers no such opinions either. *See* EX1003, ¶¶145-52; EX1023, ¶¶50-52.

Drying at 300 hPa or less (all claims): The PG (although not Petitioner’s Opposition) preliminarily found that Hayashi teaches an overlapping pressure range, which is said to render the claimed pressure range obvious. PG, 11-14. This finding, if adopted, would (respectfully) be in error. The “overlapping ranges” case law applies where the prior art differs from the claims only because it teaches a range that is different from, but overlapping with, the claimed range. *See In re Kumar*, 418 F.3d 1361, 1366 (Fed. Cir. 2005) (“A *prima facie* case of obviousness may be made when the only difference from the prior art is a difference in the range or value of a particular variable.”); *Pharmacyclics LLC v. Alvogen, Inc.*, 2022 WL 16943006, at *9 (Fed. Cir. Nov. 15, 2022). In the present case, however, the reference that is said to teach the overlapping range (Hayashi) is radically different from the proposed substitute claims (EX2022, ¶¶121-125), while Hanisch teaches no pressure range, and otherwise differs from the claims in several notable respects (as described above). Moreover, the arguments in the POR (pp. 17-21, 30-63) and evidence cited therein *rebut* any presumption. *See DuPont v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018)(presumption can be rebutted by evidence of non-obviousness).

Gaseous electrolyte recoverable by condensation: Petitioner’s arguments do

not apply to Hanisch's decomposition oven 44 which pyrolyzes solvents. *See* POR, 45; EX2022, ¶164. Additionally, Hayashi's teachings are incompatible with Hanisch's pre-dryer. POR, 3, 28-29, 42-50, EX2022, ¶167. Hayashi teaches a method in which water is added to hydrolyze the LiPF_6 into hydrogen fluoride, which is off-gassed and then sequestered. *See id.* Petitioner does not explain why a POSITA, seeking to "support[] environmental and safety objectives" and to reduce "hazards from the potential production of hydrofluoric acid," Opp., 13, would adopt Hayashi's approach, particularly where the material at issue has been comminuted.

Substitute Claims 30 and 31: Both Hayashi and Shin's teachings are particularly incompatible with a method that results in the production of almost no hydrogen fluoride. EX1006, 4:24-47, 5:33-35; EX2022, ¶167. *see* POR, 28-29, 42, 46-49; EX1010, 4:4-9; EX2022, ¶177; *see* POR, 28-29, 50-56. Petitioner fails to explain how why a POSITA using Hayashi or Shin would achieve or reasonably expect to achieve a process in which "almost no hydrogen fluoride" is produced.

C. Petitioner has not Proven Indefiniteness

The proposed substitute claims are definite. Inactivating. Petitioner criticizes Patent Owner and Mr. Dantam for their understanding of the claim language (Petitioner does not argue that the Board's preliminary construction of "inactivating" is indefinite. *See* ID, 12), contending that it renders the claims indefinite. However, Petitioner's own expert employs precisely the same

understanding on numerous occasions. *See* EX1023, ¶¶14-15 (“[T]he fact that battery material goes from the pre-dyer to the separators and classifier means that the battery material must have been ***fully dried to the point of inactivation.***”); ¶18; EX2061, 13:7-14:19, 17:2-11, 27:6-23, 172:2-175:12 (“[I]n the case of ***fully dried to the point of inactivation***, there’s no liquid electrolyte to carry the ions around in an electrochemical reaction. So ***that’s inactive.***”) (Emphases added). As Petitioner’s expert recognizes, inactivation is the ***endpoint*** of drying, and material is ***fully dry*** when it has been ***inactivated***. *See Sonix Tech. Co. v. Publications Int’l, Ltd.*, 844 F.3d 1370, 1380 (Fed. Cir. 2017) (“[C]ontinued application by the experts in this case further supports the conclusion that a skilled artisan did understand the term with reasonable certainty.”).

Petitioner argues that “PO’s framing means there is no limitation on how one knows material has been inactivated,” and that the claims are thus indefinite Opp., 16, 14-18. PO has explained that the patent specification recites various metrics for determining if drying has resulted in inactivation. *See* POR, 9. The specification thus provides clear examples to aid a POSITA in determining whether drying has resulted in inactivation. This is more than sufficient to allow a POSITA to determine the boundaries of the claim with reasonable certainty. *See Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1335 (Fed. Cir. 2010) (“Because the intrinsic evidence here provides a general guideline and examples

sufficient to enable a person of ordinary skill in the art to determine [the scope of the claims], the claims are not indefinite”) (internal citation and quotation omitted); *Sonix Tech.*, 844 F.3d at 1379; *see also Nevro Corp. v. Bos. Sci. Corp.*, 955 F.3d 35, 39 (Fed. Cir. 2020). PO’s positions regarding the term “inactivating” have always been entirely consistent *See* EX1029, 9-11; *cf.* Opp., 18.

Almost no HF. Because a POSITA would readily understand that “almost no hydrogen fluoride” is an amount that does not result in detrimental consequences to plant equipment or human health, a POSITA would be able to determine the scope of this language with reasonable certainty. The ’097 patent describes a method in which “almost no hydrogen fluoride” is produced and states that it is “beneficial to prevent the development of hydrogen fluoride.” EX1001, 3:11-17, 5:7-10. It states that doing so “increases the service life of the battery processing installation and reduces the environmental risk.” *Id.* The specification thus informs the understanding of this term, tying the production of “almost no hydrogen fluoride” to plant longevity and reduced safety risk.

As Petitioner’s own expert testified, hydrogen fluoride is a known corrosive and toxic gas which was known to be capable of damaging plant equipment as well as harming human health. EX2061, 39:25-41:25, 123:22-124:11, 161:19-164:14. It was also known that hydrogen fluoride could be generated when heating a

lithium battery, *id.* at 131:2-132:18, and that “[a] relatively minimal amount of hydrogen fluoride could cause” “havoc.” *Id.* at 139:11-140:19.

In view of the known threats associated with HF in a manufacturing setting, a POSITA would appreciate that, in the words of Petitioner’s expert, “almost no hydrogen fluoride” means that “the amount of HF that is being generated is – does not have consequence to your equipment, your personnel or your other processes. And that would be my definition of almost no. You are going to generate some hydrogen fluoride. But it’s going to be in small quantities.” *Id.* at 152:15-155:22; *see also id.* (“So you’re basically finding a sweet spot where you can get your pre-drying in a reasonable amount of time without producing too much HF that’s affecting your equipment and processes.”). A POSITA would have been well aware of the dangers of HF, safety protocols and safe limits for exposure, and methods for measuring HF which ensure that any amount of HF produced would not be detrimental. *Id.* at 161:11-164:14. Petitioner’s expert himself uses this understanding of “almost no hydrogen fluoride” in opining that “almost no Hydrogen Fluoride is produced in the drying process of Hanisch.” EX1023, ¶47. And Petitioner’s expert’s understanding is consistent with the ’097 patent’s teachings. EX1001, 3:11-17, 5:7-10. Here, “extrinsic evidence . . . help[s] to identify objective boundaries” of a claim. *Guangdong Alison Hi-Tech Co. v. Int’l Trade Comm’n*, 936 F.3d 1353, 1360 (Fed. Cir. 2019); *see also id.* at 1361-62.

Date: <u>June 20, 2025</u>	<u>/Matthew A Smith/ (RN 49,003)</u> Matthew A. Smith Reg. No. 49,003 SMITH BALUCH LLP 700 Pennsylvania Ave. SE, 2nd floor Washington, DC 20003 (202) 669-6207 smith@smithbaluch.com <i>Counsel for Patent Owner</i>
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CERTIFICATE OF SERVICE

The undersigned hereby certifies that the foregoing Reply to Petitioner's Opposition to Patent Owner's Contingent Motion to Amend was served on June 20, 2025 on Petitioner's counsel of record in the above-referenced proceeding, by electronic mail directed to:

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Date: June 20, 2025

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