

Ascend Elements, Inc.

v.

Duesenfeld GmbH

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

Petitioner's Demonstrative Exhibits

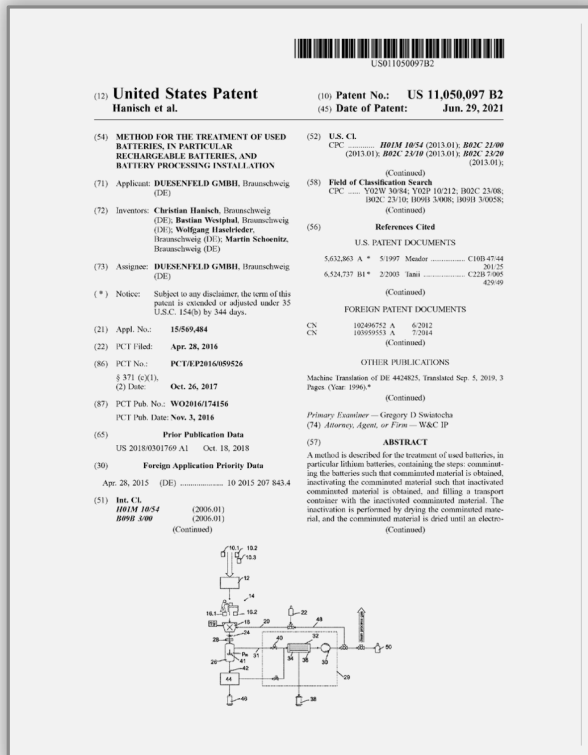
August 22, 2025

Ex. 1039

Table of Abbreviations

Abbreviation	Description
'097	EX1001, U.S. Patent No. 11,050,097
Pet.	Paper 2
Van Schalkwijk	EX1003, Declaration of Dr. Walter Van Schalkwijk, May 21, 2025
Van Schalkwijk II	EX1023, Declaration of Dr. Walter Van Schalkwijk, May 09, 2025
Van Schalkwijk Dep.	EX2061, Transcript of June 6, 2025 Deposition of Dr. Walter Van Schalkwijk
Hanisch	EX1004, U.S. Patent No. 9,780,419
Hayashi	EX1006, U.S. Patent No. 9,843,077
DI	Decision on Institution, Paper 10
POR	Patent Owner's Response, Paper 19
Reply	Petitioner's Reply, Paper 31
POSR	Patent Owner's Sur-Reply, Paper 38
MA	Patent Owner's Contingent Motion to Amend, Paper 21
OMA	Petitioner's Opposition to Patent Owner's Contingent Motion to Amend, Paper 32
RMA	Patent Owner's Reply to Petitioner's Opposition to Patent Owner's Contingent Motion to Amend, 39
PGMA	Preliminary Guidance - Patent Owner's Contingent Motion to Amend, Paper
Dantam	EX2001, Declaration of Vani Dantam, Aug. 26, 2025
Dantam II	EX2022, Declaration of Vani Dantam, Feb. 14, 2025
Grote	EX2040, Declaration of Lydia Grote, Feb. 14, 2025
Grote II	EX1026, Declaration of Lydia Grote, Dec. 17, 2024
Grote Dep.	EX1025, Transcript of April 18, 2025 Deposition of Lydia Grote

'097 Patent, Claim 1



- [1 pre] 1. A method for the treatment of used batteries, comprising the steps:
- [1a] (a) comminuting the batteries such that comminuted material is obtained;
- [1b] (b) inactivating the comminuted material such that an inactivated comminuted material is obtained, wherein the inactivating step is performed during or after the comminuting step; and
- [1c] (c) filling a transport container with the inactivated comminuted material;
- [1d] wherein the inactivating step is performed by drying the comminuted material, and
- [1e] wherein the drying occurs at a maximum pressure of 300 hPa.

'097 Patent, Claim 1.

'097 Patent, Claim 12


 US 11,050,097 B2

(12) **United States Patent**
Hanisch et al.

(16) **Patent No.:** US 11,050,097 B2
 (45) **Date of Patent:** Jun. 29, 2021

(54) **METHOD FOR THE TREATMENT OF USED BATTERIES, IN PARTICULAR RECHARGEABLE BATTERIES, AND BATTERY PROCESSING INSTALLATION**

(71) **Applicant:** DUSENFELD GMBH, Braunschweig (DE)
 (72) **Inventors:** Christian Hanisch, Braunschweig (DE); Bastian Westphal, Braunschweig (DE); Wolfgang Haschrieder, Braunschweig (DE); Martin Schenitz, Braunschweig (DE)
 (73) **Assignee:** DUSENFELD GMBH, Braunschweig (DE)

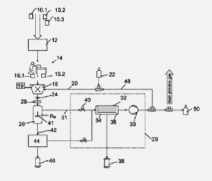
(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 344 days.

(21) **Appl. No.:** 15/569,484
 (22) **PCT Filed:** Apr. 26, 2016
 (86) **PCT No.:** PCT/EP2016/059526
 § 371 (c)(1),
 (2) **Date:** Oct. 26, 2017
 (87) **PCT Pub. No.:** WO2016/174156
 PCT Pub. Date: Nov. 3, 2016
 (65) **Priority Publication Data**
 US 2018/0301769 A1 Oct. 18, 2018
 (30) **Foreign Application Priority Data**
 Apr. 26, 2015 (DE) 10 2015 207 843.4
 (51) **Int. Cl.**
 H01M 10/54 (2006.01)
 B01D 5/00 (2006.01)
 (Continued)

(52) **U.S. CL.**
 CPC H01M 10/54 (2013.01); B01D 21/00 (2013.01); B01D 23/10 (2013.01); B01D 23/06 (2013.01);
 (Continued)
 (58) **Field of Classification Search**
 CPC Y02W 50/84; Y02P 10/212; B01D 23/06; B01D 23/10; H09B 3/008; H09B 3/0058; (Continued)

(56) **References Cited**
 U.S. PATENT DOCUMENTS
 5,652,863 A * 5/1997 Mosler C10L 47/44
 6,524,737 B1 * 2/2003 Iani C25B 1/00
 (Continued)
 FOREIGN PATENT DOCUMENTS
 CN 102486752 A 6/2012
 10059553 A 7/2014
 (Continued)
 OTHER PUBLICATIONS
 Machine Translation of DE 4424825, Translated Sep. 5, 2019, 3 Pages (Year 1996).
 (Continued)
 Primary Examiner — Gregory D Switacha
 (74) **Attorney, Agent, or Firm —** W&C IP

(57) **ABSTRACT**
 A method is described for the treatment of used batteries, in particular lithium batteries, containing the steps: comminuting the batteries such that comminuted material is obtained, inactivating the comminuted material such that inactivated comminuted material is obtained, and filling a transport container with the inactivated comminuted material. The inactivation is performed by drying the comminuted material, and the comminuted material is dried until an electro-
 (Continued)



- [1 pre] **12.** A battery processing installation for treatment of used batteries, comprising:
- [1a] (a) a comminution unit configured to comminute the batteries such that comminuted material is obtained;
- [1b] (b) an inactivation device comprising a drying device configured to inactivate the comminuted material, wherein the inactivation device is configured to perform the inactivating step during or after the comminuting step of the comminution unit;
- [1c] (c) a filling device configured to fill a transport container with the inactivated comminuted material; and
- [1d] (d) a vacuum installation connected to the drying device and configured to generate a vacuum in the drying device.

'097 Patent, Claim 12.

Grounds of Unpatentability

Ground	Claims	Basis	Prior Art
1	1, 2, 3, 7, 8, 9, 10, 12, 13, and 19	§ 103	Hanisch alone or in combination with Dunagan
2	1, 2, 3, 7, 8, 9, 10, 12, 13, and 19	§ 103	Hanisch in view of Dunagan, Shin, and/or Hayashi

Pet. at 3.

Disputed Claim Constructions

"inactivat[e]/[ed]" (claims 1, 12)

Board's Preliminary Construction	PO's Constructions
"an electrochemical reaction [being] no longer possible, or only to a negligibly small extent" (DI, 12)	"inactivation is the 'result' of drying" (POR, 9) "inactivation is the endpoint result of drying, but [without] specifying the particular metric of drying that must be reached" (POR, 10) "'dry' does not mean inactivated" (POSR, 3) "rendered safe for transport" (EX1029, 18)

Claim Construction

"inactivat[e]/[ed]" (claims 1, 12)

Resolution of indefiniteness is not necessary for the IPR Petition but is necessary for the Contingent Motion to Amend. Reply at 2-3.

Hilti Aktiengesellschaft v. Specified Techs. Inc., IPR2024-00192, pap. 16, at 12-13 (P.T.A.B. May 14, 2024) (instituting IPR despite alleged indefiniteness because "we do not discern an indefiniteness issue that renders it logically impossible to adjudicate the prior-art challenges in the Petition")

Intel Corp. v. Qualcomm Inc., 21 F.4th 801, 813 (Fed. Cir. 2021) (citing *Samsung Electronics America, Inc. v. Prisua Eng'g Corp.*, 948 F.3d 1342, 1353 (Fed. Cir. 2020)) ("it is not always impossible to adjudicate a prior-art challenge, one way or the other, just because some aspect of a claim renders the claim indefinite," rather indefiniteness "precludes a patentability determination only when the indefiniteness renders it logically impossible for the Board to reach such a decision")

Claim Construction

Resolution of Board's construction vs. PO's various constructions Not Necessary to Find Claims Invalid Over Prior Art

Board's Preliminary Construction	PO's Constructions
"an electrochemical reaction [being] no longer possible, or only to a negligibly small extent" (DI, 12)	"inactivation is the 'result' of drying" (POR, 9) "inactivation is the endpoint result of drying, but [without] specifying the particular metric of drying that must be reached" (POR, 10) "'dry' does not mean inactivated" (POSR, 3) "rendered safe for transport" (EX1029, 18)

Under Either Construction, Hanisch Discloses Inactivation

Disputed Limitations

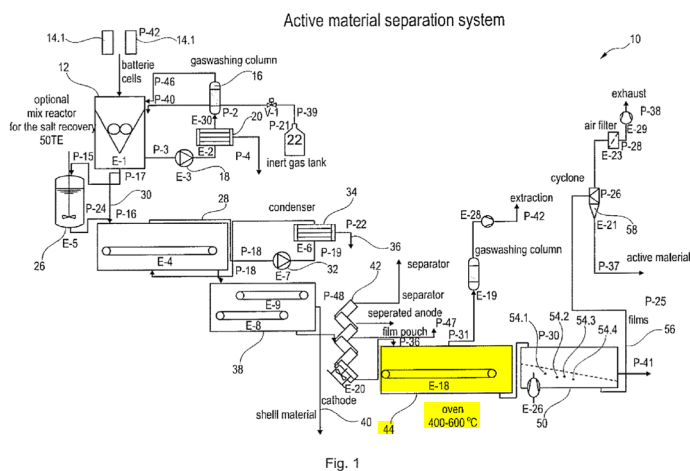
Disputed Limitations	POR	Slides
Claim 1[b]: "inactivating the comminuted material such that an inactivated comminuted material is obtained" Claim 1[d]: "wherein the inactivating step is performed by drying the comminuted material"	POR 14-17 POSR 2-5	10-19
Claim 1[e]: "wherein the drying occurs at a maximum pressure of 300 hPa"	POR 17-21, 30-50 POSR 6-18	20-29
Claim 12[d]: "a vacuum installation connected to the drying device and configured to generate a vacuum in the drying device"	POR 22-24, 52-55	10-19, 20-29
Claim 9: "The method according to claim 1 wherein drying occurs at a temperature of less than 80° C"	POR 21-22	30

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Hanisch's High Temp Decomposition Discloses Inactivation

PO does not appear to dispute that Hanisch's high-temperature drying discloses inactivation.

Hanisch discloses inactivation by its disclosure of high-temperature drying



"An oven 44 is set up in the direction of material flow behind the classifier 42 , in which there is a decomposition temperature T , between 400 and 600° C . The binder, for example polyvinylidene fluoride (PVDF), thus decomposes." Hanisch Fig. 1, 6:8-11; Pet. 26-27.

- Hanisch's high-temperature drying is similar to the '097 Patent's disclosure

Reply 5.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Hanisch's High Temp Decomposition Discloses Inactivation

'097	Hanisch
"drying at a drying temperature and for a drying time that have been selected such that the binder which binds the active material of the lithium battery to a carrier at least largely decomposes." '097 5:38-41.	"The decomposition temperature is preferably at least 350° C . and at the most 800° C . It has been found that at these temperatures the binder is certain to decompose." Hanisch 4:25-27.

As Dr. van Schalkwijk explained:

"[A] POSITA would also understand that for solvents like EMC and DMC that have boiling points around 90-110°C, heating to temperatures used for decomposing a binder (e.g., at or above 400°C) would also mean that solvents like EMC and DMC would be evaporated and removed from the comminuted material." Van Schalkwijk ¶103.

Pet. 26-27.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Hanisch discloses that “dry”—and therefore electrochemically safe—material exits the low-temperature “pre-dryer”

- Hanisch Teaches:

"The method preferably comprises the step that, before heating the cell fragments up to the decomposition temperature, the cell fragments are dried at a drying temperature , so that *dry cell fragments* and drying vapours are formed" Hanisch 3:65-4.

"Claim 5. The method according to claim 1 , further comprising the steps of drying the solid cell fragments at a drying temperature *to form dry cell fragments* and drying vapours and at least partly condensing the drying vapours to retrieve electrolyte solvents before heating the solid cell fragments up to the decomposition temperature" Hanisch claim 5.

Pet. 18, 24; Van Schalkwijk ¶¶ 87-30; Pet. 24-26; Reply 6; Van Schalkwijk II ¶¶ 10, 15-18.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Hanisch discloses that “dry”—and therefore electrochemically safe—material exits the low-temperature “pre-dryer”

[A] POSITA would have understood that forming “dry” cell fragments—especially ones that must go through the separators and classifiers—necessarily means all the volatile electrolyte solvent, i.e. the bulk liquid components of the electrolytes, has been removed. And this is the point of Hanisch's “pre-drying” process, materials are dried before the processing step so they can effectively and safely be processed by the zigzag classifier and eddy current separator. “Dry cell fragments” is therefore the endpoint of Hanisch's low-temperature pre-drying process. Van Schalkwijk II ¶¶ 9-18

- No suggestion in Hanisch that its pre-dryer forms only “partially” dry material. Contrast specification disclosure of the stirred reactor with the “pre-dryer”:

“a stirred reactor for the retrieval of conducting salt, which is connected to the cell crushing device and which at least *partly* removes the liquid fraction from the cell crushing device.” Hanisch 4:63-67.

Reply 6-9.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Hanisch discloses that dry and electrochemically safe material exits the low-temperature "pre-dryer"

As Dr. Van Schalkwijk explained:

[A] POSITA would have understood that forming "dry" cell fragments— especially ones that must go through the separators and classifiers—necessarily means all the volatile electrolyte solvent, i.e. the bulk liquid components of the electrolytes, has been removed. And this is the point of Hanisch's "pre-drying" process, materials are dried before the processing step so they can effectively and safely be processed by the zigzag classifier and eddy current separator. "Dry cell fragments" is therefore the endpoint of Hanisch's low-temperature pre-drying process. Van Schalkwijk II ¶ 10.

- Board agreed that when no electrolyte solvent remains, the material is inactivated:

"Thus, on the present record, we take inactivating to require the removal of sufficient amounts of dimethyl carbonate and/or ethyl methyl carbonate from the comminuted material to make an electrochemical reaction either no longer possible or only possible to a negligibly small extent." DI 12.

"Given that Hanisch's decomposition oven would destroy the electrolyte solvent such that "none would remain," we determine that Petitioner has shown sufficiently that Hanisch teaches removing enough solvent in its decomposition oven to make an electrochemical reaction either no longer possible or only possible to a negligibly small extent." DI 15.

Reply 6-9.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Hanisch discloses that dry and electrochemically safe material exits the low-temperature "pre-dryer"

- A POSITA would have understood that the separators and zigzag classifiers are typically designed to work with dry material.

Dr. Van Schalkwijk explains:

"Classifiers are used to separate materials based on size and density. However, active lithium-ion battery materials contain volatile electrolytes that can ignite if exposed to heat or friction during classification For example, residual electrolyte reactivity may result in fire or explosion within the separator/classifier because wet battery material still containing volatile organic solvents from the electrolyte (e.g., EC, DEC, DMC) can vaporize and ignite under friction or heat."

"Moisture in comminuted material can alter its conductivity, potentially affecting the efficiency of eddy current separation. Damp material tends to clump together due to surface tension imparted by free or adsorbed organic solvents from the battery electrolyte, making it difficult for individual particles to separate properly. This can hinder the effectiveness of sorting processes, including eddy current classification. Similarly, damp material can impact how particles move through the zigzag classifier's airflow. If the classifier sorts particles by size and weight—as is typical—then dampness and clumping can also impact the effectiveness of the classifier."

Van Schalkwijk II ¶¶ 16-17 (citing EX1036, EX1037, EX1038).

Reply 6-9.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Dr. Van Schalkwijk's deposition testimony confirms Hanisch's pre-dryer results in *fully dry* cell fragments.

Q: ...I said that it would be troublesome for the classifier to operate if wet materials went through them. Taking the zig-zag classifier, it's your opinion that passing wet and active battery fragments through this de-classifier would be dangerous; right?

MR. SCHENKER: Objection, form, mischaracterizes the declaration.

A: I didn't say they would be dangerous. I said that it would be troublesome for the classifier to operate if wet materials went through them. Van Schalkwijk Dep. 20:8-19

If a material is still wet or moist, there's a tendency, due to colligative properties between the solvents and the particles, for particles to clump together. And if it clumps together, it's hard for the zig-zag separator to do its work." Van Schalkwijk Dep., 2:24-21:6

"But if you passed your material through the batteries being discharged, then crushed, then comminuted and then put through the pre-dryer, they're dry. There's no electrolyte present to propagate any reaction that might occur. So the chance of an electrochemical reaction that could lead to any kind of battery-simulated reaction with electrons passing, ions passing and then so-called thermal runaway, it would just be very, very unlikely ..." Van Schalkwijk Dep. 22:22-23:6.

POSR 4.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Dr. Van Schalkwijk's deposition testimony is consistent with his conclusions regarding the dry cell fragments output from the pre-dryer in Hanisch, contrary to PO's assertions.

- Dr. Van Schalkwijk testified that it remained his opinion that "active lithium-ion battery materials contain volatile electrolytes that can ignite if exposed to heat or friction during classification." Van Schalkwijk Dep., 21:16-22:1.
- Dr. Van Schalkwijk also explained that passing still active battery material through a zigzag classifier could present dangers.

"Operating the equipment at this point and going from the dry cell fragments from the pre-dryer and into the classifiers assumes that the cell fragments are dry. And if they are wet, then you have not operated your pre-dryer correctly, unless you could be creating yourself a danger; however unlikely." Van Schalkwijk Dep. 29:10-30:20.

- Dr. Van Schalkwijk emphasized that under normal operation, the use of the pre-dryer should mean that there is "no electrolyte there to support a reaction" Van Schalkwijk Dep. 34:2-9.
- Dr. Van Schalkwijk testified that using the pre-dryer avoids risks of electrochemical reactions:

"When things are entering the pre-dryer, they can be in contact with each other. And that is operated to quickly dry the material out and thus have no electrolytes, so that you can't have an electrochemical reaction." Van Schalkwijk Dep. 35:4-10.

POSR 4, PO's exhibit 2061.

Elements (1b), 1(d), (12d) - Hanisch Discloses Inactivation Through Drying

Petitioner's Reply is Proper Rebuttal

- PO's reliance on *Intelligent Bio-Systems* is misplaced.

"IBS chose which grounds of invalidity to assert in its petition and it chose not to assert this new one. . . . IBS supported its new theory of invalidity by reference to new evidence, citing "a number of non-patent literature references which were not relied upon to support unpatentability in the Petition." *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016).

"Alere does not point to any new embodiments not previously identified to advance a meaningfully distinct contention from what it first asserted in its petition. It points to those additional portions to convey the benefits of removing wicking material as "a legitimate reply" to Rembrandt's arguments and the Board's observations. . . . Alere's reply argument involves the same "legal ground" based on "the same prior art reference[s]" and the "same legal argument"—the motivation to remove Tydings's wicking material and reverse its orientation." *Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1385 (Fed. Cir. 2023) (quoting *Apple Inc. v. Andrea Elecs. Corp.*, 949 F.3d 697, 706-07 (Fed. Cir. 2020)(citations omitted).

POSR 3.

Elements 1[e] / 12[d] - Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

Both the low-temperature and high-temperature drying processes in Hanisch are disclosed as occurring under "a vacuum"

- Hanisch discloses that low-temperature drying involves reduced temperatures at 80° C or lower.
- The parties agree that it has been well-understood for decades or longer that one can reduce the boiling point of compounds by lowering ambient pressure. .

"As the explained in the Petition, "it has been well-known for decades, if not longer, that the evaporation of gases, including volatile compounds and gases formed during drying, can be facilitated at lower temperatures when ambient pressure is reduced from normal pressure, because of the reduction in boiling point that occurs." POR, 31 (citing EX1003, ¶¶68-70, 114). PO's expert also agrees that the '097 patent does not purport to have invented the scientific principle that liquids evaporate at lower temperatures under partial vacuum pressure. EX2022, 12-18. Pet. 31; Van Schalkwijk ¶¶68-70, 114; Reply 12.

"Given these known scientific principles, a POSITA would have appreciated that, to quickly vaporize the volatile electrolytes and produce "dry cell fragments" at 80° C or lower, vacuum pressures below 300 hPA are desirable." Reply 12; Hanisch, 3:67-4:5.

Elements 1[e] / 12[d] - Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

Both the low-temperature and high-temperature drying processes in Hanisch are disclosed as occurring under "a vacuum"

- Hayashi teaches the use of reduced pressures less than 300 hPa at temperatures that include the range of temperatures in Hanisch at 80° C or lower:

"[T]he electrolyte solution is heated at 80° C . to 150° C . under reduced pressure of less than or equal to 1 kPa , the volatile component is gasified" Hayashi, 3:20-25; Pet. 45.

- PO does not present arguments as to the combination of Hanisch's low temperature drying with Hayashi, instead PO addresses only the combination of Hanisch's high-temperature drying embodiment with Hayashi. POR 31.

Elements 1[e] / 12[d] -

Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

High temperature drying - Hanisch discloses high temperature-temperature drying at temperatures between 350 to 600 C

PO Argues: "Hanisch '419 does not disclose any of the sealing mechanisms needed to run a continuous process under vacuum." POR 18-19.

- But PO admits that such seals exist and were known in the art, and does not suggest that it would have been beyond the skill of a POSITA to implement such a seal, only that it might have been difficult.

"A POSITA would know that there are mechanisms that can be employed to maintain a vacuum in a continuous manufacturing process. . . . Hanisch '419 does not depict any mechanisms for maintaining a vacuum in the continuous system it teaches; these systems may exist in some form (see, e.g., the water seals in Meador, or a rotary airlock), are limited in their functionality, and are generally leaky." POR, 18-20.

Elements 1[e] / 12[d] -

Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

High temperature drying - Hanisch discloses high temperature-temperature drying at temperatures between 350 to 600 C

- PO also acknowledges that allowing oxygen to enter the pyrolysis chamber "would run counter to the goals of Hanisch '419 to exclude oxygen, to avoid oxidizing the copper and aluminum foils." POR 41; Dantam ¶¶68, 146, 158, 169; Hanisch 4:6-18.
- Hanisch teaches that use of vacuum during high temperature stage helps to avoid copper oxidization, which is useful because it means that "copper can thus be retrieved with a high degree of purity as a valuable element." Hanisch 4:6-18; Reply 15.

Elements 1[e] / 12[d] - Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

High temperature drying

- POSITA would have understood that using vacuum below 300 hPa would be main way to control free atmospheric oxygen in the chamber.

Dr. Van Schalkwijk explains:

"Although the fraction of this thermally labile LiCoO_2 is typically reduced by discharging of cathode materials prior to recycling, it remains possible that a small portion of that species will remain in the comminuted material being processed by the high temperature decomposition oven, and when decomposed, that material will undergo the reaction above, contributing to the release of reactive species of oxygen that can contribute to oxidization of copper. This can be a non-trivial amount of oxygen when not completely controlled by discharging the batteries, and thus use of vacuum pressure becomes an important way of limiting the amount of oxygen available to react with the copper." Van Schalkwijk II ¶ 22.

Elements 1[e] / 12[d] -

Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

High temperature drying

Dr. Van Schalkwijk explains:

"[I]f one uses a pressure of 300 hPa for the high temperature decomposition heating, there will be roughly 3-4 fold less oxygen (8×10^{20} molecules) from the chamber atmosphere than compared to 1 atmosphere of pressure (2.7×10^{21} molecules), whereas the use of vacuum pressure of 0.0000133 hPa would have up to nearly eight orders of magnitude less oxygen (3.5×10^{13}) available from the chamber atmosphere to react with the copper. This awareness would have been within the knowledge of a POSITA as of at least 2011, in my opinion." Van Schalkwijk II ¶ 25.

Elements 1[e] / 12[d] - Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

POSITA would have been motivated to apply Hayashi's Teachings to the high temperature drying process in Hanisch

PO argues: "Hanisch '419 is a continuous process, and must be operated with mechanisms and under conditions compatible with that continuous process." POR at 38. "Hayashi is a batch process. A POSITA would not look to vacuum levels from a batch process to inform how to determine the pressure levels to maintain in a continuous process. *Id.*" POR 42-43.

But Hanisch Teaches:

"The method according to invention is preferably performed as continual process and not in batches."
Hanisch, 3:27-28; Reply 10.

- The Board properly recognized that Hanisch merely describes a continuous process as a preferred embodiment, and that Hanisch does contemplate both batch and continuous processes.

"Accordingly, our preliminary determination is that Hanisch discloses batch mode drying operations, and further that a person of ordinary skill in the art reviewing Hanisch would not have been dissuaded from using batch mode drying operations." PGMA 7-8; *see also* Reply 17-18.

Elements 1[e] / 12[d] -
Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

- Even if Hanisch were a continuous process, POSITA would have had reasonable expectation of success in using vacuum seals to achieve levels of vacuum disclosed in Hayashi.
- PO's expert admits that rotary airlocks were known and would work with Hanisch's method when performed as a continuous process, even if doing so might be challenging.

"A more suitable mechanism would be rotary airlock. U.S. Patent No. 5,405,231 shows how a rotary airlock can be used to allow solid items to pass through a valve into a chamber that is maintained under vacuum." Dantam II ¶152; POR, 19-21, 41.

"While a POSITA would likely turn to a rotary airlock for allowing a continuous flow of shredded battery material into the system of Hanisch '419, a POSITA would be highly focused on managing the problem of leakage." Dantam II ¶ 157; POR, 19-21.

Reply 14, 18-19.

Elements 1[e] / 12[d] -
Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

- Even if Hanisch were a continuous process, POSITA would have had reasonable expectation of success in using vacuum seals to achieve levels of vacuum disclosed in Hayashi.
- PO never explains why a POSITA would be incapable of otherwise addressing the risk of leaks, or why it would have been "beyond the skill" of a POSITA to do so. Reply 19; Van Schalkwijk II ¶¶28-33.

Dr. Van Schalkwijk explains:

"Even if one assumed that a single rotary airlock would be difficult to use across the pressure differences needed to maintain less than 300 hPa in a drying chamber, one possible approach would be to use a series of such airlocks, and [PO's expert] does not explain why such an arrangement would have been considered beyond the skill of a POSITA." Van Schalkwijk II ¶32.

Reply 18-19.

Elements 1[e] / 12[d] -
Hanisch In View Of Secondary References Discloses Drying Under 300 hPa

Hayashi's treatment of HF gas does not teach away from Hanisch

- PO argues that Hayashi teaches away from Hanisch because it manages HF risks by permitting the production of HF and using various means to neutralize it. POR 46-50.
- This merely demonstrates that Hayashi recognizes that one must manage the risks associated with LiPF₆ undergoing hydrolysis to form HF, and that Hayashi selects one possible approach of controlled production and neutralization. Hayashi, 2:4-12; 2:24-33.

Reply 19-20.

Claim 9 Hanisch Discloses - "wherein drying occurs at a temperature of less than 80° C"

- Hanisch discloses two drying steps—a low temperature "pre-dryer" process and a high-temperature decomposition step. The low-temperature drying is disclosed as taking place "in particular below 80° C." Pet. 24-27; Van Schalkwijk, ¶¶74-75, 85-93, 103, 108-09, 127-28.

PO's sole argument merely rests on PO's contention that "pre-dryer" process does not result in inactivated material. POR 21-22

- This is not relevant: claim 9 does not use a definite article, limiting the claim to "the drying" of claim 1.

"The method according to claim 1 wherein drying occurs at a temperature of less than 80° C."

- Rather, claim 9 simply specifies that some, unspecified "drying occurs at a temperature of less than 80° C" regardless of whether that drying results in inactivated material. Reply 16.

Secondary Considerations of Commercial Success

- Due to protective order considerations, the parties will rest on their briefing
- Ascend's position has been set forth at Reply at 21-25.

PO'S Motion To Amend Should Be Denied

Substitute Claims 22-31 Are Invalid Because the "Batch Mode" is Disclosed in Hanisch

"Patent Owner notes that 'each of claims 22-31 now contains a limitation requiring a dryer, or drying, operating in a batch mode.' . . . Patent Owner contends that 'Neither Hanisch's pre-dryer, nor its high-temperature drying, however, employs a batch drying device.'" PGMA at 4; POMA at 18.

"On this record, we tend to agree with Petitioner that Hanisch discloses that batch mode drying is a suitable, albeit non-preferred, method of drying battery material. . . . Accordingly, our preliminary determination is that Hanisch discloses batch mode drying operations, and further that a person of ordinary skill in the art reviewing Hanisch would not have been dissuaded from using batch mode drying operations." PGMA at 8; OMA at 2-3.

- PO has not offered any basis to depart from that preliminary determination; the substitute claims are invalid.

PO'S Motion To Amend Should Be Denied

Substitute Claims 22-31 Are Invalid for indefiniteness of "Inactivat[e]/[ion]/[ing]"

- Board and Petitioner agree that when no liquid electrolyte solvent remains in the comminuted material it is inactivated. DI at 11-12.
- But there is no guidance to a POSITA on how much liquid electrolyte solvent can remain in the comminuted material and have it be considered inactivated.
- PO argues that "drying" is not coextensive with "inactivated"

"Duesenfeld's proposed construction is consistent with the teachings of the '097 patent, which shows that inactivation, rather than being coextensive with drying, is a resulting end point of the drying process." EX1029 at 9; Reply at 18.

PO'S Motion To Amend Should Be Denied

Substitute Claims 22-31 Are Invalid for indefiniteness of "Inactivat[e]/[ion]/[ing]"

- PO relies on various embodiments that describe the endpoint of "drying"

"The patent specification recites various metrics for determining if that result has been reached, such as if no flammable gas can form above the dried material (Ex. 1001, 3:49-4:4); or if no electrochemical reaction is possible in the dried material (4:5-18); or if there is no build-up of heat (4:19-27); or if the electrolyte concentration is below a specified threshold (4:28-36)." POR at 9.

- But the '097 Patent States:**

It is "*beneficial*" if the comminuted material is dried until the electrolyte content of organic components that are volatile at 80° C. has a maximum value of 3% by weight, in particular a maximum of 2% by weight, especially preferably a maximum of 1.5% by weight." '097 at 4:28-32.

Dr .Van Schalkwijk Explains:

The specification does not state that any of these metrics measure whether the material is *inactivated*, and accordingly, the specification and the claims do not provide guidance as to the outer boundaries of "inactivation." Reply at 17-18; Van Schalkwijk II ¶¶66-67.

PO'S Motion To Amend Should Be Denied

Substitute claims 30 and 31 are invalid for indefiniteness for reciting "*almost no* Hydrogen Fluoride is produced"

"At this preliminary stage, on this record, we tend to agree with Petitioner that the '097 patent's specification does not inform those skilled in the art about the scope of the invention with reasonable certainty. The cited portions of the Specification "mere[ly] restate[] the claim language," replace "almost no Hydrogen Fluoride is produced" with "the formation of a significant amount of fluorophosphates can be ruled out," and state that "formation of hydrogen fluoride is hindered." PGMA at 18; OMA at 20-2.

"On the present record, we are persuaded that Petitioner has shown a reasonable likelihood that it will prevail in showing that none of these portions provide 'boundaries that are 'precise enough to afford clear notice of what is claimed, thereby apprising the public of what is still open to them.' *J.R. Simplot Co. v. McCain Foods USA, Inc.*, 713 F. Supp. 3d 904, 944-45 (D. Id. 2024)." PGMA at 18.

- PO has not offered any basis to depart from that preliminary determination; the substitute claims are invalid.