

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

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ASCEND ELEMENTS, INC.

Petitioner,

v.

DUESENFELD GMBH.

Patent Owner.

Inter Partes Review No. IPR2024-00948

U.S. Patent No. 11,050,097

**PATENT OWNER PRELIMINARY RESPONSE
UNDER 35 U.S.C. § 313 AND 37 C.F.R. §42.107**

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PATENT OWNER'S EXHIBIT LIST

Exhibit Number	Description
2001	Declaration of Vani Dantam in support of Patent Owner's Preliminary Response to the Petition ("Dantam Declaration")
2002	Gao Liu et al., <i>Binder Interactions in the Electrodes of the Lithium-ion Batteries</i> , TFUG Conference, February 17, 2009 ("Gao")
2003	DE 102012024876 A1 to Electrocyling GmbH ("Electrocyling") (English)
2004	U.S. Patent No. 7,198,865 to Sloop ("Ecobat")
2005	WO 2010/149611 A1 to LiMotive Company Ltd. ("LiMotive") (English)
2006	WO 2010/149611 A1 to LiMotive Company Ltd. ("LiMotive") (German)
2007	DE 102012024876 A1 to Electrocyling GmbH ("Electrocyling") (German)
2008	Yang et al., <i>Thermal Stability of LiPF₆ Salt and Li-Ion Battery Electrolytes Containing LiPF₆</i> , Journal of Power Sources 161, 573 (2006) (Preprint) ("Yang")
2009	Gnanaraj et al., <i>A Detailed Investigation of the Thermal Reactions of LiPF₆ Solution in Organic Carbonates Using ARC and DSC</i> , Journal of the Electrochemical Society, 150(11), A1533 (2003) ("Gnanaraj")
2010	Certification of Translation of the Electrocyling Patent
2011	Certification of Translation of the Limotive Patent
2012	Duesenfeld GmbH Website – Recycling [https://www.duesenfeld.com/recycling_en.html]
2013	Ascend Elements Press Release

2014	<i>Ascend Elements, Inc. 's Answer to Complaint</i> , Case No. 1-23-cv-01194 (D. Del.)
2015	Scheduling Order in Case No. 23-1194-JFM
2016	Email from J.Stiel to J.Ploger (dated Dec. 6, 2023)(German)
2017	Email from J.Stiel to J.Ploger (dated Dec. 6, 2023)(English)
2018	Certification of Translation of Email from J.Stiel to J.Ploger (dated Dec. 6, 2023) and of Kwade, et al. (Ex. 2020, below)
2019	Christian Hanish et al., <i>Recycling von Lithium-Ionen-Batterien – das Projekt LithoRec</i> , Recycling und Rohstoffe, January 2012 (“Kwade, et al.”) (German)
2020	Christian Hanish et al., <i>Recycling von Lithium-Ionen-Batterien – das Projekt LithoRec</i> , Recycling und Rohstoffe, January 2012 (“Kwade, et al.”) (English)
2021	Yang et al., <i>Thermal Stability of LiPF₆ Salt and Li-Ion Battery Electrolytes Containing LiPF₆</i> , Journal of Power Sources 161, 573 (2006)

I. PRELIMINARY STATEMENT

Pursuant to 37 C.F.R. § 42.107, Patent Owner Duesenfeld GmbH (“Duesenfeld” or “Patent Owner”) submits this Preliminary Response to the Petition for *Inter Partes* Review (“IPR”) of U.S. Pat. No. 11,050,097 (“the ’097 patent”). Paper 2 (“Petition”). Petitioner Ascend Elements, Inc. (“Ascend” or “Petitioner”) challenges the validity of claims 1-3, 7-10, 12-13, and 19 of the ’097 patent (“Challenged Claims”).

The Petition has not established a reasonable likelihood that any of the challenged claims are unpatentable. The art asserted in the Petition, whether alone or in combination, does not disclose all of the limitations of the challenged claims, as discussed below and confirmed in the Declaration of Vani Dantam—who worked as a POSITA in the field at the time of the inventions. The Petition also advances unsupported arguments concerning how a POSITA would have understood certain teachings in the prior art. Accordingly, Patent Owner requests that the Board deny institution of *inter partes* review.

Further, the Board should exercise its discretion to deny the Petition under 35 U.S.C. § 314 and particularly in view of *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sep. 6, 2017) because it is a serial petition that followed less than one month after a similar petition filed by the Petitioner’s equipment supplier URT Umwelt und Recyclingtechnik GmbH.

Finally, the Board should exercise its discretion to deny the Petition under 35 U.S.C. § 325(d) because it not only relies for its primary reference on a patent that was front-and-center before the Examiner in prosecution and expressly distinguished in the specification of the challenged patent, but because the Petition makes the same argument that the Examiner made and that the applicants successfully overcame in obtaining allowance.

Accordingly, Duesenfeld respectfully requests that the Board deny institution.

II. FACTUAL BACKGROUND OF THE '097 PATENT

A. The growth of the electric vehicle market in the 2010's spurred demand for battery recycling.

In the early 2010's the growing market for electric vehicles ("EVs") prompted the question of how to safely recycle EV batteries. *See, e.g.*, Ex. 1006, 1:18-21. It was well-understood that there would be ecological and economic benefits if parties could achieve efficient recycling of these batteries and the precious metals contained therein. *See, e.g.*, Ex. 1018, 1:23-25. But the complex design of the EV batteries and the toxic nature of active compounds therein posed challenges in designing a safe and effective EV battery recycling system. *See, e.g.*, Ex. 1006, 1:22-27; Ex. 1018, 2:37-40.

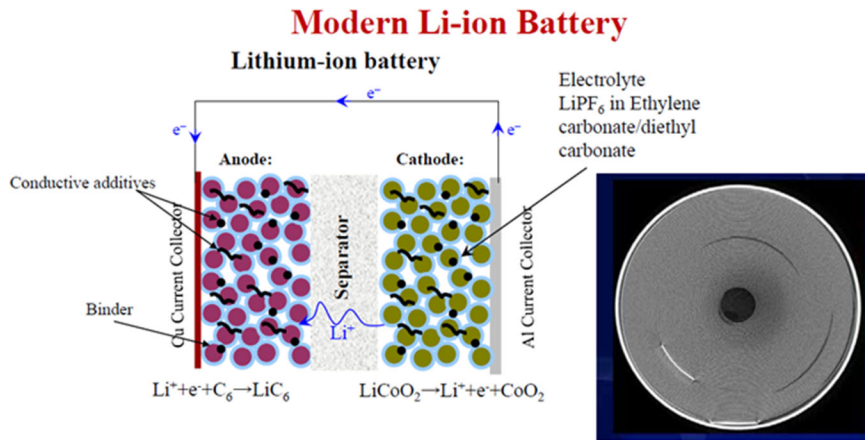
The process of stripping the most precious metals from the battery was energy-intensive and involved hazardous chemicals, calling for centralized recycling

facilities. *See* Ex. 2001 (Dantam Decl.), ¶43; Ex. 1011, 1:16-26. A basic question arose—how to transport batteries to these central processing facilities for extracting the metals. Ex. 2001, ¶43.

Transporting used batteries was a fundamental problem—EV batteries contained toxic chemicals, which could react in hazardous ways during shipment and storage. *See* Ex. 2001, ¶44; *see also* Ex. 1006, 1:22-27; Ex. 1018, 2:37-40. Thus, there was a need to collect batteries locally and inactivate their chemical constituents, so they could be subsequently and safely transported to a centralized facility for further processing. *See* Ex. 2001, ¶¶43-44.

B. EV battery chemistry and its hazards.

Each EV battery contains a collection of cells, at the heart of which is a pair of electrodes between which electric current flows. Ex. 2001, ¶¶34-36; Ex. 2002 (Gao) at 5. Figure 1 below is an image of an EV battery. Ex. 2001, ¶34; Ex. 2002 at 5. At bottom right is a cutaway cross-section of a battery cell, showing the layers of foils and separators comprising the cell. Ex. 2001, ¶35; Ex. 2002 at 5. At left is an illustration of the primary components of the cell. Ex. 2001, ¶35; Ex. 2002 at 5.



Ex. 2002 at 5.

Electrodes. The positive electrode is the cathode, which is typically composed of lithium metal oxides such as lithium cobalt oxide, lithium iron phosphate, or nickel manganese cobalt oxide. Ex. 2001, ¶35; Ex. 2002 at 5. These metal oxides are mounted onto a support, with the aid of a binder, discussed below. The cathode support is typically copper foil. Ex. 2001, ¶35; Ex. 2002 at 5. The negative electrode is the anode, which is usually made from copper foil. Ex. 2001, ¶36; Ex. 2002 at 5.

Separator. The cathode and anode are separated by a thin, porous membrane called a separator. Ex. 2001, ¶37; Ex. 2002 at 5. Without the separator, the two electrodes would touch, causing a short-circuit. Ex. 2001, ¶37; Ex. 2002 at 5. The separator allows the lithium ions to pass freely between the cathode and anode. Ex. 2001, ¶37; Ex. 2002 at 5. In order for lithium to travel between the electrodes, the lithium must be dissolved in a liquid solvent. Ex. 2001, ¶37; Ex. 2002 at 5.

Solvent and lithium salt. The solvent typically consists of ethylene carbonate or dimethyl carbonate (among others). Ex. 2001, ¶38; Ex. 2002 at 5. Lithium is typically introduced in the form of lithium hexafluorophosphate (LiPF_6), which dissolves in the solvent, producing the lithium ions. Ex. 2001, ¶38; Ex. 2002 at 5. The lithium salt, dissolved in the solvent, is referred to as the electrolyte, which transits back and forth between the cathode and the anode as the battery is charged and discharged. Ex. 2001, ¶38; Ex. 2002 at 5.

Binder. The binder, shown in blue in Figure 1 above, holds the metal oxides onto electrode support foils, and is typically a polymer like polyvinylidene fluoride (PVDF). Ex. 2001, ¶39; Ex. 2002 at 5. The binder affixes the precious metal oxides onto the surface of the foils, thereby maintaining the structural integrity of the electrodes. Ex. 2001, ¶39; Ex. 2002 at 5. The binder is chemically stable and designed to withstand the battery's chemical environment and mechanical stresses over its lifetime. Ex. 2001, ¶39.

Decomposition of binder. To retrieve the metal oxides from the cells during the recycling process, the binder must be decomposed. Ex. 2001, ¶40; *see* Ex. 1011 (Meador) at Abstract. Due to the stable nature of the binder, a high heat furnace (with typical temperatures of 350-800°C) is used to decompose the binder. Ex. 2001, ¶40; *see* Ex. 1011 at Abstract. Once the binder decomposes, the shredded material is reduced to a black powder. Ex. 2001, ¶40.

The high-heat environment in the decomposition furnace can create unwanted byproducts. Ex. 2001, ¶41. For example, the LiPF_6 conducting salt and the PVDF binder may decompose into toxic gases, including hydrogen fluoride (“HF”). Ex. 2001, ¶41; Ex. 1006 (Hayashi) at 1:22-27. This volatile gas can corrode glass and break seals on industrial machinery and can be fatal if inhaled. Ex. 2001, ¶41.

To make these batteries more amenable to storage and transport, it was advantageous to comminute (*i.e.*, shred) them. Ex. 2001, ¶42; *see* Ex. 1018 (Dunagan) at 3:11-20. Shredding grinds the structures of the cells, making them more compact and facilitating downstream processing. Ex. 2001, ¶42. The shredders break down the batteries into a heterogeneous mixture of fragments, resulting in a stew of various chemical compounds all mixed together. Ex. 2001, ¶42.

By the early 2010’s, it was recognized that shredded batteries presented hazards of ignition, explosion, and other chemical reactions. Ex. 2001, ¶42; Ex. 2003 (Electrocycling), 2:[0004].

C. Prior attempts to solve the inactivation-transport problem.

Many companies tried and failed to develop methods for inactivating lithium-ion batteries for safe storage and transport. Companies proposed various additives to mix with the comminuted material to suppress the hazards, including:

- flame retardants; *see, e.g.*, Ex. 2005 (LiMotive);

- aqueous solution or a deactivating powder; *see, e.g.*, Ex. 2003, 5:[0034]-[0035];
- mineral acids; *see, e.g.*, Ex. 1006;
- brine solutions; *see, e.g.*, Ex. 1018;
- pressurized solvents; *see, e.g.*, Ex. 2004 (Ecobat).

Ex. 2001, ¶¶45-50.

All these prior art techniques proposed adding foreign substances to the shredded bulk for inactivation. Ex. 2001, ¶¶45-50. But adding foreign substances to the batteries negatively impacted the recycling process. Ex. 2001, ¶51; *see* Ex. 1001, 2:6-12. Moreover, treatment with aqueous solutions risked partial electrolysis, which could lead to hazards from gas formation. Ex. 2001, ¶51.

D. The '097 patent

A key advance of the '097 patent was recognizing that shredded batteries could be inactivated through the drying process itself, by vacuum drying at a maximum pressure of 300 hPa. Ex. 2001, ¶52. In particular, the inventors discovered that additives, as used in the prior art, were unnecessary. *Id.* Rather, they determined that these additives contaminated and compromised the quality of the recycled product. *Id.* The inventors further recognized that avoiding high heat during the

drying process suppressed the formation of toxic gases, particularly HF. *Id.*; *see* Ex. 1001, 2:5-12.

The inventors employed this drying process to generate dried, shredded battery material, which was chemically inert and could be safely stored and shipped. Shredded material is rendered “inactivated” after the drying process is complete. Ex. 2001, ¶¶52-54; *see* Ex. 1001, 8:54-55 (“The drying of the comminuted material results in inactivated comminuted material.”). The ’097 patent describes and claims methods and installations that provide an efficient, low-cost way of recovering spent battery material with high purity and rendering it safe for transport by inactivating the comminuted battery material using a vacuum drying process. Ex. 2001, ¶55.

The ’097 patent explains the goal of inactivating the battery material as follows:

The advantage of the invention is that the amount of electrolyte that can be obtained from the comminuted material through drying is such that an electrochemical reaction is no longer possible, or only to a negligibly small extent. In addition, no flammable or explosive gas phase forms above the battery fragments, as the organic carbonates of the electrolyte have been removed [from the fragments]. The comminuted material is therefore largely inert and can be transported safely, especially if it is packed under vacuum.

Ex. 1001, 1:63-2:4.

Claim 1 of the '097 patent teaches a method for safely inactivating batteries for secure storage or transport for downstream processing, and recites:

A method for the treatment of used batteries, comprising the steps:

- (a) comminuting the batteries such that comminuted material is obtained;
 - (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
 - (c) filling a transport container with the inactivated comminuted material;
- wherein the inactivating step is performed by drying the comminuted material, and
- wherein the drying occurs at a maximum pressure of 300 hPa.

Ex. 1001, 10:45-59.

Claims 2–11 depend from claim 1. *Id.* at 10:60-11:47.

Independent claim 12 teaches a battery processing installation configured to inactivate batteries via a drying process for storage and transport, and recites:

A battery processing installation for treatment of used

batteries, comprising:

- (a) a comminution unit configured to comminute the batteries such that comminuted material is obtained;
- (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;
- (c) a filling device configured to fill a test transport container with the inactivated comminuted material; and
- (d) a vacuum installation connected to the drying device and configured to generate a vacuum in the drying device.

Ex. 1001, 11:50-62.

Claims 13–21 depend from claim 12. Ex. 1001, 11:62-12:62.

The specification teaches how to obtain inactivated comminuted material that is suitable for transport. Ex. 2001, ¶53; Ex. 1001, 1:64-2:12. The specification emphasizes drying under low pressure, while avoiding high temperatures. Ex. 2001, ¶52; Ex. 1001, 3:7-9 (“It is beneficial if the drying occurs at a maximum pressure of 300 hPa, in particular a maximum of 100 hPa.”); *see id.* at 3:5-7 (“The size of the

vacuum is preferably selected such that the vapour pressure of dimethyl carbonate at 80°C., especially at 70° C., is not reached.”). These conditions contribute to safe inactivation of electrolytes and associated solvents without forming hydrogen fluoride. Ex. 2001, ¶¶53-54; Ex. 1001, 3:9-14.

The comminuted material is dried until its electrolyte content is low enough to prevent any electrochemical reactions. Ex. 2001, ¶¶53-54; Ex. 1001 at 4:5-7. The inactivated comminuted material is safe for transport, and thus can be filled into a transport container under vacuum or inert gas and safely shipped. Ex. 2001, ¶53; Ex. 1001, 8:56-58.

III. RELATED PARTIES, LITIGATION AND PROCEEDINGS

The invention arose from work done at the German Technische Universität Braunschweig (“TU Braunschweig”) by four researchers: Christian Hanisch, Bastian Georg Westphal, Wolfgang Haselrieder, and Martin Schoenitz. *See* Ex. 1001. In 2011, based upon their work at TU Braunschweig, they formed Lion Engineering, which filed the German priority application. Ex. 1002 at 345. As the promise of this technology grew, Mr. Hanisch worked to form a successor company, Duesenfeld GmbH, to which the ’097 patent is assigned. Ex. 1002 at 337.

Duesenfeld. Since its founding in 2016, Duesenfeld has been at the forefront of safe and energy-efficient EV battery recycling. Today,

Duesenfeld operates a recycling plant in Wendeburg, Germany. Duesenfeld's dedication to research and development has made Duesenfeld a technology leader in the recycling of lithium-ion batteries, as recognized by the German government, which awarded Duesenfeld the 2024 German Sustainability Award. *See* Ex. 2012 (Duesenfeld Website).

Ascend. In March 2023, Ascend opened a plant in Covington, Georgia, for producing black mass from used EV batteries. *See* Ex. 2013 (Press Release). Ascend purchased its vacuum drying equipment from URT Umwelt und Recyclingtechnik GmbH ("URT"). Ex. 2014, ¶7 (Ascend Answer).

URT. URT is a German company that builds equipment for recycling electric vehicle batteries. As noted above, Ascend purchased its infringing vacuum drying equipment from URT.

District court litigation. On October 23, 2023, Duesenfeld filed a lawsuit against Ascend in the U.S. District Court for the District of Delaware, asserting that Ascend's use of the vacuum drying equipment that was supplied to it by URT infringes the '097 patent. *See Duesenfeld v. Ascend*, Case No. 1-23-cv-01194 (D. Del.) (the "District Court litigation"). No trial date has been set. *See* Ex. 2015 (Scheduling Order).

Overlapping IPR petitions. On May 1, 2024, URT filed the first petition challenging claims of the '097 patent. Case No. IPR2024-00887, Paper 2 ("URT

Petition”). The URT Petition challenged the validity of claims 1-3, 7-10, 12-13, 15-19 of the ’097 patent. On May 21, 2024, Ascend filed the present Petition, which challenges the validity of claims 1-3, 7-10, 12-13, and 19 of the ’097 patent. Every claim that Ascend is challenging has been challenged by URT.

IV. LEGAL STANDARDS

The Board may not institute an *inter partes* review unless the Petition demonstrates a reasonable likelihood that the petition would prevail with respect to at least one of the claims challenged in the petition. 35 U.S.C. § 314(a).

V. PERSON OF ORDINARY SKILL IN THE ART

Patent Owner disagrees with Petitioner’s contention regarding the appropriate level of skill in the art in the field of the ’097 patent. *See* Ex. 2001, ¶¶17-19. Patent Owner contends that a person of ordinary skill in the art (“POSITA”) in the field of the ’097 patent would have at least a Bachelor’s degree in electrical engineering, materials science, chemical engineering, or an equivalent field, as well as at least 2 to 3 years of academic or industry experience in the recycling or processing of lithium-ion batteries. *See* Ex. 2001, ¶20.

VI. CLAIM CONSTRUCTION

No claim terms require express construction to determine that the Petition does not establish a reasonable likelihood of unpatentability of any claim and, thus, deny institution. For purposes of this Preliminary Response, Patent Owner contends

that the claims should be given their ordinary and customary meaning in light of the specification and prosecution history, as understood by a person of ordinary skill in the art. 37 C.F.R. § 100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). Patent Owner reserves the right to propose constructions at a later date, should such construction become necessary.

**VII. THE PETITION DOES NOT ESTABLISH A REASONABLE
LIKELIHOOD THAT THE APPLIED REFERENCES RENDER THE
CHALLENGED CLAIMS UNPATENTABLE**

The Petition does not establish a reasonable likelihood that the combination of Hanisch '419 alone or in combination with Dunagan (Ground 1) or Hanisch '419 in view of Dunagan, Meador, Shin, and/or Hayashi (Ground 2) disclose all of the limitations of any '097 claim, or that a POSITA would be motivated to combine the references. The Board should not institute trial for reasons including, but not limited to:

1. The references, alone or in combination, do not teach “wherein the inactivating step is performed by drying the comminuted material” ('097 Claim 1).
2. The references, alone or in combination, do not teach “an inactivation device comprising a drying device configured to inactivate the comminuted material” ('097 Claim 12).

3. The references, alone or in combination, do not teach “a vacuum installation connected to the drying device and configured to generate a vacuum in the drying device” (’097 Claim 12).

A. The Petition Does Not Establish a Reasonable Likelihood that Hanisch ’419 Alone or in Combination With Dunagan Renders Unpatentable Claims 1, 2, 3, 7, 8, 9, 10, 12, 13, or 19 (Ground 1)

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on any claim challenged in Ground 1 for the following reasons.

1. Overview of Hanisch ’419

Hanisch ’419 is directed to retrieving active material, such as lithium or lithium compounds, from a galvanic cell (a type of battery). Ex. 1004, 1:8-10; Ex. 2001, ¶60. Hanisch ’419 recognizes a problem in the art of incomplete separation of the active material from its support material. Ex. 1004, 1:32-36; Ex. 2001, ¶60. In particular, Hanisch ’419 notes that while it was known to shred a cell into fragments and then heat those fragments to decompose the binder that bonds the active material to the support, the active material was extremely difficult to remove from the support. Ex. 1004, 2:31-42; Ex. 2001, ¶60. Hanisch ’419 is directed to solving this problem of incomplete removal, and it teaches doing so by “air jet sieving”: smashing the heat-treated cell fragments into an air jet sieve at high speeds to separate the active material from the support. Ex. 1004, 2:39-55; Ex. 2001, ¶60.

Given the problem that Hanisch '419 seeks to solve, the patent focuses on techniques for achieving a more complete separation of active material from the support. Ex. 2001, ¶61. To achieve separation, Hanisch '419 teaches heating the crushed battery material to extremely high temperatures—350° C to 800° C—to decompose the binder that binds the active material to the support. Ex. 1004, 4:25-27; Ex. 2001, ¶61. Hanisch '419 then teaches an air-jet sieving step, in which “the support, with the active material still adhered to it, powerfully impacts upon the sieve.” Ex. 1004, 2:39-40; Ex. 2001, ¶61. According to Hanisch '419, the impact “removes the active material hitherto adhered to the support so that it can be retrieved.” Ex. 1004, 2:40-42; Ex. 2001, ¶61.

In addition to the decomposition and air-jet sieving steps, Hanisch '419 teaches an optional pre-drying step, which is set up “behind the cell crushing device and before the oven.” Ex. 1004, 5:54-56; Ex. 2001, ¶62. According to Hanisch '419, the purpose of the pre-drying step is to retrieve additional electrolyte. Ex. 2001, ¶62. As the patent explains, “the cell fragments are dried at a drying temperature, so that dry cell fragments and drying vapours are formed, whereby the drying vapours are at least partly condensed. This has the advantage that the electrolyte solvent can be retrieved.” Ex. 1004, 3:65-4:4; Ex. 2001, ¶62.

Hanisch '419 is therefore concerned with improved techniques for separating active material from carrier films. Hanisch '419 is not concerned with, and does not

address, drying comminuted battery material for the purpose of inactivating it and rendering it safe for transport. Ex. 2001, ¶63.

2. Overview of Dunagan

Dunagan is directed to processing used batteries for recycling by comminuting them and the placing them in a “neutralizing medium” such as a brine solution to neutralize volatile components in the battery material. Ex. 1018, 3:5-11, 3:29-35. Dunagan is primarily concerned with producing a “substantially homogenous” material having a “predetermined size distribution.” *E.g.*, Ex. 1018, 3:50-55.

While Dunagan teaches transporting processed material to end users, it teaches doing so only after the batteries have been “processed through a shredder and disposed in a brine bath to prevent fire and cause rapid discharge of any residual charge in the batteries and neutralize the electrolyte and other volatile components.” Ex. 1018, 6:19-22.

Dunagan therefore falls into the field of prior art, distinguished by the '097 patent, in which materials (in this case a brine solution) were added to the comminuted batteries in order to deactivate them. Ex. 1001, 2:5-12.

3. The Petition Does Not Establish that Hanisch '419 Alone or in Combination with Dunagan Discloses All Limitations of the Challenged Claims

a. Claim 1

i. Hanisch '419 Alone Does Not Teach “wherein the inactivating step is performed by drying the comminuted material”

The Petition has not established a reasonable likelihood that Hanisch '419 alone teaches “wherein the inactivating step is performed by drying the comminuted material.”

i(1) Pre-dryer

The Petition contends first that the “pre-dryer” discloses the inactivation-by-drying limitation, referring back to discussion in the Petition of claim element 1[b] (“inactivating the comminuted material such that an inactivated comminuted material is obtained”) and alleging that the pre-dryer evaporates the electrolyte solvent from the comminuted material. *See* Pet., 29. But neither the Petition nor Petitioner’s expert points to any disclosure in Hanisch '419 of inactivating the comminuted material, or even to any disclosure of how much of the electrolyte solvent should be extracted in the pre-drying process. Ex. 2001, ¶70. The Petition does nothing more than cite language in the '097 patent relating to “drying” (and notably *not* to “inactivation”) and then alleges—without support—that the pre-dryer of Hanisch '419 does the same thing. Pet., 25. A POSITA would have recognized,

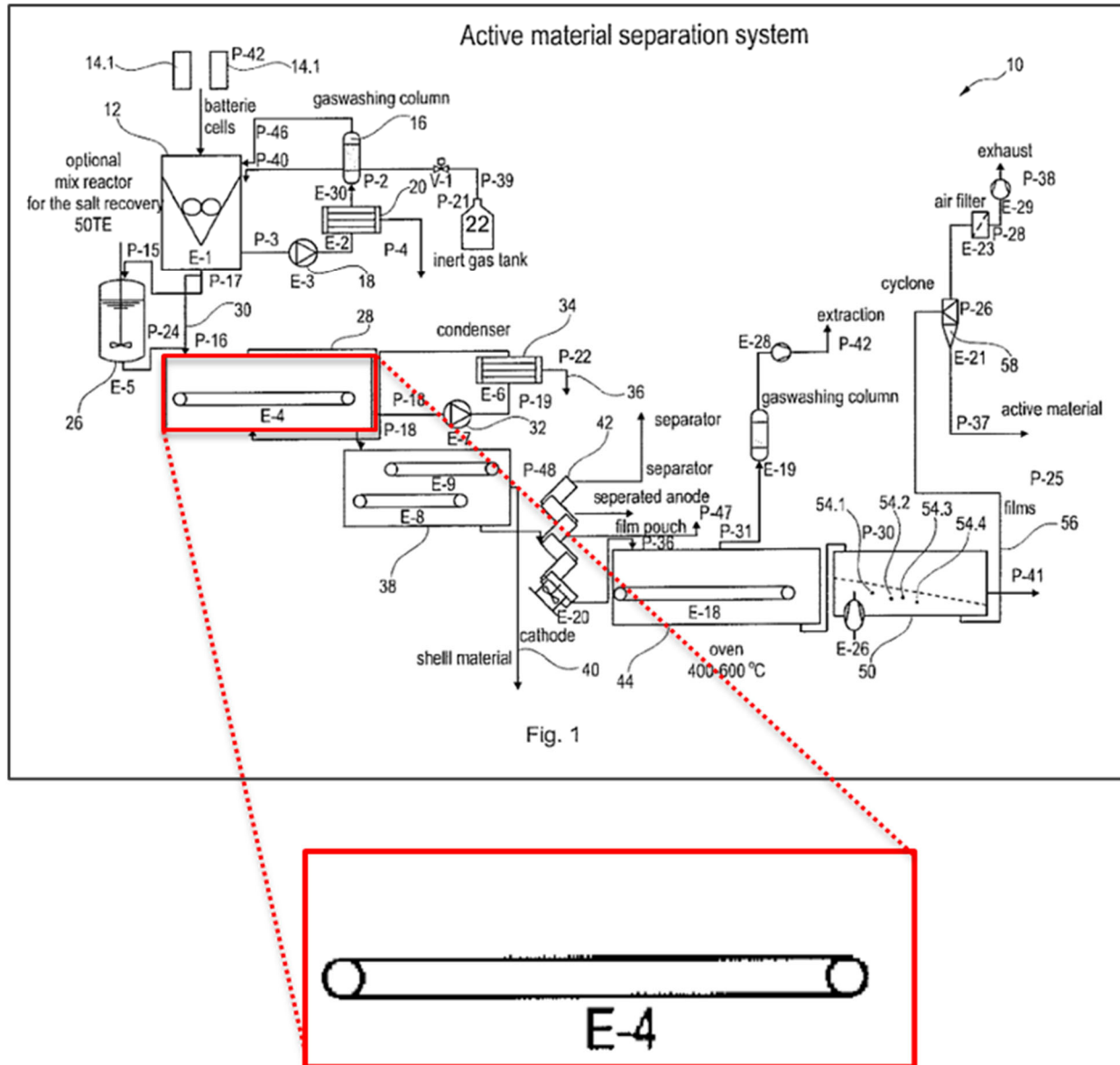
however, that the pre-dry step taught by Hanisch '419 is *not* intended to inactivate the comminuted material. Ex. 2001, ¶70.

Regarding the pre-dry step, Hanisch '419 discloses that “the cell fragments are dried at a drying temperature, so that dry cell fragments and drying vapours are formed, whereby the drying vapours are at least partly condensed,” and further that “[t]his has the advantage that the electrolyte solvent can be retrieved.” Ex. 1004, 3:65-4:4; Ex. 2001, ¶70. The focus of Hanisch '419 is electrolyte *recovery*. Ex. 2001, ¶70. Hanisch '419 is not focused on, and nowhere teaches, *inactivating* comminuted material, for instance to render it safe for transport. Ex. 2001, ¶¶70, 73.

Hanisch '419 includes other teachings that, as would have been understood by a POSITA, are inconsistent with drying comminuted material to inactivate it. Ex. 2001, ¶¶70-72. Inactivation is tedious: a POSITA would have understood that as more electrolyte solvent is extracted, the rate of extraction of the remaining solvent goes down. Ex. 2001, ¶73. Therefore, while *some* electrolyte solvent may be retrieved quickly, extracting enough to inactivate the comminuted material and render it safe to transport is both time- and energy-consuming. Ex. 2001, ¶¶73-75. The '097 patent provides various metrics for determining when the inactivation condition is met, including that “[t]he drying is preferably conducted for so long that the accumulated content of organic carbonates from the electrolyte that are volatile at 80° C. falls short of 3% by volume in the atmosphere above the comminuted

material,” and that “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.” Ex. 1001, 4:28-36; Ex. 2001, ¶74. A POSITA would have understood that these inactivation metrics would take substantial time and energy to achieve. Ex. 2001, ¶74-75.

Yet Hanisch '419, at its pre-dry step, is primarily concerned with speed, and particularly with maintaining a high throughput in extracting electrolyte and separating the active material from the support. Ex. 2001, ¶¶71-72. Hanisch '419 expressly teaches that the method is “preferably performed as [*sic*] continual process and not in batches.” Ex. 1004, 3:27-28; Ex. 2001, ¶71. Consistent with this disclosure, Figure 1 of Hanisch '419 illustrates the pre-dryer (28) as having a conveyer belt, on which comminuted material would pass through the dryer at a constant rate in a continuous manner:



Ex. 1001, Fig. 1 (annotations added); Ex. 2001, ¶71. A POSITA would have understood the conveyer belt to move material through the dryer continuously, again consistent with processing at high throughput. Ex. 2001, ¶71.

Finally, Hanisch '419 refers to the device 28 not as a “dryer,” but as a “*pre-dryer*,” which, by its plain language, would have indicated to a POSITA that it was

not intended to thoroughly dry the comminuted material so as to inactivate it, but rather only to perform a short processing step prior to decomposition, intended to recover some amount of electrolyte solvent before that solvent was destroyed during decomposition as described further below. Ex. 2001, ¶72.

The Petition fails to describe any disclosure in Hanisch '419 of inactivation in the pre-dry step or any disclosure of how much of the electrolyte solvent is extracted in that step (which determines whether the comminuted material is inactivated). Ex. 2001, ¶70. Further, as shown above, a POSITA would have understood that the pre-dry step does *not* extract a sufficient amount of electrolyte solvent to inactivate the comminuted material. Ex. 2001, ¶¶70-75. The Petition therefore fails to establish that this claim element is taught by the pre-dry step in Hanisch '419. Ex. 2001, ¶¶76, 78.

i(2) Decomposition Oven

The Petition also contends that the decomposition step in Hanisch '419 discloses the inactivation-by-drying limitation, referring back to discussion in the Petition of claim element 1[b] and alleging that the electrolyte solvent evaporates from the comminuted material at the high temperatures (400 to 600° C) in the decomposition oven. *See* Pet., 26-27. But these conclusions are unsupported, as they are based on faulty expert opinions. Ex. 2001, ¶79. As described *infra* in § X, Petitioner's expert, Dr. van Schalkwijk, improperly substitutes his own conclusory

opinions for disclosures in the prior art. Here, Dr. van Schalkwijk simply states, without support, that solvents (*e.g.*, EMC and DMC) would be “evaporated and removed” in the high-temperature processing but fails to acknowledge that the solvents—like the binder—would instead decompose, as described below. Ex. 1003, ¶108; Ex. 2001, ¶79.

Indeed, a POSITA would have recognized a distinction between the claimed “drying” and the high-temperature processing taught by Hanisch ’419 for decomposing the binder—one that Petitioner and its expert fail to acknowledge. Ex. 2001, ¶80. The ’097 patent explains that “[w]ithin the scope of the present description, the term drying should be understood particularly to mean the removal of at least one solvent in the conducting salt,” and further that “[i]n particular, the drying is executed such that dimethyl carbonate and/or ethyl methyl carbonate is removed.” Ex. 1001, 2:23-27; Ex. 2001, ¶80. The ’097 patent further discloses that the electrolyte solvent is recoverable by condensation. Ex. 1001, 5:11-22 (“The method comprises the steps of condensing components of the electrolyte by cooling and/or increasing the pressure such that an electrolyte condensate occurs . . . Electrolyte can be recovered in this way.”); Ex. 2001, ¶80.

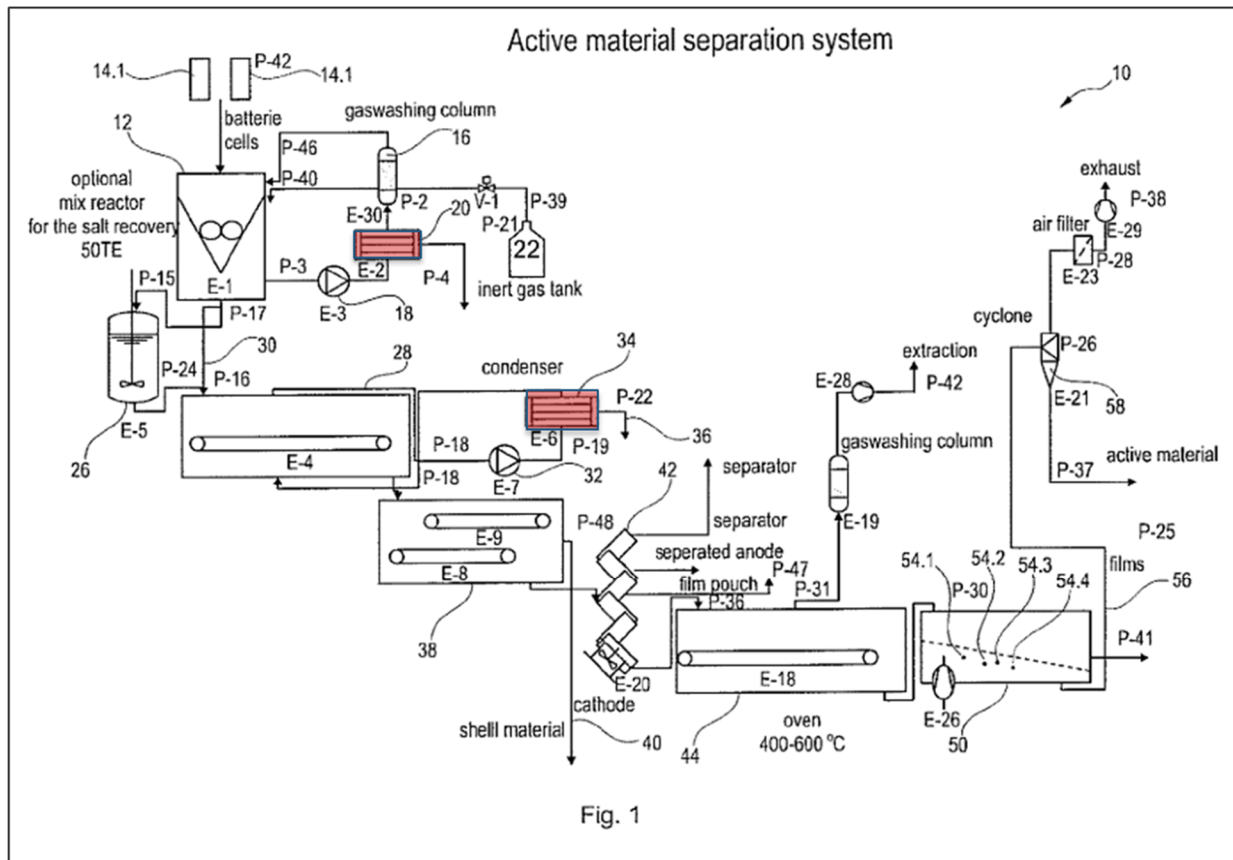
Hanisch ’419 does not teach “drying” at the decomposition step because the electrolyte solvent would not be removed in the oven 44—it would be destroyed by pyrolysis and incapable of the recovery made possible by the claimed drying. Ex.

2001, ¶¶81-82. Hanisch '419 teaches heating the cell fragments in oven 44 to a “decomposition temperature” of “preferably at least 350° C and at the most 800° C,” as at those temperatures “the binder is certain to decompose.” Ex. 1004, 4:25-27; Ex. 2001, ¶81. At those temperatures, however, the electrolyte and electrolyte solvents would also decompose into other, chemically distinct compounds. Ex. 2001, ¶81. Specifically, a POSITA would have understood that the LiPF_6 electrolyte salt present in the comminuted battery material would decompose into lithium fluoride (a solid) and PF_5 gaseous byproducts. *See* Ex. 2008 (“Yang”) at 1, 5-7;¹ Ex. 2001, ¶81. A POSITA would also have understood that the electrolyte solvents including DMC and EMC would rapidly decompose into gases including carbon dioxide, ethane, fluoroethane, and dimethyl ether. *See* Ex. 2009 (“Gnanaraj”) at A1536; Ex. 2001, ¶81. Having decomposed, they are not “dried” out of the material as claimed, and they are no longer capable of being recovered as disclosed by the '097 patent. Ex. 2001, ¶82.

Consistent with this understanding of a POSITA, Hanisch '419 teaches collecting the electrolyte removed from the comminuted battery material at both the comminution and pre-dry stages, but *not* at the decomposition stage. Ex. 2001, ¶83.

¹ The cited pages of Yang are from a 2006 preprint, included as Exhibit 2008. The published version of that preprint is also filed herewith at Ex. 2021.

As shown in Hanisch '419 Figure 1, condensers 20 and 34 connect to both the cell crushing device 12 and the pre-dryer 28, respectively, and Hanisch '419 describes condensing out and collecting electrolyte solvent during both the cell crushing and pre-drying steps. Ex. 1004, Fig. 1, 5:46-47, 5:59-61; Ex. 2001, ¶83.



But no condenser is connected to the decomposition oven 44. Ex. 1004, Fig. 1; Ex. 2001, ¶83. At the high oven temperatures taught by Hanisch '419 for decomposition, the solvents would rapidly decompose through pyrolysis into non-electrolyte gases such as carbon dioxide and ethane, and no electrolyte solvents would remain for collection and reuse. Ex. 2001, ¶83.

The '097 applicants successfully argued this same distinction over Meador and Hanisch '419 at the Patent Office during prosecution. Ex. 2001, ¶84. Distinguishing Meador, the applicants argued on two separate occasions that Meador teaches pyrolysis, and that Meador's pyrolysis furnace is therefore distinguishable from "drying" and a "drying device" as claimed:

Meador discloses a battery reclamation system and method which centers around pyrolysis, in particular decomposition temperatures between 350° and 650° F (see, e.g., Abstract). ***"Drying" and "drying device" as described in the disclosure at, e.g., page 4 of the specification, is distinguished from Meador's furnace 17. Accordingly, Meador fails to even have a "drying device" much less a "comminution unit and . . . drying device [that] are arranged in a container" as recited in claim 9.***

Ex. 1002 at 192 & 258 (emphasis added); Ex. 2001, ¶¶85-86.

In regard to Hanisch '419, applicants likewise argued twice that "[l]ike Meador, Hanisch involves heating to extremely high decomposition temperatures. In Hanisch's case, the desired temperatures are 350 to 800°C." Ex. 1002 at 192, 258; Ex. 2001, ¶86. They described Hanisch '419 as "like Meador," and pointed to the 350° to 800°C temperature range taught by Hanisch '419, which is substantially *higher than* Meador's 350° to 650° F.

Ex. 2001, ¶86. (That temperature range corresponds to approximately 175° to 350°C. Ex. 2001, ¶87). Just as Meador’s furnace is not a “drying device” and does not perform “drying,” so too the oven 44 in Hanisch ’419—which operates at much higher temperatures than Meador’s furnace—is not a “drying device” and does not perform “drying.” Ex. 2001, ¶87.

The applicants’ argument that heating to these extremely high decomposition temperatures was not “drying” as claimed—the same argument made herein—was successful at the Patent Office: the claims were allowed over Meador and Hanisch ’419 in a Notice of Allowance issued in response to the applicants’ argument. Ex. 1002 at ; Ex. 2001, ¶87.

Although the ’097 patent describes “high temperature drying,” this drying is not the same as the drying recited in the patent claims.² Ex. 2001, ¶80 n.1. In particular, as described in the ’097 patent, the high-temperature “drying” step follows the “first drying step” (Ex. 1001 at 5:43), whose purpose is to remove at least one solvent in the conducting salt. Ex. 1001, 2:23-25, 5:43; Ex. 2001, ¶80 n.1. A POSITA would have understood that by the time

² Petitioner erroneously points to this disclosure in alleging that the Petition raises arguments not before the Examiner, as described *infra* at § IX regarding “Factor 4” and at Ex. 2001, ¶¶66-69.

this second, “high temperature drying” step is performed, the solvent is already removed, i.e., that “drying” is complete. Ex. 2001, ¶80 n.1. The second, “high temperature drying” step is intended to decompose the binder rather than to remove a solvent in the conducting salt. *Id.* A POSITA would therefore have understood the high-temperature decomposition “drying” disclosed in the ’097 patent to be separate and distinct from the inactivation and removal drying described and claimed. *Id.*

As described above, therefore, the pre-dry step of Hanisch ’419 fails to teach “inactivating the comminuted material.” Ex. 2001, ¶¶89, 104. The decomposition heating step, to the extent it teaches inactivating the material by pyrolyzing the electrolyte solvents, fails to teach “drying” the comminuted material. Ex. 2001, ¶¶89, 104. Hanisch ’419 therefore fails to teach “wherein the inactivating step is performed by drying the comminuted material.” Ex. 2001, ¶¶88-89, 104.

ii. Hanisch ’419 Alone Does Not Teach “wherein the drying occurs at a maximum pressure of 300 hPa”

The Petition contends that Hanisch ’419 discloses this vacuum pressure claim limitation at both the pre-dryer embodiment and the decomposition embodiment. Pet., 30-31.

As to the pre-dryer embodiment, however, Hanisch '419 does not contain any express teaching that vacuum should be applied in the pre-dry step. Ex. 2001, ¶¶90-91. The entire Hanisch '419 disclosure includes only five instances of the term “vacuum,” and none expressly describe the pre-dry step. Ex. 2001, ¶91.

The Petition focuses on this last instance of the term “vacuum”: “The heating up of solid cell fragments is understood in particular to mean heating up in gas-proof container, so that oxygen, for example, is prevented from the entering. In particular, the heating up takes place under inert gas or in a *vacuum*.” Ex. 1004, 3:4-8 (emphasis added); Pet., 30; Ex. 2001, ¶92. But a POSITA would have understood this disclosure of a “vacuum” to refer only to the decomposition heating step, and not the pre-dry step. Ex. 2001, ¶92.

The passage on which the Petition relies appears well before any disclosure of pre-drying in Hanisch '419, and therefore does not describe pre-drying directly. Ex. 2001, ¶93. The passage appears at column 3, lines 4-8, and describes what the “heating up of solid cell fragments” should be understood to mean. Ex. 1001. Logically, it refers back to the disclosure in column 2 that “[t]he invention is based on the knowledge that the *heating of the cell fragments up to the decomposition temperature* would theoretically have to be enough to destroy the binder to the extent that the active material is set free,” and therefore describes the decomposition heating step rather than the pre-drying step. Ex. 1001, 2:31-34 (emphasis added);

Ex. 2001, ¶93. The pre-drying step is not described until much later in the specification, first appearing at column 4, line 55. Ex. 1001; Ex. 2001, ¶93. This contextual distinction is further supported by the fact that the specification expressly describes applying vacuum in the decomposition step (“The heating of cell fragments up to the decomposition temperature is preferably carried out under inert gas or in a *vacuum*,” Ex. 1004, 4:6-8, emphasis added) but nowhere describes using vacuum with the pre-dryer.

The Petition contends in the alternative that a POSITA would have found it obvious to use pressures at or below 300 hPa in the pre-dry step, but it fails to properly articulate why a POSITA would have had a reasonable expectation of success in this combination. Pet., 31-32. The Petition contends only that a “gas-proof” container would have been capable of maintaining a pressure below 300 hPa. Pet, 32. But the Petition fails to account for the fact that a POSITA would have understood that a chamber being flushed with gas would ordinarily not be under a strong vacuum, as the provision of the flushing gas would compromise the vacuum. Ex. 2001, ¶94. A POSITA reading this disclosure would further have understood that a vacuum would be unnecessary and wasteful where the container was already being flushed with inert gas to prevent entry of oxygen and potential ignition. Ex. 2001, ¶¶94, 105.

Further, to the extent Hanisch '419 teaches operating the oven 44 under vacuum for the decomposition heating step, it does not teach “a maximum pressure of 300 hPa.” Ex. 2001, ¶95. And even if that maximum pressure were obvious, which Respondent does not concede, the decomposition heating is not “drying.” See § VII.A.3.a.i.i(2), *supra*; Ex. 2001, ¶95, 105. Hanisch '419 therefore does not teach “wherein the drying occurs at a maximum pressure of 300 hPa,” whether in the pre-dry or decomposition heating steps. Ex. 2001, ¶¶95, 105.

Because the Petition fails to establish that Hanisch '419 alone teaches all limitations of Claim 1, the Petition further fails to establish that Hanisch '419 alone teaches all limitations of any of the challenged claims that depend from Claim 1, namely Claims 2, 3, 7, 8, 9 and 10.

b. Claim 12

i. Hanisch '419 Alone Does Not Teach “an inactivation device comprising a drying device configured to inactivate the comminuted material”

The Petition contends that Hanisch '419 teaches this claim element, referring back to the reasons discussed as to claim elements 1.[b] and [d]. Pet., 38. As shown above for claim elements 1.[b] and [d], however, Hanisch '419 does not teach this limitation at least because (1) Hanisch '419 fails to teach “inactivation” as part of the pre-dry step (§ VII.A.3.a.i.i(1)), and (2) Hanisch '419 fails to teach “drying” as part of the decomposition heating step (§ VII.A.3.a.i.i(2)). Ex. 2001, ¶¶96, 106.

Because Hanisch '419 fails to teach a single step in which both “inactivation” and “drying” occur, Hanisch '419 fails to teach “an inactivation device comprising a drying device.” Ex. 2001, ¶¶96, 106.

ii. Hanisch '419 Alone Does Not Teach “a vacuum installation connected to the drying device and configured to generate a vacuum in the drying device”

The Petition contends that Hanisch '419 teaches this claim element, referring back to the reasons discussed as to claim element 1.[e]. Pet., 39. As shown above for claim element 1.[e], however, Hanisch '419 does not teach this limitation at least because (1) Hanisch '419 does not teach performing the pre-dry step under vacuum (§ VII.A.3.a.ii) and therefore has no need to connect a vacuum installation to a “drying device,” and (2) the oven 44 of Hanisch '419 is not a “drying device” (§ VII.A.3.a.i.i(2)) and therefore any vacuum installation, to the extent one is present, is not connected to a “drying device.” Ex. 2001, ¶¶99-102, 107.

The Petition contends that Hanisch '419 teaches this claim limitation for “other reasons” beyond those described for claim element 1.[e], but these allegations are based on impermissible hindsight in the obviousness analysis and should therefore be disregarded. Pet., 39. In particular, both the Petition and Petitioner’s expert rely on the '097 patent disclosure *itself* in alleging that a POSITA would have understood the circulation pump and condenser in Hanisch '419 to be a vacuum

installation, alleging that this understanding would have followed in view of four separate disclosures in the '097 patent. Pet., 40; Ex. 1003, ¶ 136; Ex. 2001, ¶100. “To draw on hindsight knowledge of the patented invention, when the prior art does not contain or suggest that knowledge, is to use the invention as a template for its own reconstruction—an illogical and inappropriate process by which to determine patentability.” *Sensonics, Inc. v. Aerosonic Corp.*, 81 F.3d 1566, 1570 (Fed. Cir. 1996).

Hanisch '419 discloses a circulation pump 32 and condenser 34 connected to the pre-dryer. Ex. 1004, Fig. 1. Hanisch '419 says nothing further about this equipment, identifying it only in a “List of reference numbers.” Ex. 1004, 6:43-54. Both the Petition and Petitioner’s expert rely *solely* on disclosures in the '097 patent in alleging that this circulation pump and condenser comprise a vacuum installation. Pet., 39-40; Ex. 2001, ¶100. The Petition therefore impermissibly “use[s] the invention as a template for its own reconstruction,” and fails to show a reasonable likelihood that this claim element is taught by the pre-dryer in Hanisch '419.

Because the Petition fails to establish that Hanisch '419 alone teaches all limitations of Claim 12, the Petition further fails to establish that Hanisch '419 alone teaches all limitations of any of the challenged claims that depend from Claim 12, namely Claims 13 and 19.

c. Dunagan Does Not Cure the Deficiencies of Hanisch '419

The Petition raises Dunagan in Ground 1 only for claim elements 1.[c] and 12.[c], for the proposition that Hanisch '419 in view of Dunagan would render obvious the limitations “filling a transport container with the inactivated comminuted material” and “a filling device configured to fill a transport container with the inactivated comminuted material.” Pet., 28, 39. Without waiving any argument to the contrary, Respondents note that neither the Petition nor Petitioner’s expert contends that Dunagan teaches drying or inactivation of comminuted battery material or doing so under vacuum. Dunagan therefore fails to cure the deficiencies of Hanisch '419 described at §§ VII.A.3.a and b above. Ex. 2001, ¶108.

Therefore, neither Hanisch '419 alone nor Hanisch '419 in combination with Dunagan teaches all limitations of Claims 1 or 12 or, by extension, their dependent claims; the Petition therefore fails to establish a reasonable likelihood that Hanisch '419 alone or in combination with Dunagan renders unpatentable claims 1, 2, 3, 7, 8, 9, 10, 12, 13, or 19.

B. The Petition Does Not Establish a Reasonable Likelihood that Hanisch '419 in View of Dunagan, Meador, Shin, and/or Hayashi Renders Unpatentable Claims 1, 2, 3, 7, 8, 9, 10, 12 13, or 19 (Ground 2)

The Petition has not demonstrated a reasonable likelihood of success that Petitioner will prevail on any claim challenged in Ground 2 for the following reasons.

1. Overview of Secondary References

The only substantive difference between Grounds 1 and 2 is the addition in Ground 2 of three secondary references—Meador (Ex. 1011), Shin (Ex. 1010), and Hayashi (Ex. 1006)—each of which Petitioner combines with Hanisch '419 in arguing that claim elements 1.[d] and 12.[c] would have been obvious. As shown below, these references do not render those claim elements obvious, and in any case fail to cure the deficiencies of Hanisch '419 discussed above regarding other claim elements not addressed by Petitioner in Ground 2.

a. Overview of Meador

Meador is directed to a pyrolysis process for reclaiming components of spent batteries. Ex. 1011, 3:11-16. Meador teaches passing crushed, used batteries through a pyrolysis chamber operated at between 350° and 650° F (approximately 175° to 350° C). Ex. 1011, 4:30-47, 5:59-60. The pyrolysis chamber includes a collector for retrieving “dry residue” following pyrolysis, which allows for recovery of “valuable components of the batteries and other wastes.” Ex. 1011, 3:31-36.

Meador is not concerned with, and does not even address, drying comminuted battery material for the purpose of rendering it safe to transport. Instead of vacuum drying, Meador teaches pre-treating lithium batteries “in a potassium hydroxide electrolyte which deactivates the lithium battery leaving lithium salt which is virtually undetectable after pyrolysis.” Ex. 1011, 3:50-53. Meador does not teach filling processed battery materials into containers for transport and does not address any of the challenges associated with transporting hazardous battery wastes.

b. Overview of Shin

Shin is directed to recovering valuable metals from used batteries using a continuous process that allows for processing large volumes. Ex. 1010, 3:47-53. Used batteries are placed in a reaction reservoir and subjected to continuous heat treatment at 470° to 550° C. Ex. 1010, 5:9-26, 8:28-34. Following heat treatment, Shin teaches transferring the treated batteries to a crusher to grind them. Ex. 1010, 9:21-26.

Shin is concerned with an entirely different problem than that addressed by the '097 patent, that of pre-treating whole batteries so that they can be safely crushed without risk of explosion. Shin is not concerned with, and does not even address, drying comminuted battery material for the purpose of rendering it safe to transport. Shin does not teach filling processed battery materials into containers for transport

and does not address any of the challenges associated with transporting hazardous battery wastes.

c. Overview of Hayashi

Hayashi is directed to processing an electrolyte solution containing a fluorine compound and an organic compound, and doing so in a way that enables recovery and reuse of the organic compound. Ex. 1006, 1:64-2:11. Hayashi teaches heating the electrolyte solution under reduced pressure, allowing the fluorine component to react with calcium so that the component is immobilized as calcium fluoride, and then collecting the organic solvent component left behind. Ex. 1006, 2:24-33. According to Hayashi, these teachings enable detoxifying the battery without the need to freeze it or heat it to very high temperatures. Ex. 1006, 9:3-8.

Hayashi is concerned with an entirely different problem than that addressed by the '097 patent, that of with recovering a part of the electrolyte solution so that it can be reused. Hayashi is not concerned with, and does not even address, drying comminuted battery material for the purpose of rendering it safe to transport. Hayashi does not teach filling processed battery materials into containers for transport and does not address any of the challenges associated with transporting hazardous battery wastes.

2. None of Dunagan, Meador, Shin, or Hayashi Cures the Deficiencies of Hanisch '419

The only substantive distinction in the Petition between Grounds 1 and 2 is the introduction in Ground 2 of Meador, Shin, and Hayashi for alleged obviousness of claim elements 1.[e] (“wherein the drying occurs at a maximum pressure of 300 hPa”) and 12.[d] (“a vacuum installation connected to the drying device and configured to generate a vacuum in the drying device”). For all other claim elements, the Petition simply refers back to the arguments of Ground 1.³ *See generally* Pet., 51.

Each of Meador, Shin, and Hayashi fails to cure the deficiencies of Hanisch '419 discussed above in Ground 1. In particular, none of these references teach—and Petitioner does not argue that they teach—claim limitation 1.[d] (“wherein the inactivating step is performed by drying the comminuted material”) or 12.[b] (“an inactivation device comprising a drying device configured to inactivate the comminuted material.” Meador, like Hanisch '419, teaches decomposition by pyrolysis, which is not the same as the claimed drying. (*See* § VII.A.3.a.i(2),

³ The Petition does reargue the Hanisch '419/Dunagan combination for Ground 2, *see* Pet., 42, but makes no substantive distinction from the argument in Ground 1.

supra). And neither Shin nor Hayashi teaches drying comminuted material in order to achieve inactivation.

Therefore, Hanisch '419 in view of Dunagan, Meador, Shin, and/or Hayashi fails to teach all limitations of Claims 1 or 12 or, by extension, their dependent claims (Ex. 2001, ¶109); the Petition therefore fails to establish a reasonable likelihood that Hanisch '419 in combination with Dunagan, Meador, Shin, and/or Hayashi renders unpatentable claims 1, 2, 3, 7, 8, 9, 10, 12, 13, or 19.

VIII. THE BOARD SHOULD EXERCISE ITS DISCRETION TO DENY INSTITUTION IN LIGHT OF THE PETITION ALREADY FILED BY PETITIONER'S SUPPLIER, URT.

URT, the supplier of the infringing machinery to Ascend, filed its petition challenging every claim (and more) that Ascend now challenges in its follow-on petition. There is no basis for Ascend to file this second petition on the footsteps of URT's petition.

Indeed, the Board has recognized that Patent Owners should be protected from serial IPRs filed against them by related entities. In *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sep. 6, 2017), the panel identified seven non-exclusive factors that bear on the issue of whether the Board should invoke its discretion to deny institution under 35 U.S.C. § 314(a) and 37 C.F.R. § 42.108(a). These factors include:

1. whether the same petitioner previously filed a petition directed to the same claims of the same patent;
2. whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it;
3. whether at the time of filing of the second petition the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the first petition;
4. the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition;
5. whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent;
6. the finite resources of the Board; and
7. the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.

See General Plastic, IPR2016-01357, Paper 19, 9–10 (citations omitted).

The Board's "discretion under 35 U.S.C. § 314(a) and 37 C.F.R. § 42.108(a) is not limited to situations where the same party files multiple petitions, and ... the

General Plastic factors provide a useful framework for analyzing the facts and circumstances ..., in which a different petitioner filed a petition challenging a patent that had been challenged already by previous petitions.” *NetApp Inc. v. Realtime Data LLC*, IPR2017-01196, Paper 10, slip op. at 9 (PTAB Oct. 13, 2017) (emphasis added).

As discussed below, the *General Plastic* factors weigh against the Board instituting this Petition.

Factor 1: whether the same petitioner previously filed a petition directed to the same claims of the same patent.

Ascend filed the present Petition shortly after its own supplier, URT, filed the first IPR petition (IPR2024-00887) attacking the '097 patent. Thus, while the Petitioner is not the same party that filed the first petition against the '097 patent, Ascend and URT are related parties, given that URT supplied the infringing equipment to Ascend. This supplier/customer relationship is sufficient to trigger the protections afforded by *General Plastics*. See *Valve Corp. v. Elec. Scripting Prods. Inc.*, IPR2019-00062, Paper 11 at 9 (Apr. 2, 2019) (“our application of the *General Plastic* factors is not limited solely to instances when multiple petitions are filed by the same petitioner.”); see also *id.* (“[W]hen different petitioners challenge the same patent, we consider any relationship between those petitioners when weighing the *General Plastic* factors.”).

In *Valve Corp.*, the Board ultimately found that—despite the fact that the first petition was filed by a different entity (HTC)—Factor No. 1 of *General Plastic* nevertheless weighed in favor of exercising discretionary denial because (1) HTC was accused of infringing the same patent based on its “devices that incorporate technology licensed from Valve,” (2) “Valve was aware of Patent Owner’s infringement allegations at the time HTC filed its petition,” and (3) that there was “complete overlap in the challenged claims.” *Id.* at 10.

The relationship between URT and Ascend is akin to the relationship between Valve and HTC. URT builds and supplies the accused instrumentality that is at issue in the District Court litigation. *See, e.g.,* District Court litigation, Dkt. 9 at ¶7 (“Ascend admits that it has purchased certain equipment from URT Umwelt-und Recyclingtechnik GmbH.”). Duesenfeld pleaded numerous facts in the District Court litigation alleging that URT was the source of the infringing machinery. URT was aware of these allegations, as well as the infringement allegations against Ascend. *See* IPR2024-00887, Paper 2 (“URT Petition”) at 2. Indeed, in December 2023—less than two months after the Complaint was filed in the District Court litigation and almost simultaneously with Ascend’s responsive pleading deadline—it was **URT** that reached out to Duesenfeld to assert prior art against the ’097 patent, including LithoRec I. *See* Ex. 2017 (Stiel Email)(EN). Moreover, every claim that Ascend is challenging has already been challenged by URT. *Compare* URT Petition

(challenging claims 1-3, 7-10, 12-13, and 15-19) *with* Petition (challenging claims 1-3, 7-10, 12-13, and 19).

In sum, URT's relationship with Ascend is analogous to the relationship between the parties in *Valve Corp.* As such, all of the above weighs in favor of discretionary denial.

Factor 2: whether at the same time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it.

The prior art references asserted by Ascend and URT are intimately intertwined. Both parties knew, or should have known, about this same constellation of prior art at or near the time the District Court litigation was filed, which is over six months before URT's Petition was filed. There is therefore no reason for the Board to consider two separate petitions.

URT's petition (*i.e.*, the first petition filed) focuses on a research project orchestrated by the German government called "LithoRec." *See* URT Petition at 4-5. LithoRec was organized through TU Braunschweig. *See, e.g.*, Ex. 2020 (Kwade, et al.)(EN). It was led through the laboratory of Arno Kwade. Christian Hanisch—one of the named inventors of the '097 patent—joined that research group. *Id.* Mr. Hanisch became part of the ongoing LithoRec project. *Id.* The first report to come

of out this project (“LithoRec”)⁴ is the focus of URT’s petition. *See* URT Petition at 4-5. The primary basis of Ascend’s Petition (*i.e.*, the second petition filed) is the Hanisch reference, which is Mr. Hanisch’s first patent (US Patent No. 9780419) (“the Hanisch ’419 patent”). Pet. at 3. This patent arose from the LithoRec project. *See* Ex. 2017. The Hanisch ’419 patent was cited on the face of the ’097 patent. *See* Ex. 1001 at 2. Further, the German application to which the ’097 patent claims priority also discusses the Hanisch ’419 patent. Ex. 1002 (German Application) at 583. Given the close relationship between these works, it is unavoidable that Ascend and URT knew about any reference arising from the LithoRec project (including both LithoRec and Hanisch ’419) early in development of either side’s respective investigations concerning their invalidity positions. *See General Plastic*, IPR2016-01357, Paper 16 at 11 (“As to whether the prior art asserted here ‘should have been known’ earlier, the evidence supports that Ikesue and Yasuda were reasonably identifiable from related matters”). For Ascend, this would have been no later than December 13, 2023, which is the date Ascend filed its Answer & Counterclaims in the District Court litigation asserting invalidity positions against the ’097 patent. *See* District Court litigation, Dkt. 9. For URT, this likely would have been at or very

⁴ Arno Kwade et al., “LithoRec Recycling of Lithium-Ion Batteries”, Culliver Verlag (2012) (referenced as the “LithoRec” reference in the URT Petition.)

near the date that URT reached out to Duesenfeld to assert prior art against the '097 patent, *i.e.*, December 6, 2023. Ex. 2020.

Furthermore, many of the references asserted by both Ascend and URT were before the examiner during prosecution of the '097 patent. For URT, WO 2013/023640 (referenced in the URT Petition as the “Hanisch” reference) was before the examiner during prosecution of the '097 patent. *See* Ex. 1001 at 2. Likewise, for Ascend, Hanisch '419, as well as secondary references Meador and Hayashi, were before the examiner during prosecution of the '097 patent. *See id.* at 1-2; *see also* § IX, *infra*, concerning “Factor 2.” Any of the references that were not before the examiner during prosecution were publicly available for years prior to the filing date of either petition. For URT, the reference referred to in the URT Petition as “Perry”⁵ was published in 1997; the reference referred to as “DIN 28400”⁶ was published in 1990. *See* URT Petition at iii. For Ascend, Dunagan was issued on September 20, 2016; Shin issued on August 27, 2019 (though the PCT application was published years earlier on August 18, 2016). *See* Exs. 1101 & 1018. Therefore, neither Ascend

⁵ Perry’s Chemical Engineers’ Handbook 7th Edition. New York: McGraw-Hill, 1997.

⁶ Vacuum Technology; Terms and Definitions; General Terms. DIN 28400-1, German Institute for Standards e.V., 1990.

nor URT would have been unaware, if exercising reasonable diligence, of the references asserted in each other's respective petitions prior to the filing of URT's petition. *See General Plastic*, IPR2016-01357, Paper 16 at 11 ("We agree with Canon that the circumstances here do not favor institution of an inter partes review. . . . As to whether the prior art asserted here 'should have been known' earlier . . . Suzuki, General Plastic does not assert, or even suggest, that the reference could not have been found by an earlier reasonable prior art search.").

The above weighs in favor of discretionary denial.

Factor 3: whether at the time of filing of the second petition the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the first petition.

Ascend did not receive Patent Owner's preliminary response to the URT Petition prior to the filing of this Petition. However, the Board has determined that this factor, when analyzed holistically with the other factors, has comparatively little independent weight. *See, e.g., Paypal, Inc. v. Ioengine, LLC*, IPR2019-00887, Paper 21 at 17 (PTAB Oct. 3, 2019) ("However, five of the factors (Factors 1, 4, 5, 6, and 7) weigh in favor of exercising our discretion and only a single factor (Factor 3) weighs against exercising our discretion. Based on the facts of this case, we find the

first, fifth, and sixth—all of which weigh in favor of exercising our discretion—the most important.”).

Factor 4: the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition.

Ascend should reasonably have been aware of the primary reference alleged in its Petition (*i.e.*, Hanisch ’419) shortly after commencement of the District Court litigation in October 2023, and in any event no later than December 13, 2023 (the date that Ascend first alleged invalidity claims in the District Court litigation). Hanisch ’419 is not only cited on the face of the ’097 patent; it is expressly characterized in the ’097 patent specification and is discussed at length in the file history. *See, e.g.*, Ex. 1001 at 1-2; Ex. 1002 at 213-14. Accordingly, Ascend’s routine diligence before filing its answer in the District Court litigation would almost certainly have resulted in Ascend becoming aware of this reference.

In either case, Ascend’s attempt to assert a “second bite of the apple” now—particularly in light of how likely it is that both parties would have been aware of the same universe of prior art asserted in both petitions well before the filing of the first petition—is highly disfavored. PTAB Consolidated Trial Practice Guide (2019) at 59 (“Two or more petitions filed against the same patent at or about the same time (*e.g.*, before the first preliminary response by the patent owner) may place a

substantial and unnecessary burden on the Board and the patent owner and could raise fairness, timing, and efficiency concerns. . . . In addition, multiple petitions by a petitioner are not necessary in the vast majority of cases.”). This weighs in favor of discretionary denial.

Factor 5: whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent.

Ascend provides no explanation regarding the time elapsed between the two petitions, even though Ascend was aware of the URT Petition prior to filing their own Petition. This factor therefore also weighs in favor of discretionary denial. *Apple Inc. v. Uniloc 2017 LLC*, IPR2020-00854, Paper 9 at 11 (PTAB Oct. 28, 2020) (“For the same reasons stated above, for instance, Apple’s lack of explanation, we conclude that this fifth *General Plastic* factor also weighs in favor of denying institution.”).

Factor 6: the finite resources of the Board; and [7] the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.

“The sixth and seventh factors are efficiency considerations”, which the Board often addresses together. *See Valve Corp.*, Paper 11 at 15. To that end, it is well established that “analysis of ‘multiple, staggered petition filings’ is ‘an inefficient

use of the *inter partes* review process and the Board’s resources.” *See FedEx Corp v. Intellectual Ventures II LLC*, IPR2017-02030, Paper 12 at 11 (PTAB Feb. 20, 2018) (finding that “further consideration of the instant follow-on Petition would represent an unwise use of the Board’s finite resources.”); *Valve Corp.*, Paper 11 at 15. Accordingly, there is no need for the Board to waste its resources to address Ascend’s second petition. These factors therefore also weigh in favor of discretionary denial.

IX. THE BOARD SHOULD DENY INSTITUTION UNDER 35 U.S.C. § 325(d).

Ascend’s follow-on petition recycles prior art that was expressly evaluated by the Patent Office during examination of the ’097 patent. Ascend speculates that the examiner failed to appreciate the teachings of the art before the Patent Office. However, Duesenfeld submitted a short and focused list of prior art with its application. Ex. 1002 at 526. The Patent Office actively considered this art. *Id.*; *see also* Ex. 1002 at 213 & 330. Hanisch ’419—the foundation of Ascend’s Petition—was not only disclosed to the Patent Office, but the Patent Office focused its rejection of Duesenfeld’s initial claims based on Hanisch ’419. Ex. 1002 at 213, 330. Ascend’s Petition merely seeks to reargue the patent prosecution.

The Board may “reject the petition . . . because, the same or substantially the

same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). When evaluating whether to deny institution under § 325(d), the Board has considered the following non-exclusive factors:

- a. the similarities and material differences between the asserted art and the prior art involved during examination;
- b. the cumulative nature of the asserted art and the prior art evaluated during examination;
- c. the extent to which the asserted art was evaluated during examination;
- d. the extent of the overlap between the arguments made during examination and the manner in which a petitioner relies on the prior art or a patent owner distinguishes the prior art;
- e. whether a petitioner has pointed out sufficiently how the Office erred in evaluating the asserted prior art; and
- f. the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments.

See Becton Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8, 17– 18 (PTAB Dec. 15, 2017) (informative).

As will be demonstrated below, all of these factors support denying *inter partes* review.

Factor 1: the similarities and material differences between the asserted art and the prior art involved during examination.

Ground 1 of the Petition asserts Hanisch '419 (alone or in combination with Dunagan). Ground 2 of the Petition asserts Hanisch '419, again, but in combination with Dunagan, Hayashi, Meador, or Shin. Ascend concedes that Hanisch '419 was presented to the Office during examination of the '097 patent. *See* Pet., 17; *see also* Ex. 1001. Therefore, the only primary reference asserted in the Petition was already before the Office during examination. Indeed, it was raised by the Examiner. *See* Ex. 1002 at 213 & 330.

Ascend concedes that Meador and Hayashi were also submitted to the Office during examination. *See* Pet., 19-20; *see also* Ex. 1001.

Meador, like Hanisch '419 was actively discussed during the Office Actions during the prosecution of the '097 patent. *See* Ex. 1002 at 192; *see also id.* at 213 & 330.

Although not actively discussed during prosecution, Hayashi was also submitted to the Office, Ex. 1002 at 583, and is merely duplicative of the information contained within Meador and Hanisch '419. Ascend acknowledges as much in its Petition, as Ascend uses Hayashi as an *alternative reference* to Meador, Shin, and Hanisch '419 for apparently teaching the claim limitations involving drying under a vacuum. *See* Pet., 45 (“As another example, Hayashi discloses”); 50.

The remaining references, though not previously before the Office, are merely duplicative of the references that were before the Office. There are no material differences, and the Petition does not identify any, simply providing a laundry list of secondary references for the same, uncontested claim element.

Thus, the similarities between the asserted art and the prior art involved during examination are stark. This factor therefore supports denying *inter partes* review.

Factor 2: the cumulative nature of the asserted art and the prior art evaluated during examination.

In Ground 1, Ascend relies on Hanisch '419 for every claim element challenged, and relies on Hanisch '419 *exclusively* for nine claim elements and six claims.⁷ Ascend only relies on Dunagan as an *alternative to Hanisch '419* and does so only for two claim elements and two claims. As summarized above, *see supra* at § IX, Hanisch '419 was examined during prosecution and was a focus of the

⁷Ascend relies exclusively on Hanisch '419 for claims 2, 3, 8, 9, 13 and 19, and for claim elements 1[pre], 1[a], 1[b], 1[d], 1[e], 12[pre], 12[a], 12[b], and 12[d]. In contrast, Ascend relies on Dunagan – the only other reference relied on in Ground 1 – as an “alternative” to Hanisch '419, and only for claims 7 and 10, and claim elements 1[c] and 12[c].

examiner's office actions. *See* Ex. 1002 at 213 & 330. In sum, ***all claim elements*** challenged in Ground 1 rely on Hanisch, and only four claim elements challenged rely on another reference (Dunagan), but only do so in a limited capacity as an “alternative” to Hanisch '419.

Hanisch '419 is duplicative of all of the art that was before the examiner. The examiner cited three references in support of its initial rejection of, *inter alia*, independent claims 1 and 12: Stevens (U.S. 8,210,456), Kellermann (DE 4424825), and Zhang (CN 10249675). Ex. 1002 at 207-208.

The examiner concluded that Stevens teaches “comminuting the batteries such that comminuted material is obtained,” as well as “inactivating the comminuted material such that an inactivated comminuted material is obtained” and “wherein the inactivating step is performed by drying the comminuted material.” *Id.* at 207. The examiner found that, while Stevens does not disclose “filling a transport container with the inactivated comminuted material”, that such disclosure would nevertheless be obvious to do so in light of Kellerman, which teaches a “method for the disposal of lithium batteries including filling a transport container with the inactivated comminuted material . . . in order to further process the batteries.” *Id.* The examiner also found that, while Stevens does not disclose the claim elements involving drying by vacuum (*e.g.*, claims 1[e] and 12[d]) , that such disclosure would nevertheless be obvious to do so in light of Zhang, which “teaches an alternative method of

inactivating material in lithium ion batteries including a drying process, where the drying occurs at a maximum pressure of 300 hPa . . . in order to recycle the electrolyte, protect the electrolyte from hydrolysis reactions and oxidation reactions, and prevent decomposition side reactions of lithium hexafluorophosphate.” *Id.* at 207-208.

Ascend makes the *same arguments* in this petition, but merely relies on Hanisch to supply the teachings of Stevens and Zhang, and relies on Hanisch/Dunagan for the teachings of Kellerman. *See, e.g.*, Pet., 22-27, 29-32 (relying on Hanisch for the non-transport elements of claim 1, *i.e.*, claim elements 1[pre], 1[a], 1[b], 1[d], 1[e]) & 27-29 (relying on Hanisch/Dunagan for the transport element, *i.e.*, claim element 1[c]). The asserted art in Ground 1 is therefore cumulative of the prior art evaluated during examination.

As to Ground 2, Ascend once again relies on Hanisch for every claim element challenged, and again relies on Hanisch exclusively for the same nine claim elements and six claims.⁸ Ascend relies on Hayashi and Meador (both of which were before

⁸ Ascend relies exclusively on Hanisch ’419 for claims 2, 3, 8, 9, 13 and 19, and for claim elements 1[pre], 1[a], 1[b], 1[d], 1[e], 12[pre], 12[a], 12[b], and 12[d].

Ascend relies on Hayashi, Meador, and Shin as alternatives to Hanisch ’419 for

the examiner) and Shin as alternative grounds to Hanisch, and only for the two claim elements involving the vacuum drying step. Ascend relies on Dunagan (which was not before the examiner) as a final alternative to Hanisch, and again for only the two claim elements involving filling a transport container with the inactivated comminuted material. In sum, *all claim elements* challenged in Ground 2 rely on Hanisch '419, and only four claim elements challenged rely on another reference, but only do so in a limited capacity as an “alternative” to Hanisch '419.

As discussed above, Hanisch '419 and Dunagan are both cumulative of the prior art relied on by the Examiner (*i.e.*, Stevens, Kellermann, and Zhang) during the rejection of the independent claims. Hayashi, Meador, and Shin are no different. Ascend asserts that these references (in the alternative to Hanisch '419) teach the claim elements involving drying by vacuum.⁹ But as noted by the examiner, Zhang already teaches vacuum drying. *See* Ex. 1002 at 207-208. The asserted art in Ground 2 is therefore also largely cumulative of the prior art evaluated during examination.

claim elements 1[e], 12[d]. Ascend relies on Dunagan as another alternative to Hanisch '419, and only for claim elements 1[c], 12[c].

⁹ Claim element 1[e] “wherein the drying occurs at a maximum pressure of 300 hpa”; claim element 12[d] “a vacuum installation connected to the drying device and configured to generate a vacuum.”

This factor therefore supports denying *inter partes* review.

Factor 3: the extent to which the asserted art was evaluated during examination.

Hanisch '419 and Meador were both evaluated extensively during the prosecution of the '097 patent, including with scrutiny of the high temperature furnace of Hanisch '419 that is now the focus of Ascend's Petition. Indeed, the examiner cited both references in support of a final rejection issued against the '097 patent, which was ultimately overcome. *See* Ex. 1002 at 213-14. Hayashi was also cited on the face of the '097 patent, and therefore presumably considered by the examiner. *See* Ex. 1001 at 1. The fact that Hayashi was not specifically cited in support of a rejection by the examiner does not mean that the examiner did not consider the reference. Rather, for the reasons stated herein, Hayashi simply bears little relevance to the patentability of the claims. This is supported by the fact that even Ascend relies on Hayashi only in the alternative and only for claims/elements 1[e] and 12[d]. Thus, Ascend presented no compelling reason which would support any contention that this reference was not appropriately and duly considered during prosecution by the examiner.

The remaining references, although not cited during prosecution, are merely cumulative of the references cited during prosecution for the reasons stated above. The Petition cites no evidence to support any other conclusion.

This factor therefore supports denying *inter partes* review.

Factor 4: the extent of the overlap between the arguments made during examination and the manner in which a petitioner relies on the prior art or a patent owner distinguishes the prior art.

The Patent Office actively considered Hanisch '419 and Meador and focused its final rejection of the '097 patent on these references, specifically focusing on the high temperature furnaces disclosed in Hanisch '419 and Meador. Ex. 1002 at 213-14. Ascend provides little beyond conjecture that the examiner failed to appreciate the full extent of these references.

During examination, Patent Owner overcame obviousness rejections based on Hanisch '419 and Meador by arguing that neither Hanisch '419 nor Meador teach *drying*, rather, they merely teach *high temperature decomposition*. Ex. 1002 at 192. For example, with regard to Hanisch '419, Patent Owner argued that “Hanisch involves heating to extremely high decomposition temperatures. In Hanisch’s case, the desired temperatures are 350 to 800°C.” *Id.* Likewise, Patent Owner argued that Meador’s high temperature processing is not “drying”. Ex. 1002 at 192, 258 (“‘Drying’ and ‘drying device’ as described in the disclosure at, e.g., page 4 of the specification, is distinguished from Meador’s furnace 17. Accordingly, Meador fails to even have a ‘drying device’”) (emphasis added).

Now Ascend attempts to argue that despite these distinguishing characteristics, the Examiner failed to appreciate that “the ’097 patent itself disclosed an ‘embodiment that uses high-temperature drying to decompose the binder.’” Pet., 14 (regarding Meador), 15 (regarding Hanisch ’419). But as addressed in Factor 5, *infra*, Ascend relies on nothing more than conjecture to support its conclusion that the Examiner somehow failed to appreciate the scope of what was taught. Further, as described in the accompanying declaration of Vani Dantam, the high-temperature decomposition discussion in the ’097 patent specification that Ascend calls an “embodiment” is not the same as the claimed drying. Ex. 2001, ¶¶66-69. The ’097 patent specification states that this high-temperature step is optional (*i.e.*, “preferably”), occurs in a separate space from, and may be performed at a different pressure than, the claimed drying. Ex. 1001, 5:37-52; Ex. 2001, ¶68.

In sum, the examiner specifically weighed the disclosure in Hanish ’419 and Meador of a furnace and compared that disclosure against the pending claims, concluding that the claims were patentable over the disclosed furnace. Ascend is seeking to relitigate this same issue. Ascend fails to articulate why the arguments considered by the examiner about the furnace of Hanisch ’419 and Meador did not put into focus the arguments it seeks to present now. Absent such evidence, the overlap is total.

This factor therefore supports denying *inter partes* review.

Factor 5: whether a petitioner has pointed out sufficiently how the Office erred in evaluating the asserted prior art.

Ascend has failed to identify if, or how, the Patent Office erred in evaluating the prior art that was already before it.

In order to satisfy this element, the Petitioner must demonstrate that the Office erred in a manner material to the patentability of challenged claims. *Google LLC v. Valtrus Innovations Ltd.*, IPR2022-01197, Paper 9 at 23 (PTAB Jan. 3, 2023). In other words, “a petitioner should explain with specificity what it believes the previous error is and also show why that error is material to the patentability of the challenged claims.” *Id.* Failure to make specific allegations that the Examiner erred in a “material way” will not suffice. *See Microsoft Corp v. AlmondNet Inc.*, IPR2022-01319, Paper 9 at 11 (PTAB Jan. 30, 2023). Additionally, failure to offer explanation of why a reference is not ‘substantially the same’ as art considered by the Examiner will not suffice. *Id.*

Ascend has provided no explanation as to how, or even if, the Office materially erred in its appreciation of the asserted prior art, nor has Petitioner made any affirmative showing that the art it now asserts in this Petition is not cumulative of that which was before the examiner. Instead, Ascend has done little beyond making the conclusory statements that “the Examiner did not consider several relevant aspects of how . . . [Meador] and . . . [Hanisch ’419] disclose the subject

matter of the '097 patent.” Pet., 13. The minimal additional explanation that has been proffered by Ascend is nothing more than speculation derived from Ascend’s improper expert declaration. *See, e.g.*, Pet. at 14 (“The Examiner thus ***did not appear*** to consider”) (emphasis added); 15 (same regarding Hanisch ’419). Further, as discussed with above with regard to Factor 4, the high-temperature decomposition discussion in the '097 patent specification (which Ascend alleges was missed by the Examiner, *see* Pet., 13-14) is not the same as the claimed drying. Ex. 2001, ¶¶66-69. The '097 patent specification states that this high-temperature step is optional (*i.e.*, “preferably”), occurs in a separate space from, and may be performed at a different pressure than, the claimed drying. Ex. 1001, 5:37-52; Ex. 2001, ¶68. As such, Ascend’s attack is unsupportable. *See Microsoft*, IPR2022-01319, Paper 9 at 11 (asserting that references were not substantively considered during prosecution does not show error); *Google LLC v. Valtrus Innovations Ltd.*, IPR2022-01197, Paper 9 at 23 (PTAB Jan. 3, 2023) (exercising §325(d) discretion where petitioner failed to discuss with specificity how examiner erred).

This factor therefore supports denying *inter partes* review.

Factor 6: the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments.

There is little evidence presented with the Petition that was not previously before the examiner during examination of the '097 patent, and the limited new evidence now proffered should be disregarded by the Board.

The only new prior art patents or printed publications provided by Ascend are Dunagan and Shin. However, as noted in the above sections, Ascend relies primarily on Hanisch '419 for each of the claims challenged in the Petition. Hanisch '419 was extensively reviewed by the examiner during the examination of the '097 patent. *See* § IX, *supra*, concerning “Factor 2.” Any additional prior art cited is relied on by Ascend is solely as alternative bases to buttress Ascend’s nearly exclusive reliance on Hanisch '419.

Rather than offer other new facts in the form of prior art patents and/or printed publications, *see* 35 U.S.C. §311, Ascend attempts to inject new facts through its expert declaration. This is an improper basis in which to challenge claims of the '097 patent. *See* § X, *infra*. These new facts that are found only in the expert declaration should be discounted. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022).

Further, the Petition relies on conclusory and unsupported expert opinion to support its positions. Ascend’s expert declaration provides no basis for its assertions that the asserted references teach the element at issue (alone or in combination with Hanisch '419) or that a POSITA would have been motivated to combine such

reference with Hanisch '419 in the first instance. *See, e.g.*, Ex. 1003 (van Schalkwijk Decl.), ¶¶ 85, 87, 89-92, 94-97, 99-103, 104-109, 113-117, 120-122. 135-137, 143 (supplementing prior art teaching with matters that would allegedly be obvious to a POSITA); *id.*, ¶¶ 123-125 (describing general knowledge in the field as a grounds for obviousness).

In support of these opinion(s), van Schalkwijk offers *no evidence* to support why he believes a POSITA would come to the same conclusions he does. Instead, van Schalkwijk offers the Board nothing beyond raw conjecture. Such new “evidence” is of little use to the Board in these proceedings. *Xerox Corp.*, IPR2022-00624, Paper 9 at 15 (“Thus, the cited declaration testimony is conclusory and unsupported, adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight.”); *see* § X, *infra* (“The Board Should Disregard”).

Accordingly, Ascend has provided little evidence that was not previously before the examiner during examination of the '097 patent. This factor therefore supports denying *inter partes* review.

X. THE BOARD SHOULD DISREGARD PORTIONS OF THE PETITION WHICH RELY ON IMPROPER SUBSTITUTION OF DISCLOSURES IN THE PRIOR ART WITH EXPERT TESTIMONY.

As a further matter, the Board should disregard portions of the Petition which improperly rely on expert testimony to substitute for disclosures in the prior art.

Expert testimony is not “prior art” upon which an IPR may be based; instead, an IPR may be based only on prior art consisting of (1) patents or (2) printed publications. 35 U.S.C. §311 (“[a] petitioner in an inter partes review may request to cancel as unpatentable 1 or more claims of a patent only on a ground that could be raised under section 102 or 103 and only on the basis of prior art *consisting of patents or printed publications.*”) (emphasis added).

A petitioner may rely on expert declarations as supporting evidence, 35 U.S.C. §312, but only about (1) “teachings of the prior art and how they relate to the patentability of the challenged claims,” and (2) “whether there would have been a reason to combine the teachings of references in a certain way, or if there may have been a reasonable expectation of success in doing so.” PTAB Consolidated Trial Practice Guide (2019) at 35. Expert testimony “is not a substitute for disclosure in a prior art reference itself.” *Id.* at 36; *Unified Pats. Inc. v. Velos Media, LLC*, IPR2019-00883, Paper 16 at 15 (PTAB Nov. 15, 2019) (“We, therefore, agree with Velos that expert testimony regarding the restricted placement limitation cannot take the place of disclosure from patents or printed publications.”); *Google LLC v. Videoshare LLC*, IPR2020-01631, Paper 14 at 16 (PTAB Apr. 7, 2021) (“expert testimony may explain ‘patents and printed publications,’ but is not a substitute for disclosure in a prior art reference itself.”).

Ascend's use of Declaration of Walter van Schalkwijk goes beyond what is allowed or contemplated by the Board's rules and procedures. *See, e.g.*, Ex. 1003, ¶¶ 85, 87, 89-92, 94-97, 99-103, 104-109, 113-117, 120-122, 135-137, 143 (supplementing prior art teaching with matters that would allegedly be obvious to a POSITA); *id.*, ¶¶ 123-125 (describing general knowledge in the field as a grounds for obviousness). For instance, regarding claim elements 1[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 12[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"), Dr. van Schalkwijk opines:

- "As to the electrolyte evaporation approach [t]he '097 Patent further discloses that the 'amount of electrolyte that can be obtained from the comminuted material through drying is such that an electrochemical reaction is no longer possible, or only to a negligibly small extent.' [citing '097 patent] A POSITA would therefore have understood from these disclosures that this limitation could include inactivating the comminuted material by the evaporation of sufficient portions of the electrolyte, such as organic carbonate solvents like dimethyl carbonate and/or ethyl

carbonate. . . .” Ex. 1003, ¶¶ 89, 91; *see id.*, ¶ 132 (incorporating analysis for 12[d]).

- “As to the decomposition heating approach . . . [i]n my opinion, a POSITA would further understand that decomposing the binder that carried the active material would render the resulting material inactive and not capable of undergoing the sorts of electrochemical reactions that would be observed in a functioning battery.” Ex. 1003, ¶¶ 94, 102; *see id.*, ¶ 132 (incorporating analysis for 12[d]).
- “As to the decomposition heating approach . . . [i]t is also my opinion that 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. A POSITA would appreciate that the removal of such solvents would tend to prevent electrochemical reactions from occurring in the comminuted material, such that it was inactivated.” Ex. 1003, ¶¶ 94, 103; *see id.*, ¶ 132 (incorporating analysis for 12[d]).

In each of these opinions, Dr. van Schalkwijk goes beyond providing any “teachings of the prior art and how they relate to the patentability of the challenged claims” or discussing any purported motivation to combine. Instead, Dr. van

Schalkwijk—through the veil of his opinion on what a “POSITA would . . . understand” and/or “appreciate”—*supplements the prior art*. Such supplementation is improper in these proceedings. Accordingly, Patent Owner respectfully requests the Board disregard any portion of the Petition which relies on this improper supplementation.

XI. CONCLUSION

For the foregoing reasons, the Petition fails to establish a reasonable likelihood of rendering the Challenged Claims obvious. The Petition should be denied.

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U.S. Pat. No. 11,050,097

Date: August 26, 2024

Respectfully submitted,

ROBINS KAPLAN LLP

/Steven C. Carlson/

Steven C. Carlson
Registration No. 48632
SCarlson@RobinsKaplan.com
555 Twin Dolphin Drive, Suite 310
Redwood City, CA 94065

Samuel J. LaRoque
Registration No. 68542
SLaRoque@RobinsKaplan.com
800 LaSalle Avenue, Suite 2800
Minneapolis, MN 55402
612-349-8500

**ATTORNEYS FOR PATENT OWNER
DUESENFELD GMBH**

WORD COUNT CERTIFICATION

Pursuant to 37 C.F.R. § 42.24(d), Patent Owner certifies that this Patent Owner Preliminary Response has a total of 13,970 words as counted by Microsoft Word, exclusive of the cover page, table of contents, table of authorities, mandatory notices 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 include all other text, including headings, footnotes, and quotations. This is within the 14,000-word limit allowed under § 42.24(a)(1)(i).

Date: August 26, 2024

Respectfully submitted,

ROBINS KAPLAN LLP

/Steven C. Carlson/

Steven C. Carlson

Registration No. 48632

Robins Kaplan LLP

SCarlson@RobinsKaplan.com

**ATTORNEY FOR PATENT OWNER
DUESENFELD GMBH**

CERTIFICATE OF SERVICE

I hereby certify that on August 26, 2024, a copy of this Patent Owner Preliminary Response, including all accompanying attachments, appendices, and exhibits, has been served in its entirety via e-mail on Attorneys for Petitioner at the following e-mail addresses:

Lead Counsel:

Andrew D. Gish (Reg. # 67,562)
GISH PLLC
41 Madison Avenue
New York, New York 10010
Telephone: (212) 518-7380
andrew@gishpllc.com

Back-Up Counsel:

Ryan Iwahashi (Reg. # 63,378)
GISH PLLC
50 California Street, Suite 1500
San Francisco, CA 94111
Telephone: (415) 630-8960
ryan@gishpllc.com

Conor B. McDonough
(*pro hac vice* motion forthcoming)
GISH PLLC
41 Madison Avenue
New York, New York 10010
Telephone: (212) 518-2620
conor.mcdonough@gishpllc.com

Josef B. Schenker
(*pro hac vice* motion forthcoming)
GISH PLLC
41 Madison Avenue
New York, New York 10010
Telephone: (212) 518-2870
josef.schenker@gishpllc.com

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Date: August 26, 2024

Respectfully submitted,

ROBINS KAPLAN LLP

/Steven C. Carlson/

Steven C. Carlson

Registration No. 48632

Robins Kaplan LLP

SCarlson@RobinsKaplan.com

**ATTORNEY FOR PATENT
OWNER DUESENFELD GMBH**