

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EVE ENERGY CO., LTD.,
Petitioner,

v.

VARTA MICROBATTERY GMBH,
Patent Owner.

IPR2022-01478
Patent 11,024,907 B1

Before CHRISTOPHER L. CRUMBLEY, CHRISTOPHER M. KAISER,
and BRIAN D. RANGE, *Administrative Patent Judges*.

KAISER, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Eve Energy Co., Ltd. (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 1–30 (the “challenged claims”) of U.S. Patent No. 11,024,907 B1 (“the ’907 patent,” Ex. 1001). Paper 1 (“Pet.”). VARTA Microbattery GmbH (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). With Board authorization, Petitioner filed a Reply to the Preliminary Response (“Prelim. Reply,” Paper 10) and Patent Owner filed a Sur-Reply to Petitioner’s Reply (“Prelim. Sur-Reply,” Paper 11).

Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314 (2018); *see also* 37 C.F.R. § 42.4 (2021). For the reasons discussed below, we determine that Petitioner establishes a reasonable likelihood of prevailing with respect to the unpatentability of at least one claim of the ’907 patent, and we do not exercise discretion to deny the Petition. Accordingly, we institute an *inter partes* review of claims 1–30 of the ’907 patent.

A. *Real Parties in Interest*

Each party identifies itself as the real party in interest. Pet. 1; Paper 7, 2.

B. *Related Matters*

The parties do not identify any related judicial proceedings that involve the ’907 patent. Pet. 2; Paper 7, 2–4. The ’907 patent is also the subject of IPR2022-01477, filed by Petitioner. Pet. 2; Paper 7, 5. The parties further identify several other *inter partes* reviews directed to patents

related to the '907 patent, as well as several judicial proceedings that “may affect or be affected by a decision in this proceeding.” Pet. 2; Paper 7, 2–5.

C. The '907 Patent

The '907 patent “relates to button cells having a housing consisting of two metal housing halves” that “contain[] a wound electrode separator assembly.” Ex. 1001, 1:21–23. The '907 patent teaches that the two housing halves (the “housing cup” and the “housing top”) are separated “by an electrically insulating seal” to form “a housing having a plane bottom region and a plane top region parallel thereto.” *Id.* at 3:18–23. Arranged inside the housing is “[a]t least one positive electrode and at least one negative electrode, . . . each in the form of flat electrode layers” that are “preferably connected to one another by at least one flat separator.” *Id.* at 3:34–38. This electrode assembly “is provided in the form of a winding” that is “arranged such that its end sides face in the direction of the plane bottom region and the plane top region of the housing.” *Id.* at 3:43–47.

The '907 patent explains that the “button cell always also comprises metal conductors which electrically connect the at least one positive electrode and/or the at least one negative electrode respectively to one of the housing halves.” *Id.* at 3:55–58. “The conductor . . . connected to the . . . positive electrode preferably consist[s] of aluminum,” and “[t]he conductor[] connected to the at least one negative electrode preferably consist[s] of nickel or copper.” *Id.* at 3:58–62. “On the electrode side, the conductors are preferably connected to current collectors,” which “are generally metal foils or meshes conventionally coated on both sides with active electrode material.” *Id.* at 3:63–66. “These current collectors preferably consist of aluminum on the side of the positive electrode, and preferably nickel or copper on the side of the negative electrode.” *Id.* at 3:66–4:2.

The '907 patent explains that, “particularly in lithium ion button cells, the electrodes are subject to volume changes during a charging-discharging cycle” that may result in “contact problems . . . between the conductors and the housing halves.” *Id.* at 4:31–35. The '907 patent teaches that welding the conductors to the respective housing halves alleviates these problems, and the conductors are preferably welded onto the inner side of the housing of the plane bottom region or the plane top region, respectively. *Id.* at 4:35–40.

D. Challenged Claims

Petitioner challenges claims 1–30 of the '907 patent. Pet. 1. Claim 1, the only independent challenged claim, is illustrative of the claimed subject matter, and is reproduced below:

1. A button cell comprising:
 - a housing, the housing including:
 - a metal cell cup, the metal cell cup having a cell cup plane region, and
 - a metal cell top, the metal cell top having a cell top plane region extending substantially parallel to the cell cup plane region;
 - an electrode winding disposed within the housing, the electrode winding having a first end side, a second end side, and an outer side, the first end side and the second end side extending substantially parallel to the cell cup plane region and the cell top plane region, the electrode winding being formed from a multi-layer assembly that is wound in a spiral shape about an axis, the multi-layer assembly including:
 - a positive electrode formed from a first current collector coated with a first electrode material,
 - a negative electrode formed from a second current collector coated with a second electrode material, and

- a separator disposed between the positive electrode and the negative electrode; and
- a first conductor including a first portion extending substantially perpendicular to the first end side of the electrode winding, a strip-shaped second portion, and a bend connecting the first portion to the second portion, wherein the strip-shaped second portion of the first conductor lies flat between (i) the first end side of the electrode winding and (ii) a first of the cell cup plane region or the cell top plane region, and wherein the strip-shaped second portion of the first conductor has a length that is less than a diameter of the first end side of the electrode winding;
- a second conductor including a first portion extending substantially perpendicular to the second end side of the electrode winding, a strip-shaped second portion, and a bend connecting the first portion to the second portion, wherein the strip-shaped second portion of the second conductor lies flat between (i) the second end side of the electrode winding and (ii) a second of the cell cup plane region or the cell top plane region, and wherein the strip-shaped second portion of the second conductor has a length that is less than a diameter of the second end side of the electrode winding;
- wherein the first conductor and the second conductor, including the respective first portions, second portions, and bends thereof, are metal foils,
- wherein the button cell is a secondary lithium ion cell.

Ex. 1001, 9:11–58.

E. Asserted Grounds

Petitioner asserts that claims 1–30 would have been unpatentable based on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–11, 13–26, 29, 30	103 ¹	Higuchi, ² Kobayashi, ³ Fujita ⁴
12	103	Higuchi, Kobayashi, Fujita, Kubota ⁵
27, 28	103	Higuchi, Kobayashi, Fujita, Kubota

Pet. 5, 13–98.⁶ Petitioner relies on the Declaration of Marc Juzkow (Ex. 1002) in support of its contentions.

II. ANALYSIS

A. 35 U.S.C. § 325(d)

Patent Owner argues that we should exercise our discretion under 35 U.S.C. § 325(d) to deny institution because the same prior art was considered during prosecution of Patent Owner’s U.S. Patent No. 10,804,506 (“the ’506 patent”), which also claims priority to the parent of the application that became the ’907 patent. Prelim. Resp. 12–15.

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011), revised 35 U.S.C. §§ 102 and 103 effective March 16, 2013. Petitioner argues, and Patent Owner does not contest, that the pre-AIA statutory provisions apply to this case. *See* Pet. 5–6. Neither party indicates the result would change based on which version of the statute the Board applies for purposes of deciding whether to institute review.

² Higuchi, Chinese Patent App. Pub. CN101286572 A, published October 15, 2008 (Ex. 1006, with English translation).

³ Kobayashi, JP 2007-294111, published November 8, 2007 (Ex. 1009, with English translation).

⁴ Fujita, Japanese Unexamined Patent App. Pub. H4-162351, published June 5, 1992 (Ex. 1007, with English translation).

⁵ Kubota, US 5,654,114, issued August 5, 1997 (Ex. 1010).

⁶ Petitioner explains that it “separately presents grounds that rely upon the same prior art references as other grounds because each ground entails different modifications to the primary reference.” Pet. 5 n.1.

1. Legal Framework

Section 325(d) provides that, in determining whether to institute an *inter partes* review, “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” The Board uses a two-part framework for evaluating arguments under § 325(d):

(1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and

(2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”). In applying this framework, we consider the *Becton, Dickinson*⁷ factors that address discretion to deny when a petition presents the same or substantially the same prior art or arguments previously presented to the Office, including:

(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, including whether the prior art was the basis for rejection;

⁷ *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) (“*Becton, Dickinson*”).

(d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;

(e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of 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.

Becton, Dickinson, Paper 8 at 17–18. Factors (a), (b), and (d), relate to whether the same or substantially the same art or arguments were previously presented to the Office, and factors (c), (e), and (f) relate to whether the petitioner demonstrates that the Office erred in a manner material to the patentability of the claims. *Advanced Bionics*, Paper 6 at 9–11. Only if the same or substantially the same art or arguments were previously presented to the Office do we then consider whether the petitioner has demonstrated a material error by the Office. *Id.*

2. *Part One of the Advanced Bionics Framework*

Patent Owner asserts that Petitioner contends that a POSITA “would be motivated to use Higuchi’s leads to make connections to the housing of Kobayashi,” and argues that “[t]he issue of whether Higuchi teaches output conductor leads that could be so connected was addressed by the Patent Owner during prosecution of” the ’506 patent. Prelim. Resp. 14–15 (citing Ex. 2037, 18–19). Petitioner responds “[t]he ’506 patent is not a direct family member of the ’907 patent, so any prosecution history of the ’506 patent was not before the Office in the ’907 patent.” Prelim. Reply 1.

We read the *Becton, Dickinson* factors broadly “to apply to any situation in which a petition relies on the same or substantially the same art or arguments previously presented to the Office during a proceeding

pertaining to the challenged patent.” Advanced Bionics, Paper 6 at 10 (emphasis added). The record before us does not establish that the prosecution of the ’506 patent is a proceeding pertaining to the ’907 patent. The ’506 patent and the ’907 patent issued from different divisional applications of the same parent application. The application that issued as the ’506 patent was a direct division of the parent application. Ex. 1011, 27. The application that issued as the ’907 patent was a division of a different direct division of the parent application. Ex. 1001, code (62). The ’506 patent’s application is not identified as “related U.S. application data” on the face of the ’907 patent. Because the ’907 patent is the product of a different line of divisions of the parent application than the ’506 patent, that they share the same parent application is not sufficient to establish that the ’506 patent prosecution pertains to the ’907 patent for purposes of § 325(d). Accordingly, we determine that part one of the *Advanced Bionics* framework is not satisfied by the Office’s consideration during the prosecution of the ’506 patent of some of the same art asserted here.

Patent Owner also argues that, during the prosecution of the ’907 patent itself, “the Examiner discussed Kobayashi in detail” and “Higuchi was also before the Examiner” due to its inclusion on an Information Disclosure Statement. Prelim. Resp. 13–14 (citing Ex. 1004, 35, 51). By arguing that Kobayashi and Higuchi were before the Office, Patent Owner presumably means to argue that the portion of § 325(d) relating to the previous presentation of “the same or substantially the same prior art” is triggered. But the combinations asserted here by Petitioner include not only Kobayashi and Higuchi, but also Fujita and, in two of the three asserted grounds, Kubota. Pet. 5. Although Patent Owner notes in the Sur-Reply that Fujita and Kubota previously were before the Office, Prelim. Sur-

Reply 1–2, Patent Owner does not base its original argument for discretionary denial under § 325(d) on the Office’s prior consideration of either of these references. Prelim. Resp. 12–15 (not mentioning either Fujita or Kubota). To determine whether Patent Owner is correct that “the same or substantially the same prior art” that is asserted here previously was before the Office, we must consider both “the similarities and material differences between the asserted art and the prior art involved during examination” and “the cumulative nature of the asserted art and the prior art evaluated during examination.” *See Advanced Bionics*, Paper 6 at 9–11 (requiring use of *Becton, Dickinson* factors a, b, and d to determine “whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office”); *Becton, Dickinson*, Paper 8 at 17–18 (reciting the quoted factors as factors a and b, and reciting factor d as relating to “the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art,” relevant only to whether the same or substantially the same arguments were presented). Patent Owner does not allege that the same or substantially the same arguments previously were presented to the Office. Patent Owner also does not address either of the factors it quotes with respect to the Office’s prior opportunity to consider Kobayashi and Higuchi and lack of opportunity to consider Fujita or Kubota. Prelim. Resp. 13–14. Accordingly, we are not persuaded that the record sufficiently shows that the art asserted here previously was presented to the Office during the prosecution of the ’907 patent.

3. *Conclusion*

Based on our analysis within the *Advanced Bionics* framework, we find that the Petition does not implicate § 325(d) in a manner sufficient to warrant discretionary denial, and we decline to exercise our discretion to deny institution under § 325(d).

B. Level of Ordinary Skill in the Art

Petitioner contends that a person having ordinary skill in the art (“POSITA”) would have had “a Bachelor’s level college degree in Mechanical, Electrical, Materials or Chemical Engineering, or Science, including Chemistry or Physics or a related field and three to four years of training and experience in the design of electrochemical cells and batteries.” Pet. 5–6. Petitioner further contends that “[a]dditional work or research experience can substitute for a lesser or different education, and vice-versa.” *Id.* Patent Owner states that the Preliminary Response “establishes that Petitioner’s arguments fail even under its proffered definition of” a person of ordinary skill in the art. Prelim. Resp. 11. Patent Owner does not propose a different level of skill in the art at this stage of the proceeding. *See id.* (“Patent Owner reserves the right to dispute Petitioner’s definition of a [person of ordinary skill in the art] if an IPR is instituted.”).

To the extent necessary, and for purposes of this Decision, we accept the uncontested assessment offered by Petitioner.

C. Claim Construction

We construe each claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b) (2019). Under this standard, claim terms are generally given their plain and ordinary meaning as would have been understood by a person

of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019).

Petitioner requests that all claim terms other than “disposed along” be afforded their plain and ordinary meaning, as understood by a POSITA at the time of the purported invention.” Pet. 9. Patent Owner asserts that its arguments “do not hinge on the outcome of an actual controversy about any claim construction.” Prelim. Resp. 12 (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

We determine that no claim term requires express construction for purposes of this Decision.

D. Ground 1: Asserted Obviousness over Higuchi, Kobayashi, and Fujita

Petitioner contends that claims 1–11, 13–26, 29, and 30 would have been obvious over the combined teachings of Higuchi, Kobayashi, and Fujita. Pet. 13–94.

1. Overview of Higuchi

Higuchi is a Chinese Patent Application entitled “Coin Type Non-Aqueous Electrolyte Secondary Battery.” Ex. 1006, code (54).⁸ Higuchi describes a coin type rechargeable battery having a strip-shaped anode, strip-shaped cathode, and strip-shaped separator that are wound together to form a

⁸ Petitioner provides a certified English translation of Higuchi. Ex. 1006, 1. All citations to Higuchi are to the certified English translation.

cylindrical wound body. *Id.* at 25,⁹ Fig. 5B. Higuchi's Figure 5B is reproduced below.

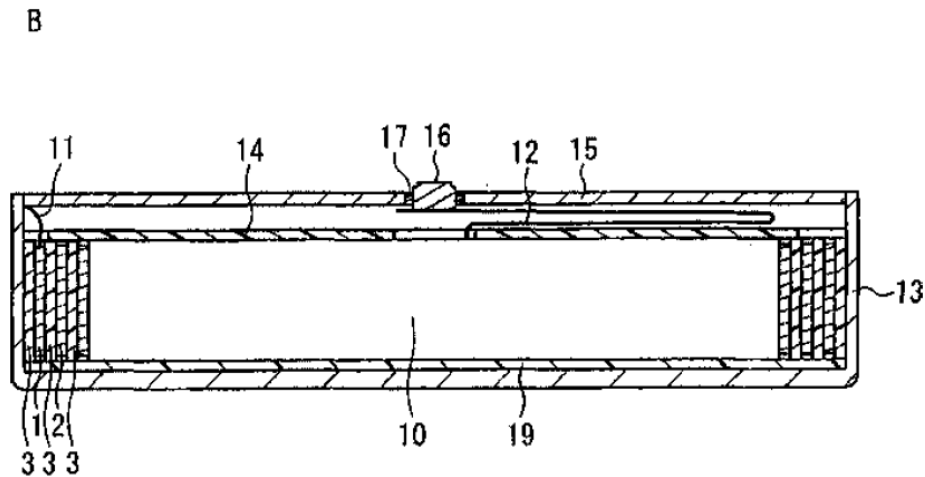


Figure 5

Figure 5B is a cross-sectional view of the battery described in Higuchi. *Id.* at 34. Lower insulating plate 19 is arranged on the bottom battery can 13. *Id.* Wound body 10 is structured such that strip-shaped separator 3 is interposed between the strip-shaped positive electrode 1 and strip-shaped negative electrode 2 and wound into a spiral. *Id.* Positive electrode lead 11 is provided on the outside peripheral side of wound body 10, and negative electrode lead 12 is provided on the inner peripheral side (not shown) of wound body 10. *Id.* at 33–34. Wound body 10 is inserted into cylindrical battery can 13 so that the winding axis direction matches the height direction of battery can 13. *Id.* at 34. Positive electrode lead 11 is inserted between battery can 13 and cap 15, so that battery can 13 and cap 15 can act as the positive electrode terminal. *Id.* Upper insulating plate 14 is placed on wound body 10, and negative lead 12 is welded to the inside of negative

⁹ We refer to the page numbers added by Petitioner in the lower-left corner of the page.

terminal 16 at the center of cap 15. *Id.* Insulating packing 17 insulates negative terminal 16 and cap 15. *Id.*

2. Overview of Kobayashi

Kobayashi is a Japanese Unexamined Patent Application entitled “Small Battery” and “relates to a small battery (for example, a button-type battery or coin-type battery) provided with a wound electrode group.”

Ex. 1009, code (54), ¶ 1.¹⁰ Kobayashi describes

a small battery having excellent heavy load properties can be provided by using a container having a sealed structure in which a metal anode case that also serves as an anode terminal and a metal cathode case that also serves as a cathode terminal are fitted together via an insulation gasket, and the cathode case or the anode case is further crimped by a crimping process, and housing in this container an electrode group of a laminate including a cathode and an anode wound in a spiral.

Id. ¶ 13.

Kobayashi’s Figure 1 is reproduced below.

[FIG. 1]

FIG. 1

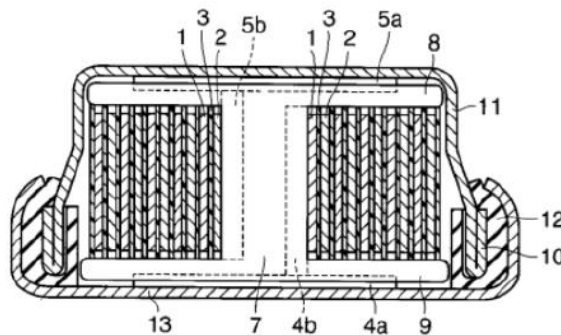


Figure 1 is a cross-sectional view schematically illustrating a coin-type secondary battery described by Kobayashi. Ex. 1009 ¶ 46. The secondary

¹⁰ Petitioner provides a certified English translation of Kobayashi. Ex. 1009, 1. All citations to Kobayashi are to the certified English translation.

battery includes cathode 1, anode 2, cathode terminal 4, cathode terminal plate 4a, cathode lead part 4b with slit 4c (not shown) formed thereon, anode terminal 5, anode terminal plate 5a, and anode lead part 5b with slit 5c (not shown) formed thereon. *Id.* ¶¶ 26–28. Insulating plates 8, 9 are integrated into the upper and lower ends of wound shaft core 7. *Id.* ¶ 30. Separator 3 is “interposed and fixed, one sheet each between the wound shaft core 7 and the cathode 1 and between the wound shaft core 7 and the anode 2,” and cathode 1 and anode 2 are wound in spiral via separator 3. *Id.* ¶ 32. Insulation gasket 12 is fitted into reverse part 10 of anode case 11. *Id.* ¶ 33. The electrode group is inserted into anode case 11 “so that the anode terminal plate 5a contacts the inner surface of anode case 11,” and into cathode case 13 “so that the cathode terminal plate 4a contacts the inner surface of the cathode case 13.” *Id.* ¶¶ 33–34. Cathode case 13 is fit to anode case 11 and sealed by performing a crimping process on cathode case 13. *Id.* ¶ 35.

3. *Overview of Fujita*

Fujita is a Japanese Unexamined Patent Application entitled “Method for Manufacturing Round Cylindrical Battery,” and “relates to a method for manufacturing a round cylindrical battery.” Ex. 1007, code (54), 10.¹¹

Fujita describes a manufacturing method “wherein the lead is welded well to the bottom inner surface of the exterior case.” *Id.* at 11. Fujita teaches that,

after an electrode group wherein a positive electrode and a negative electrode, with a separator interposed therebetween, has been coiled into a coil shape, is placed in an exterior case can, a lead that leads out from either electrode of the electrode group is

¹¹ Petitioner provides a certified English translation of Fujita. Ex. 1007, 1–2. All citations to Fujita are to the certified English translation. We refer to the page numbers added by Petitioner in the lower-left corner of the page.

arranged so as to contact the bottom inner surface of the exterior case can, and the lead and bottom inner surface of the exterior case can are welded together, wherein the welding together of the lead and the bottom inner surface of the exterior case can is carried out through applying a laser beam or an electron beam to the bottom outer surface of the exterior case can.

Id. at 11.

4. Petitioner's Proposed Combination

Petitioner contends that the combined disclosures of Higuchi, Kobayashi, and Fujita teach all of the limitations of independent claim 1, and that a person of ordinary skill in the art would have been motivated to combine the teachings of the references in a manner that would result in the claimed button cell. Pet. 14–58. Petitioner begins its analysis with Higuchi's cell, and contends that a POSITA would have been motivated to modify Higuchi's cell by “(1) replac[ing] Higuchi's housing with Kobayashi's housing, and (2) apply[ing] Fujita's folding of the negative electrode lead, and welding of the negative electrode lead to the housing, to Higuchi's lead extending portions of the positive and negative electrodes.” *Id.* at 14 (citing Ex. 1002 ¶ 51). Petitioner further contends that “[t]he result is a ‘combination of familiar elements according to known methods’ that ‘does no more than yield predictable results.’” *Id.* (citing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007)).

a) replacing Higuchi's housing with Kobayashi's housing

Petitioner contends that Higuchi teaches that both “the battery can 13 and the cap 15 act as the positive electrode terminal,” and that “a large portion of negative electrode lead 12 is positioned near cap 15 without insulation.” Pet. 15–16 (emphasis removed) (citing Ex. 1006, 34, Fig. 5B; Ex. 1002 ¶ 54). Petitioner contends that “[t]he proximity of the negative

electrode lead to the positive electrode terminal poses a risk for short-circuit,” so Higuchi provides “additional space in the upper part of the casing . . . to distance [negative electrode] lead 12 from cap 15.” *Id.* at 16. Petitioner further contends that Higuchi teaches that negative electrode lead 12 is formed from the negative electrode current collector “that could be ‘made of copper foil with a thickness of 12 μm .’” *Id.* at 17 (citing Ex. 1006, 32, 37). Petitioner contends that “[a] POSITA would have understood such a material to be thin and soft, such that when Higuchi’s battery is placed upside down, shocked or vibrated, lead 12 would make contact with cap 15.” *Id.* (citing Ex. 1002 ¶ 57).

Petitioner contends that, in contrast, Kobayashi’s “anode case 11 permits a safe connection between the negative electrode lead and a housing half.” *Id.* Petitioner also contends that “Kobayashi discloses a more stable design” wherein “anode case 11 is in contact with anode terminal plate 5a,” and “cathode case 13 is in contact with cathode terminal plate 4a.” *Id.* at 19 (citing Ex. 1009 ¶¶ 33, 34, Fig. 1). Petitioner contends that

a POSITA would have understood Kobayashi’s cases 11 and 13 to act as an extension of their respective terminals, and to be analogous to Higuchi’s cap 15 and negative terminal 16. Ex. 1002 at ¶ 63. Kobayashi separates these extensions of the positive and negative terminals (cases 11 and 13) by placing them on opposite ends of the battery. Kobayashi’s housing provides a more complete separation of the two terminals, and a more robust insulation between them.

Id. Therefore, according to Petitioner, “replacing Higuchi’s housing with Kobayashi’s eliminates Higuchi’s risk for short-circuit and increases the volumetric energy density.” *Id.* at 20 (citing Ex. 1002 ¶ 64).

Patent Owner responds that “replacing Higuchi’s housing with that of Kobayashi would have resulted in a drastic reduction of available space for

active battery components.” Prelim. Resp. 29. Patent Owner argues that the button cell resulting from such a modification “would have considerably reduced energy discharge capability and reduced battery life,” and devices using the button cell “would need to be recharged far more frequently.” *Id.* at 31.

Patent Owner also argues that Petitioner and Mr. Juzkow recognized these drawbacks in a petition directed to a related patent, where Petitioner argued that “a significant portion of the available space within [Kobayashi’s] cell is reduced by the process of crimping the cell closed.” *Id.* at 32 (quoting Ex. 2008, 2–3). Patent Owner argues that “Petitioner fails to explain why the beaded-over Kobayashi housing Petitioner and its same expert disparaged in another petition would be used in the present combination of references proposed in this Petition.” *Id.* at 33–34.

Patent Owner also argues that a POSITA would not have replaced Higuchi’s housing with Kobayashi’s to reduce the risk of short circuits. Prelim. Resp. 34–35. Patent Owner points to Petitioner’s arguments regarding claims 27 and 28 in Ground 3, where Petitioner argues that it would have been obvious to add Kubota’s insulation tape to Higuchi’s leads 11 and 12, and argues this modification “could reduce such risk of short circuits without the corresponding loss of volume associated with Kobayashi’s housing.” *Id.* at 34 (citing Pet. 97–98). According to Patent Owner, “[i]f Petitioner’s argument that a [POSITA] would be motivated to adhere an insulation strip to both sides of Higuchi’s lead is correct, it would not be necessary” to replace Higuchi’s housing with Kobayashi’s “to reduce the risk of short circuits.” *Id.* at 34–35.

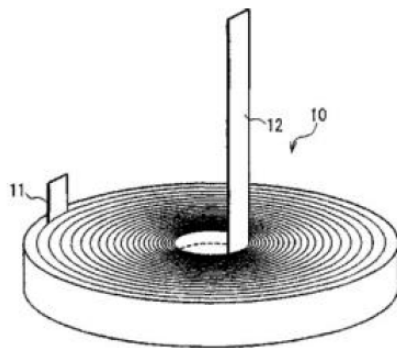
We have considered Patent Owner’s arguments, and although they cast doubt on Petitioner’s contentions and create a genuine issue of material

fact, we are persuaded, on this record, that Petitioner provides sufficient reasoning with rational underpinning to support a motivation to combine the teachings of Higuchi and Kobayashi as proposed. Pet. 14–26. Specifically, Petitioner sufficiently establishes, for purposes of institution, that a POSITA would have had reason to modify Higuchi’s cell to use Kobayashi’s housing in order to reduce the risk that the cell would short circuit. *Id.* at 15–20.

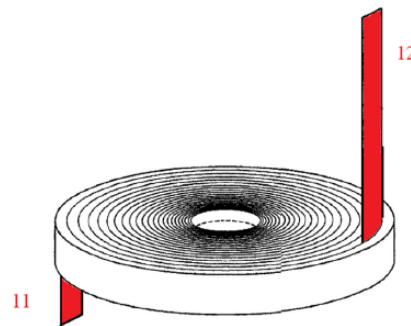
We invite the parties to develop these arguments further at trial, to the extent permitted under our rules.

b) applying Fujita’s folding and welding techniques to Higuchi’s lead 11 and 12

Petitioner contends that, before applying Fujita’s folding and welding technique, a POSITA would have been motivated to move Higuchi’s lead 11 below Higuchi’s winding 10, as shown below. Pet. 26–28.



Ex. 1006 at Fig. 1



Ex. 1002 at ¶77

Higuchi Figure 1, depicting wound body 10 with lead 11 provided on its outer peripheral side and lead 12 provided on its inner peripheral side, is reproduced on the left, and Figure 1, modified to show lead 11 (in red) extending below wound body 10, is reproduced on the right. Pet. 27 (citing Ex. 1002 ¶ 77). Petitioner contends that, after replacing Higuchi’s housing with Kobayashi’s, “a POSITA would have been motivated to dispose electrode lead 11 on the opposite side of electrode lead 12 to further prevent

the same problem previously discussed with respect to lead 12 and Higuchi's cap 15." *Id.* (citing Ex. 1002 ¶ 79). Petitioner contends that "Kobayashi would have prompted this modification" because moving lead 11 to the bottom of the winding facilitates the connection between lead 11 and cathode case 13. *Id.* at 27–28 (citing Ex. 1002 ¶ 80). Petitioner also contends that a POSITA would have moved lead 12 to the outer portion of the winding, because Higuchi teaches that "both the positive electrode lead 11 and the negative electrode lead 12 may be provided on the outer peripheral side of the wound body 10." *Id.* at 28 (quoting Ex. 1006, 33).

Petitioner then contends that "[i]t would have been obvious to a POSITA that lead 11 [could] only connect to case 13 in [a small number of] ways." *Id.* at 30 (citing Ex. 1002 ¶ 86). Specifically, Petitioner argues that lead 11 could connect to cathode case 13 only (1) on the lateral surface, (2) in the area between the plane and lateral surfaces, or (3) on the plane surface. *Id.* Petitioner contends that, of these options, "it would have been obvious to a POSITA to bend lead 11 such that it would be positioned between the winding and the plane surface of case 13." *Id.* at 36 (citing Ex. 1002 ¶ 98). Petitioner contends that, as compared to options 1 and 2, option 3 provides a better seal at least by eliminating a contact area between two metals, and prevents damage during battery assembly. *Id.* at 31–35 (citing Ex. 1002 ¶¶ 86–97). In addition, Petitioner asserts that "Kobayashi also discloses positioning its electrode terminals between the winding and the plane surfaces of the housing." *Id.* at 35 (citing Ex. 1009, Fig. 1).

Petitioner further contends that "Fujita discloses bending lead 2a, and then positioning it between the winding and the plane surface of the housing," and "it would have been obvious to a POSITA to bend lead 11 in a similar fashion as Fujita's lead 2a, then position lead 11 between the

winding and the plane surface of case 13.” Pet. 35 (citing Ex. 1002 ¶ 97). Petitioner also contends that “Fujita’s treatment of the negative electrode lead 2a (using a single fold) is an improvement over Higuchi’s lead 12 (using a double fold) because Fujita’s folding technique uses fewer materials and increases energy density.” *Id.* at 28 (citing Ex. 1002 ¶ 84).

In order to permit welding, Petitioner next contends that “it would have been obvious to a POSITA to extend lead 11” so that leads 11 and 12 could be welded “to the plane surface[s] of Kobayashi’s case 13.” Pet. 37–39. Petitioner contends that Fujita’s welding technique “is an improvement on the Higuchi-Kobayashi combination because welding towards the open cavity of the winding avoids potential harm to the body of the winding.” *Id.* at 36–37 (citing Ex. 1002 ¶ 102).

Patent Owner responds that “Kobayashi could not have prompted any modifications of Higuchi’s leads 11 and 12 because Kobayashi expressly teaches away from using output conductor leads.” Prelim. Resp. 39. Patent Owner asserts that “Kobayashi explains that the manufacture of a battery with collector tab terminals requires ‘complex bending processing’ and” complicated welding processes, and, due to this “‘complex manufacturing process, . . . it has been considered impossible to house this electrode group structure in a small battery such as a button-type or coin-type battery.’” *Id.* (quoting Ex. 1009 ¶¶ 7, 14). Patent Owner further asserts that Kobayashi solves these problems by “eliminat[ing] collector tab terminals to provide a ‘simplified’ structure ‘by installing a terminal . . . on the wound shaft core that is included in the electrode group.’” *Id.* at 39–40 (quoting Ex. 1009 ¶¶ 15, 18). Patent Owner argues that Higuchi teaches that “the negative electrode lead 11 undergoes bend processing and that lead is welded to an electrode pin,” which is the processing that Kobayashi characterizes as

making it “impossible” to house the structure in a small button-type battery. *Id.* at 40.

On this record, we disagree. Petitioner asserts that “a POSITA would have appreciated that Kobayashi’s design has certain drawbacks relative to the proposed [Higuchi-Kobayashi] combination” despite Kobayashi’s disclosure “that using terminal connecting parts 4b, 5b to connect to its winding shaft core 7” achieves an improvement over conventional batteries with complex manufacturing processes. Pet. 23–24 (citing Ex. 1009 ¶¶ 11, 14, 15). Specifically, Petitioner argues that Higuchi teaches welding its current conductors directly to the housing, which is a simpler manufacturing process than Kobayashi, which “requires an assembly of its current conductor . . . with a wound shaft core” before welding can take place. *Id.* at 24 (citing Ex. 1002 ¶ 71; Ex. 1006, Fig. 5B; Ex. 1009 ¶¶ 30–31). Petitioner also argues that “Higuchi’s strip-shaped electrode lead structure also presents a more simplified manufacturing process” than “Kobayashi’s T-shaped electrode terminal structure.” *Id.* (citing Ex. 1002 ¶ 72; Ex. 1009, Figs. 4, 5). At least on the present record, Petitioner’s arguments that the Higuchi-Kobayashi combination would have had advantages over the Kobayashi design that might have counterbalanced the disadvantages noted by Kobayashi are supported by the cited evidence.

Patent Owner also argues that “Petitioner’s proposed modifications to Higuchi’s output conductor leads also fail because Fujita’s welding technique is only applicable to welding of a single output conductor.” Prelim. Resp. 40. Patent Owner asserts that “Fujita teaches that only one of the output conductors, the negative electrode 2a, is welded to the bottom case from the outside,” and that positive electrode lead 1a “is welded to the top in a conventional manner.” *Id.* at 40–41 (citing Ex. 1007, 12). Again, at

least on the present record, we disagree. Petitioner contends that, because “leads 11 and 12 mirror each other structurally,” “a POSITA would have been motivated to apply Fujita’s welding technique to both electrode leads.” Pet. 38–39 (citing Ex. 1002 ¶ 106). Petitioner also contends that “laser welding from the outside” as taught by Fujita is an improvement at least “because the diameter of the open cavity [of wound body 10] can be decreased (thereby increasing the energy density of the battery).” *Id.* at 37 (citing Ex. 1002 ¶ 103).

Based on the record before us at this stage of the proceeding, we are persuaded that Petitioner adequately establishes, for purposes of this Decision, that a POSITA would have been motivated to use Fujita’s bending and welding techniques as proposed.

c) Conclusion

Having considered the parties’ arguments and the evidence of record, we are persuaded that Petitioner provides sufficient reasoning with rational underpinning to support a motivation to combine the teachings of Higuchi, Kobayashi, and Fujita as proposed. Pet. 14–26.

5. Claims 1–11, 13–26, 29, and 30

Petitioner asserts, with supporting testimony from Mr. Juzkow, that the combination of Higuchi, Kobayashi, and Fujita teaches all of the limitations of independent claim 1. Pet. 40–58. In particular, Petitioner relies on Higuchi for its teaching of elements of the button cell such as a wound body including a positive electrode and a negative electrode, an insulator, and a first and second current collector, on Kobayashi’s teachings of a housing, and on Fujita’s teachings regarding welding a lead to the housing. *Id.*; *see also id.* at 14–39 (Petitioner’s proposed combination). At

this stage of the proceedings, Patent Owner does not address Petitioner's specific contentions with respect to claim 1. Prelim. Resp. 28–44.

We have reviewed Petitioner's contentions for all of the elements of independent claim 1, as well as the supporting evidence. Pet. 40–58. Based on the record before us at this time, we are persuaded that Petitioner's discussion of the particular structures and methods in Higuchi, Kobayashi, and Fujita establishes a reasonable likelihood that the combined teachings of Higuchi, Kobayashi, and Fujita teach or suggest all of the limitations of independent claim 1. *Id.* We have also reviewed Petitioner's contentions with regard to claims 2–11, 13–26, 29, and 30, which depend, directly or indirectly, from claim 1. *Id.* at 58–94. Patent Owner does not, on the present record, dispute these particular contentions. Prelim. Resp. 44–45. We are persuaded that Petitioner establishes a reasonable likelihood that the teachings of Higuchi, Kobayashi, and Fujita teach or suggest all of the limitations of these dependent claims as well. Pet. 58–94.

E. Remaining Grounds

Petitioner contends that: (1) claim 12 would have been obvious over the combined teachings of Higuchi, Kobayashi, Fujita, and Kubota (*id.* at 94–96); and (2) claims 27 and 28 would have been obvious over the combined teachings of Higuchi, Kobayashi, Fujita, and Kubota (*id.* at 96–98). At this stage of the proceeding, Patent Owner does not address Petitioner's contentions with respect to these claims and grounds. *See* Prelim. Resp. 45 (“[F]or the same reasons discussed above with respect to independent claim 1, Petitioner also has not demonstrated a reasonable likelihood that it would prevail in showing that any of these remaining dependent claims, namely claims 12 and 27-28, would have been obvious.”). Having determined that Petitioner establishes a reasonable likelihood of

showing that at least one of the challenged claims is unpatentable as set forth above, we institute an *inter partes* review based on these grounds as well. *See* 37 C.F.R. § 42.108(a) (“When instituting inter partes review, the Board will authorize the review to proceed on all of the challenged claims and on all the grounds of unpatentability asserted for each claim.”).

III. CONCLUSION

Based on the arguments in the Petition, the Preliminary Response, the Preliminary Reply, and the Preliminary Sur-Reply, and the evidence of record, we determine that Petitioner establishes a reasonable likelihood that it will prevail on its challenge to at least one claim of the ’907 patent. Accordingly, we institute an *inter partes* review of all the challenged claims on all the grounds presented in the Petition.

The factual findings set forth in this Decision are preliminary and provided for the sole purpose of deciding whether to institute a review. Any final findings will be based on the full trial record, including any information presented in a timely filed response to the Petition. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting that “there is a significant difference between a petitioner’s burden to establish a ‘reasonable likelihood of success’ at institution, and actually proving invalidity by a preponderance of the evidence at trial”) (quoting 35 U.S.C. § 314(a) and comparing *id.* with § 316(e)).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review is instituted with respect to the grounds asserted in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which shall commence on the entry date of this Decision.

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Patent 11,024,907 B1

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