

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZHUHAI COSMX BATTERY CO., LTD.,
Petitioner

v.

NINGDE AMPEREX TECHNOLOGY LTD.,
Patent Owner

IPR2025-00389
Patent 11,923,498

PATENT OWNER'S RESPONSE

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Exhibit Number	Description
2001	Second Amended Complaint, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , Case No. 2:24-cv-00728-JRG, ECF No. 23 (E.D. Tex. Jan. 28, 2025)
2002	Scheduling Order, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , Case No. 2:24-cv-00728-JRG, ECF No. 27 (E.D. Tex. Feb. 6, 2025)
2003	CosMX Invalidity Contentions Cover Pleading, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , Case No. 2:24-cv-00728-JRG (E.D. Tex. Jan. 7, 2025)
2004	Summons to attend oral proceedings in German Case No. 3 Ni 12/23 (EP) (“Germany Order 1”)
2005	Summons to attend oral proceedings in German Case No. 3 Ni 12/24 (EP) (“Germany Order 2”)
2006	Docket Navigator Statistics for Judge Rodney Gilstrap (accessed May 5, 2025)
2007	Docket, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , Case No. 2:22-cv-00232 (E.D. Tex.)
2008	Joint Motion for Entry of Protective Order, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , No. 2:24-cv-00728-JRG, ECF No. 30 (E.D. Tex. Feb. 11, 2025)
2009	Amended Final Judgment, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , Case No. 2:22-cv-00232, ECF No. 427 (E.D. Tex.)
2010	Article, <i>Lithium battery manufacturer ATL won injunction against its Chinese rival COSMX in German Court</i> , China IP Today (April 6, 2024)
2011	Reserved
2012	Reserved
2013	Darts IP Reports: CN109301326, CN104466097, CN206490141, CN108352492 (May 6, 2025)
2014	Reserved
2015	Declaration of James L. Kaschmitter, Ph.D.
2016	<i>Curriculum Vitae</i> of James L. Kaschmitter, Ph.D.
2017	Papers and Presentations of James L. Kaschmitter, Ph.D.
2018	Supplemental Declaration of James L. Kaschmitter, Ph.D.

2019	CosMX Proposed Construction of Claim Terms, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , No. 2:24-cv-00728-JRG
2020	Deposition Transcript of Ulrich von Sacken, Ph.D. dated November 25, 2025, IPR2025-00389

I. INTRODUCTION

Ningde Amperex Technology Ltd. (“ATL” or “Patent Owner”) respectfully submits this Response to the Petition for inter partes review filed by Petitioner Zhuhai CosMX Battery Co., Ltd. (“Petitioner” or “CosMX”). Paper 1 (“Pet.”). None of the cited art, alone or in combination, renders the challenged claims unpatentable.

First, for every asserted Ground, Petitioner’s obviousness case relies on modifications of the length, width, and placement of tape in an expressly disparaged counterexample (the battery of Figures 8 and 9) of Takemura. *See Chemours Co. FC, LLC v. Daikin Indus., Ltd.*, 4 F.4th 1370, 1376-77 (Fed. Cir. 2021) (finding insufficient motivation to “increase [a prior art reference’s] melt flow rate to the claimed range,” in part because the reference “includes numerous examples of processing techniques that are typically used to increase melt flow rate, which [the reference] cautions should not be used due to the risk of obtaining a broader molecular weight distribution”); *Galderma Labs., L.P. v. Tolman, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013); *Laboratory Corp. of America Holdings v. Ravgen, Inc.*, IPR No. 2021-01054, Paper 51 at 38-39 (PTAB Nov. 1, 2022). Indeed, Takemura explicitly cautions that “[t]he presence of extra active material and **masking tape** in [the] positions [of Figures 8 and 9] leads to a decrease in energy density [and] an increase in the overall thickness of the battery.” Ex. 1006, ¶[0010]; *see also id.*, ¶[0035] (explaining that “**extra space** readily occurs ... due to the thickness of

current collector terminals 1, 2 *and the insulating tape 7.*”). That is, Takemura informed a POSITA that the placement and size of the tape specifically relied on by Petitioner leads to an undesirable decrease in energy density and an undesirable increase in the overall thickness.¹

Second, for all Grounds, Petitioner relies on expert testimony *alone* to support its theory that a POSITA would *expand* the length of tape found in Takemura and *move* it to a middle portion of the electrode (instead of at an end). Pet., 38. Specifically, Petitioner asserts that “Takemura *does not illustrate* that the insulating tape has a length larger than the length of the exposed metal on the negative electrode current collector, a *POSA would have done so* (or at least found it obvious) to minimize exposing the negative electrode metal to lithium ions released from the positive active material.” Pet., 38. This unsupported theory, finding an element obvious where it is admittedly absent from *every* prior art reference, is improper in an IPR proceeding and, worse, flouts the teachings of Takemura itself. *See* 37 C.F.R.

¹ Takemura’s solution is to *eliminate* the use of tape, not move it and increase its coverage. Ex. 1006, ¶[0035]. Instead of using tape to prevent lithium deposition, Takemura teaches removing the active layer, thereby avoiding the “extra space” caused by the tape. *Id.*, ¶[0035] (teaching removing tape to eliminate “extra space”), [0019] (teaching the uncoated portion “prevents lithium metal deposition”).

§ 42.104(b)(4) (requiring petitions to specify where each element is found “in the prior art patents or printed publications relied upon”); 35 U.S.C. § 311(b) (“only” patents or printed publications may form the basis for a ground in an IPR petition); *Qualcomm Inc. v. Apple Inc.*, 134 F.4th 1355, 1364-65 (Fed. Cir. 2025).

Third, Grounds 1 and 4 fail for the additional reason that the primary reference, Sato, never discloses a battery with an electrode having a “first recess” and another electrode having a “second recess,” nor does Petitioner identify one. Petitioner admits that “exposed portion 12” of Sato is a recess and appears to rely on Battery 1 of Sato to disclose a positive lead within a recess, and maps that recess to the claimed “first recess.” Pet., 26-27. Similarly, Petitioner relies on generic disclosure in a separate Sato comparative embodiment (Ex. 1005, ¶[0039]), to disclose a negative lead within a recess, and maps that to the claimed “second recess.” Pet., 29-30. But Sato *never discloses any embodiment with an electrode having a “first recess” and another electrode with a “second recess”*—only two different configurations of batteries, each with only *one electrode having one recess*: (1) one configuration having a recess on the positive electrode and no recess on the negative electrode (*see e.g.*, Battery 1) and (2) another configuration having a recess on the negative electrode with no recess on the positive electrode (*see e.g.*, Battery 8). Ex. 1005, ¶¶[0104], [0111], [0136]-[0137], [0148]. In fact, Petitioner’s expert admitted that Battery 8, the sole battery alleged to disclose both the “first

recess” and the “second recess,” only disclosed the “second recess.” Ex. 2020, 60:18-61:3.

Fourth, even if a POSITA were to ignore the teaching away in Takemura and were to combine Takemura with Oh-539 for Ground 7, this Ground still fails because, absent hindsight, a POSITA would have followed the express teachings of Takemura and would have removed the active material opposite a negative lead instead of adding more tape. Ex. 1006, ¶[0019]. In fact, removing active material from an active material uncoated portion is exactly what Takemura did in its disclosed embodiment 3, where the Takemura leads were moved to a middle portion of the electrode. *Id.*, ¶[0022]. Worse still, throughout Ground 7, Petitioner selects portions of the cited references without explanation and excludes other relevant portions that teach away from the proposed combination. As such, Petitioner’s combination in Ground 7 fails.

The Board should find all challenged claims of the ’498 Patent patentable.

II. BACKGROUND²

A. The '498 Patent

The '498 Patent discloses lithium-ion batteries that solve identified problems in the prior art. For example, leads can cause an increase in thickness which limits energy density. Ex. 1001, 1:36-48; Ex. 2015, ¶43. Recesses in active material can be used to reduce the thickness of the battery. Ex. 1001, 1:52-54; Ex. 2015, ¶43. But while recesses can reduce thickness, they create additional problems such as thickness variation around the corners of the recesses, high internal electrical resistance, and safety performance issues due to lithium precipitation. Ex. 1001, 1:49-2:3; Ex. 2015, ¶43. Due to the particular arrangement of leads, recesses, and insulating tape, the '498 Patent provides an efficient, dense battery, while effectively balancing reliability issues. *See* Ex. 1001, 4:57-65; *see also* Ex. 1001, 9:1-10:25 (showing “remarkable” reductions in short circuits and lithium precipitation, increases in energy density, and improvement in abscission of active material when tested); Ex. 2015, ¶48.

III. LEVEL OF ORDINARY SKILL IN THE ART

For purposes of this POR, Patent Owner adopts the definition proposed by Petitioner. Pet., 3; *see also* Ex. 2015, ¶¶51-54.

² Patent Owner's expert provided a technology overview and a summary in Ex. 2015, § IV.A-C, ¶¶37-42 and in Ex. 2018, § IV, ¶13.

IV. CLAIM CONSTRUCTION

Petitioner puts forth no claim construction positions in the Petition. Pet., 10. While Patent Owner reserves all rights to dispute the constructions advanced in Petition, no claim construction is necessary to find all challenged claims of the '498 Patent patentable because Patent Owner's arguments do not rely on the outcome of an actual controversy about claim interpretation and fail even under Patent Owner's constructions. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). The failure to render obvious the claims is clear in view of the arguments below without construing any specific claim term or phrase.

While Petitioner did not put forth any constructions in this IPR, in the related district court litigation, Petitioner asserts that “the positive plate” and “the negative plate” are indefinite. Ex. 2019, 9-11. Petitioner has not (and cannot) explain why advancing these inconsistent positions is warranted. *Tesla, Inc. v. Intellectual Ventures II LLC*, IPR No. 2025-00340, Paper 18 at 3-4 (PTAB Nov. 5, 2025) (informative). Petitioner has not made any showing that a POSITA would understand this term “notwithstanding” its own allegation of indefiniteness. *Id.* at 3-4. “Allowing a petitioner to advance a claim construction before the Board when that petitioner has made inconsistent indefiniteness arguments in district court fails to further, but instead detracts from, the Office’s goal of providing greater

predictability and certainty in the patent system.” *Id.* at 4 (omitting internal citations). Thus, Petitioner’s unpatentability claims should be denied.

V. ARGUMENT

A. Ground 1: Sato and Takemura Do Not Render Obvious Claims 1-3, 6, 8, 17, and 19

Petitioner asserts Sato and Takemura render obvious Claims 1-3, 6, 8, 17, and 19. Pet., 19-44. This ground fails. Ex. 2015, ¶¶56-96; *see also* Ex. 2018, ¶¶18-61.

1. The Petition Fails to Show That Sato and Takemura Render Obvious Claim 1

a. Takemura teaches away from the arrangement of tape in Figures 8 and 9, which show the prior art Takemura claims to improve over.

Petitioner relies on Sato as a primary reference, arguing Sato discloses most of the elements of claim 1—for example, a “battery,” “negative electrode,” “separator,” “positive electrode,” “first recess,” “second recess,” and “first insulating glue later.”³ Ex. 1003, ¶115-137. Petitioner explicitly acknowledges that Sato does not disclose certain elements (e.g., [1.I], [9.I.2], and [17.I]) pertaining to the claimed “second insulating glue layer”: “*Sato is silent about the adhesive tape having a width larger than a width of the second recess and a length larger than a length of the second recess.*” Pet., 36 (Ground 1 analysis for elements [1.I] and

³ Patent Owner expressly disputes that Sato discloses both a “first recess” and a “second recess.” *See* Section V.A.1.c, *infra*.

[17.I], internal citations omitted); Ex. 1003, ¶149; Ex. 2015, ¶59; *see also* Pet., 71 (Ground 4 analysis for element [9.I.2] relying on Ground 1 analysis for elements [1.I] and [17.I]), 102-103 (Ground 7 analysis for elements [1.I], [9.I.2], and [17.I] relying on Ground 1 analysis for elements [1.I] and [17.I]).

(i) Takemura expressly disparages the use of tape depicted in Figures 8 and 9.

Petitioner does not rely on Sato as disclosing the size of the “second insulating glue layer” (Pet., 36 (discussing element [1.I])), because Sato only mentions, in passing, “a polypropylene adhesive tape in order to prevent lithium deposition.” Ex. 1005, ¶[0137]. But Petitioner and its expert overlook that when Sato does address the size of polypropylene adhesive tape, Sato sizes the width of the polypropylene adhesive tape to be equal to the width of the corresponding recess. *Id.*, ¶¶[0111], [0113] (The width of the adhesive tape and the exposed portion are both equal to 8 mm.); Ex. 2018, ¶21. As such, a POSITA reading Sato, would have sized any tape to be equal to the size of a recess. Ex. 2018, ¶21.

Regardless, and to address Sato’s alleged shortcomings, Petitioner and its expert, without explanation, rely solely and entirely on the background and technical problem sections of Takemura and, specifically, the so-called background or prior art tape as shown in Takemura’s Figures 8 and 9. Pet., 36-38; Ex. 1003, ¶¶150-151.

Reliance on a comparative example, especially one that does not teach or suggest the claims as a whole, is fatal.⁴

Specifically, Takemura introduces the battery depicted in Figures 8 and 9 to highlight the problems associated with the conventional approach and to use the battery of Figures 8 and 9 as a *comparative example* illustrating Takemura's improvement. Ex. 1006, ¶¶[0002]-[0012], [0031]-[0038]; Ex. 2020, 69:21-70:3; Ex. 2018, ¶¶22-25. Takemura specifically enumerates the benefits of using its proposed solution and disparages the use of tape as in the battery of 8 and 9 because “[t]he presence of extra active material and masking tape ... leads to a decrease in energy density, an increase in the overall thickness of the battery, and an increase in cost

⁴ There is no dispute that Takemura fails to teach or suggest the elements of the claims. Dr. von Sacken admits that “a bare, exposed portion at the end of a positive current collector” is not “a first recess in the positive active material layer 3 for accommodating the positive lead 1 coupled to the positive current collector 5.” Ex. 1003, ¶¶[0366]-[0367]. Dr. von Sacken also admits that “a bare, exposed portion at the end of the negative current collector” is not “a second recess in the negative active material layer 4 for accommodating the negative lead 2 coupled to the negative current collector 6.” *Id.*, ¶¶[0378]-[0379].

due to an increase in production steps.” Ex. 1006, ¶[0010]; *Chemours*, 4 F.4th at 1376-77.

Failing to appreciate the significance of its citation to the Takemura *comparative example* and failing to appreciate the disclosures in Sato regarding the width of the tape, Petitioner argues that a POSITA would be motivated to rely on the teachings of tape opposite the *winding end* of the negative electrode in Takemura’s comparative examples (i.e., Figures 8 and 9) and modifying it so as to combine it with the Sato’s battery to prevent lithium plating. Pet., 22; Ex. 1003, ¶112. Petitioner erroneously alleges that the POSITA would be motivated to (1) *relocate* Takemura’s tape and, worse still, (2) *use more* tape than that suggested by Takemura.⁵ Pet., 19, 38. But, POSITA would not be motivated to *relocate* or *use more* tape in view of Takemura because Takemura expressly teaches away from doing so. *Chemours*, 4 F.4th at 1376-77; Ex. 2015, ¶¶62-71; *see also* Ex. 2018, ¶24. Indeed, Figure 4 of Takemura shows that even when the leads are centrally located within Takemura’s battery, no tape is provided with the leads. Ex. 1006, FIG. 4; Ex. 2018, ¶26.

Neither Petitioner nor its expert considers the complete disclosure of Takemura. Ex. 2015, ¶62; Ex. 1003, ¶¶150-151; Pet., 36-37. Specifically, Petitioner

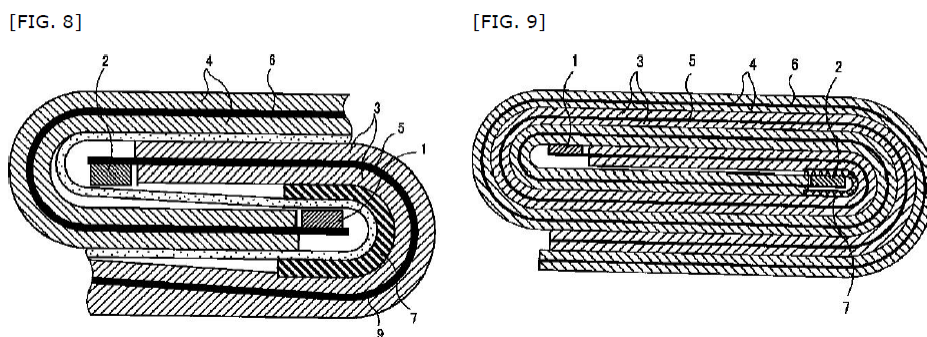
⁵ There is no dispute that Petitioner requires two substantial and unsupported modifications to the comparative example (Figures 8 and 9) of Takemura.

and Dr. von Sacken overlook that Takemura disparages the use of tape and provides technical reasons for why use of tape is not preferable, which undercuts the proposed combination by explicitly teaching that a POSITA should *eliminate* the use of tape—that is, Takemura is clear that a POSITA should *not* use the structures depicted in Figures 8 and 9. Ex. 2015 ¶62; Ex. 2018, ¶24.

(ii) Takemura discusses Figures 8 and 9 in disfavored Comparative Example 1.

Takemura describes the tape of Figures 8 and 9 in the background and technical problem sections as well as the sole *comparative example*. Takemura explicitly teaches not to use tape in the location suggested by Petitioner and not to use more tape for a variety of reasons. Ex. 1006 ¶¶[0002]-[0012], [0035]; Ex. 2015, ¶63; *see also* Ex. 2018, ¶¶27-33. In fact, Figures 8 and 9 are discussed under the heading “Technical Problem” where Takemura describes the problems with the battery depicted in Figure 8 and 9 including the use of tape and resulting deficiencies. *See* Ex. 1006, ¶¶[0005]-[0012]; Ex. 2020, 77:13-78:19. Further, Takemura uses the electrode structure of Figures 8 and 9 in disfavored Comparative Example 1 against which it shows the benefits of its own invention. Ex. 1006, ¶¶[0035] (Figure 8 depicts an enlarged portion of Comparative Example 1), [0031] (Figure 9 depicts Comparative Example 1), [0003] (Figure 9 depicts a *conventional* lithium-ion battery); *see also* Tables 1 and 2 (demonstrating that Comparative Example 1 has a reduced discharge capacity compared to the examples of Takemura’s invention).

Takemura describes Comparative Example 1 as a conventional lithium-ion battery with a positive and negative electrode with active material layers 3 and 4. *Id.*, ¶¶[0003], [0009], [0031] (Figure 9 depicts comparative Example 1). In this battery, the positive active material 3 is covered with masking tape 7. *Id.*, ¶[0008]. Comparative Example 1 can be viewed in Figures 8 and 9 below.



Id., FIGS. 8, 9. Takemura explicitly disfavors Comparative Example 1, explaining how its invention achieves advantageous increases in discharge capacity and the rate of deterioration of discharge capacity after cycling as compared to Comparative Example 1, which is shown below in Tables 1 and 2. *Id.*, ¶¶[0033]-[0037], [0035].

	Example 3	Comparative Example 1
Discharge Capacity (mAh)	340	280

Table 1

	Example 3	Comparative Example 1
Initial Discharge Capacity (mAh)	340	280
Discharge Capacity After 100 Cycles (mAh)	308	240
Deterioration (%) After 100 Cycles	90.6	85.7

Table 2

Id., Tables 1, 2.

Due to the problems associated with Comparative Example 1, Takemura disclosed ***eliminating*** the use of tape with the leads. Ex. 2015, ¶64; *see also* Ex. 2018, ¶¶27-31. Takemura explains that “[f]or the lithium-ion secondary battery shown in Fig. 9, there has been [a] demand for improvements ... ***especially in order to make batteries smaller and thinner.***” Ex. 1006, ¶[0004]. Takemura describes that “[e]qually important” is to provide batteries with “higher energy densities.” *Id.*, ¶[0004]. In the “Technical Problem” section, Takemura explains why the battery design of Figures 8 and 9 and insulating tape 7 ***are inadequate and prevent batteries from becoming smaller.*** *Id.*, ¶[0010]. Indeed, Takemura explicitly teaches that “the presence of extra active material and ***masking tape*** in [the] positions [of Figures 8 and 9] leads to a decrease in energy density, an increase in the overall thickness of the battery.” *Id.*, ¶[0010]. In the batteries of Figures 8 and 9, “***extra space*** readily occurs ... due to the thickness of current collector terminals 1, 2 ***and the insulating tape 7.***” *Id.*, ¶[0035].

After highlighting problems with the tape of Comparative Example 1, Takemura provides a solution, ***eliminating*** the tape provided with the leads 1 and 2, which solves the problems ***caused specifically by the location and size of insulating tape 7*** as illustrated in Figures 8 and 9. Ex. 1006, ¶¶[0004], [0035]; Ex. 2015, ¶65;

see also Ex. 2018, ¶32.⁶ For example, in the “Solution to Problem” section, Takemura specifically describes the issues of increased thickness and lack of energy density of Figures 8 and 9 and provides its improved solution—**eliminating** the tape provided with leads 1 and 2. Ex. 1006, ¶[0035], FIG. 3. To “reduce excess thickness,” Takemura teaches eliminating portions of the active material and **eliminating** the insulating tape. *Id.*, ¶[0035], FIG. 3 (teaching in Figures 8 and 9 that “extra space readily occurs in the innermost portion due to the thickness of current collector terminals 1, 2 and the insulating tape 7” but that “in FIG. 7, extra space is less likely to exist”). That is, Takemura is clear that the tape should be **eliminated**.

By using uncoated layers and **removing** the tape of Figures 8 and 9, Takemura teaches the POSITA that several advantages were achieved:

- “a higher discharge capacity was obtained,”
- “volumetric energy density was improved,”
- “improve[d] cycle characteristics” were obtained,

⁶ In FIG. 4, Takemura describes using a minimal amount of tape at the **winding end** of an electrode. Ex. 1006, ¶[0022], FIG. 4; Ex. 2015, ¶65, n. 2. Neither Figure 4 nor its minimal use of tape is relied on by Petitioner. Regardless, the tape disclosed in Figure 4 is unrelated to the claimed “first insulating glue layer” or the claimed “second insulating glue layer.” Ex. 2015, ¶65, n. 2.

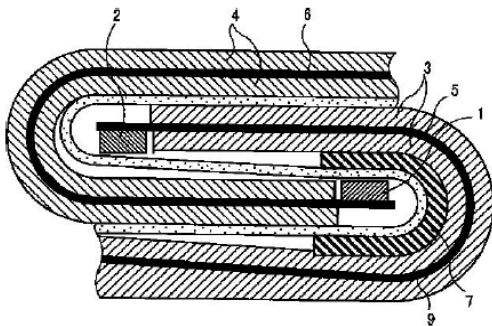
- “suppresse[d] battery degradation with respect to repeated use” was achieved, and
- an “extend[ed] battery life” was obtained.

Ex. 1006, ¶¶[0035]-[0036]; Ex. 2015 ¶66; *see also* Ex. 2018, ¶30.

A comparison of Takemura’s actual invention (Figure 7) compared to the disparaged use of tape in the prior art (Figure 8) is illustrated below:

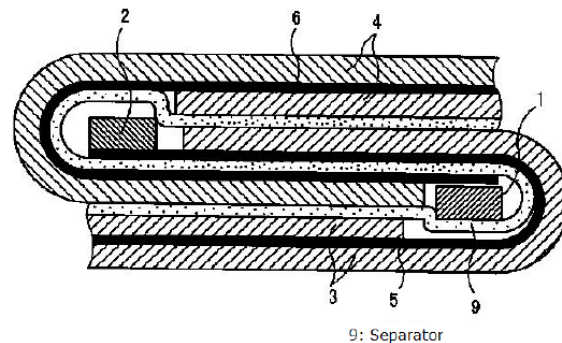
“extra space” is caused by tape

[FIG. 8]

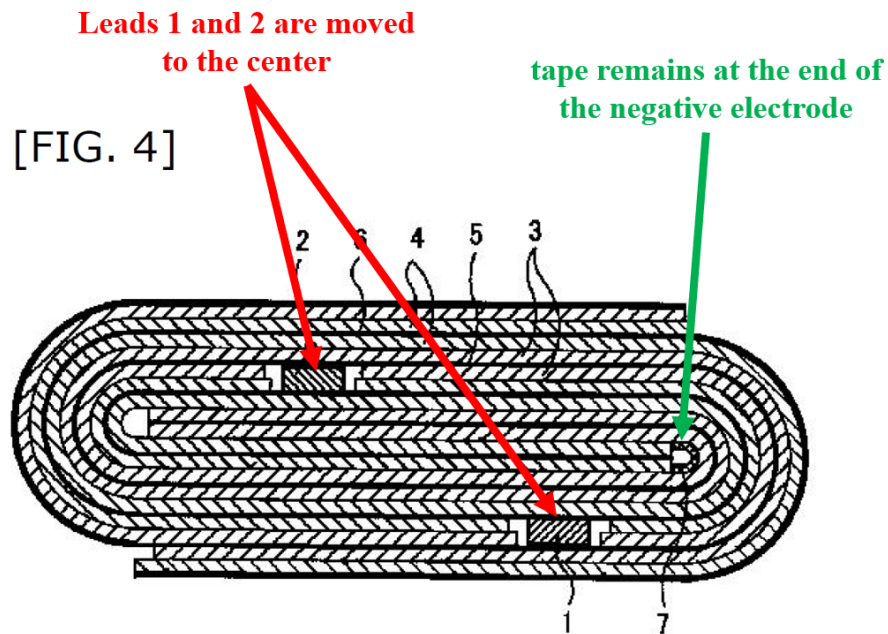


tape and active layer
are removed to
eliminate “extra space”

[FIG. 7]



Ex. 1006, FIGS. 7, 8 (annotations added); Ex. 2015, ¶67. Further, Takemura’s Figure 4 moves the leads to the central portion of the battery, but the tape is *minimized* as compared to Figures 8 and 9 and remains at the end of the negative electrode (i.e., the tape is not provided with the leads in Figure 4), as illustrated below:



Ex. 1006, FIG. 4 (annotations added); Ex. 2018, ¶32. Takemura explains that, in Figure 4, “active material layers facing the current collector terminals 1, 2 are not formed ... preventing lithium metal deposition due to excess positive electrode active material.” Ex. 1006, ¶[0022].

In view of the advantages disclosed by *eliminating or minimizing* insulating tape and further in view of the clear disparagement comparative example battery of Figures 8 and 9, Takemura teaches away from starting with the tape of Figures 8 and 9 (which show background art over which Takemura has improved) in the way suggested by Petitioner and certainly teaches away from using *more* tape in the middle portions of the electrode structure. *See id.*, ¶[0035] (highlighting the increased thickness due to tape in the innermost portion and associated problems);

Ex. 2015, ¶68; *see also* Ex. 2018, ¶33. A POSITA would in fact be dissuaded from combining the use of tape depicted in Takemura's Figures 8 and 9 with Sato. Ex. 2018, ¶33. Thus, Petitioner fails to demonstrate that a POSITA would combine Takemura's tape with the other references as proposed and, further, that a POSITA would have modified "the insulating tape [to have] a length larger than the length of the exposed metal on the negative electrode current collector." Ex. 2015 ¶68; *see also* Ex. 2018, ¶33.

(iii) Takemura does not support the use of tape to prevent lithium deposition.

Further, the evidence fails to support Petitioner's conclusion that prevention of lithium deposition is a motivation to use and modify Takemura's tape. *See* Pet., 19; Ex. 2015, ¶69; *see also* Ex. 2018, ¶¶34-37. Regardless of the lack of evidence regarding why prevention of lithium deposition is a motivation to (1) *relocate* Takemura's tape and (2) *use more* tape than that suggested by Takemura, Takemura teaches removing the active layer, thereby avoiding the "extra space" caused by the tape. Ex. 1006, ¶¶[0035] (teaching removing tape to eliminate "extra space"), [0019] (teaching the uncoated portion "prevents lithium metal deposition"); Ex. 2020, 78:21-79:3. Petitioner's analysis simply ignores Takemura's explicit suggestion to *eliminate* the use of tape and Takemura's teachings that *removing the active layer is the preferred method to prevent lithium deposition*. Ex. 1003, § IX.C (paragraphs 108–113); Ex. 2015, ¶68; *see also* Ex. 2018, ¶¶34-35. Takemura itself therefore

undercuts Petitioner's rationale that a POSITA would be motivated to relocate and rely on Takemura's tape to prevent lithium deposition because Takemura teaches an alternative approach (i.e., removing the active layer) is better for preventing lithium deposition. Ex. 1006, ¶[0035]; Ex. 2015, ¶69; *see also* Ex. 2018, ¶34. The Petition fails to address this teaching or offer any reason for why a POSITA would disregard it.

The errors with Petitioner's motivation to combine analysis are even clearer when the proposed combination is viewed as a whole. Ex. 2015, ¶70; *see also* Ex. 2018, ¶35. Not only does Petitioner conclude that Takemura's disfavored tape would be combined with Sato, Petitioner concludes that a POSITA would combine the existing tape in Takemura's background figures (which Takemura teaches to *eliminate* in its invention) with *even more tape*. Pet., 31-32. Specifically, Petitioner opines that a POSITA would combine Takemura's tape with Sato's tape which Petitioner claims to have mapped to the claimed "first insulating glue layer." Pet., 31-32; Ex. 1003, ¶134. Given Takemura teaches a solution of *eliminating* tape (as discussed in detail above), Petitioner's combination, which requires more tape than that disclosed and disparaged in Takemura, contradicts the teachings of Takemura for this additional reason. Ex. 2015, ¶70; *see also* Ex. 2018, ¶35.

In sum, Takemura disparages, and thus teaches away from, the tape placement of Figures 8 and 9, and therefore a POSITA would not be motivated to modify and

relocate the tape of Figures 8 and 9 of Takemura for use with Sato. Ex. 2015, ¶71; *see also* Ex. 2018, ¶37. Petitioner further argues that “merely changing the size of a component, such as Sato’s second insulating tape, without any unexpected result does not give rise to a patentable invention.” Pet., 38-39. But Petitioner does more than just change the size of the insulating tape—Petitioner relocates the modified tape of Takemura to a new location altogether. Regardless, the size and placement of the insulating tape in the patent at issue led to unexpected and remarkable results. Ex. 1001, 1:44-47 (“Therefore, increase of thickness of a lithium-ion battery due to the lead has become one of the key actors which limit the energy density of the lithium-ion battery.”), 3:1-5, 4:57-65, 9:1-10:25 (showing “remarkable” reductions in short circuits and lithium precipitation, increases in energy density, and improvement in abscission of active material when tested); Ex. 2018, ¶36. There is thus a tradeoff when determining the size of the insulating tape. Ex. 2018, ¶36. The size and placement of tape (or the removal of tape as taught by Takemura) is critical and has unexpected results. *Id.*, ¶36.

(iv) The institution decision overlooks the shortcomings of Takemura.

In the Institution Decision (“ID”), the Board acknowledges that “Petitioner only relies on Takemura for teaching how the tape disclosed in Sato would be sized and placed,” and goes on to explain that “[a]lthough Takemura might teach a different ultimate approach, that does not diminish Takemura’s teachings of a known

size and placement that was conventionally used in the art.” ID at 24-25. But in making this statement, the Board overlooks that the Takemura tape of Figures 8 and 9 is (1) opposite the winding end of the negative electrode (and not in opposite a recess)⁷ and (2) Takemura’s failure to disclose a length larger than a length of the second recess. Moreover, the Board further overlooked that when Takemura did disclose a lead in a recess in the middle of an electrode, Takemura placed the tape opposite the winding end of the negative electrode and not opposite the negative lead. Finally, the Board overlooked that Petitioner provided no explanation why using longer tape to minimize exposing the negative electrode metal to lithium ions was desirable, and no evidence that lithium deposition was even a problem when you have a tape that is smaller than the exposed portion (or the same size as taught in Sato). Worse still, Petitioner does not explain why longer tape was needed when the negative electrode was itself protected by tape. Ex. 2020, 66:1-11.

Given these shortcomings in Takemura and the fact that Petitioner is relying on a theory of obviousness, the Board must consider whether the POSITA would have *modified* Takemura’s teachings of a size and placement of tape based on the Takemura disclosure as whole. In view of Takemura’s ultimate approach and its

⁷ Petitioner’s expert confirms this shortcoming in his declaration. Ex. 1003,

¶¶[0366]-[0367], [0378]-[0379].

disparagement of tape, a POSITA would not have modified Takemura in the way proposed by Petitioner. Ex. 2018, ¶24.

The Board, relying on *EWP Corp.*,⁸ explains that “[a] reference must be considered for everything it *teaches* by way of technology and is not limited to the particular *invention* it is describing and attempting to protect.” ID at 24 (quoting *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985)). But in *EWP Corp.*, the trial court erred because it disregarded a reference based on its “invention” even though the reference itself also disclosed, in principle, the same method as claimed by the patent at issue. *EWP Corp.*, 755 F.2d at 907. *EWP Corp.* is inapposite to the facts in this case. Here, Petitioner is not alleging that the battery in Figures 8 and 9 of Takemura is the claimed battery. Instead, unlike *EWP Corp.*, Takemura must be **modified** because it does not disclose the size or placement of the claimed “second insulated glue layer” and, importantly, the clear disparagement of the size and placement of tape must be considered when determining whether the POSITA would have made the proposed **modification**. *Galderma Labs.*, 737 F.3d at 738. The Board’s reliance on *Intel* is similarly misplaced as Petitioner did not select a suitable option for a battery but instead has selected a disparaged comparative example and **modified** it in a way that is inconsistent with the teachings of the very

⁸ *EWP Corp.* was not cited by the Petitioner.

reference it modifies. *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021). As discussed above, a POSITA would have been dissuaded from combining the usage of tape in Takemura's Figures 8 and 9 with Sato because Takemura highlights numerous problems associated with using tape in such a manner. *See Laboratory Corp.*, IPR No. 2021-01054, Paper 51 at 38-39 (finding "a POSA would have been dissuaded from adding" a feature from a secondary reference where the secondary reference teaches problems associated with the use of the feature); Ex. 2018, ¶¶21-37.

The Board's reliance on *KSR* is also misplaced because Petitioner is not applying a similar improvement from Takemura in Sato but is instead modifying Takemura to create a new and different technique. *See* ID at 25; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). Here, Petitioner is not using the size and placement of the tape as disclosed in Figures 8 and 9 of Takemura. Petitioner is instead relying on a different size and placement of Takemura's tape, which undercuts any argument that Petitioner is relying on a known technique. At bottom, the combination of Takemura's tape with Sato's battery would not yield predictable results and would instead create new problems (e.g., increased battery thickness and lower energy density) that were not already present in Sato's battery. Ex. 2018, ¶¶27-33. A POSITA simply would not be motivated to combine Takemura's use of tape in Figures 8 and 9 with Sato's battery in light of these clear problems. *Id.*, ¶33.

b. Takemura does not render obvious a “second insulating glue layer” that “has a length larger than a length of the second recess.”

For Claim Elements [1.I], [9.I.2], and [17.I], Petitioner admits Takemura and Sato are both *silent about the claimed length* of the “second insulating glue layer.” Pet., 38 (“... *Takemura does not illustrate* that the insulating tape has a length larger than the length of the exposed metal, ...”), 36 (“*Sato is silent* about the adhesive tape having a width larger than a width of the second recess and a length larger than a length of the second recess.”); *see also* Pet., 71 (Ground 4), 102-103 (Ground 7). Petitioner’s argument, and the Board’s institution decision, is solely based on unsupported expert testimony and, thus, fails. *Xerox Corp. v. Bytemark, Inc.*, IPR No. 2022-00624, Paper 9 at 15 (Aug. 24, 2022) (ruling that conclusory and unsupported expert testimony “is entitled to little weight”); *Upjohn Co. v. MOVA Pharm. Corp.*, 225 F.3d 1306, 1311 (Fed. Cir. Sep. 11, 2000); ID at 25-26.

Worse than relying on expert testimony alone, Sato undercuts Petitioner’s argument that the length of tape should be larger than the recess as Sato discloses that tape should be sized to equal the size of a recess. Sato confirms that the width of the polypropylene adhesive tape is 8 mm (Ex. 1005, ¶[0113]; Ex. 2020, 52:4-7) and the portion where the positive electrode current collector is exposed has a width of 8 mm (Ex. 1005, ¶[0111]; Ex. 2020, 52:8-15). Thus, Sato expressly discloses that the width of the tape is equal to the width of the recess. Ex. 1005, ¶¶[0111], [0113];

Ex. 2020, 52:16-53:3. A POSITA would have understood that sizing the tape such that the width of the tape is equal to the width of the recess would have been beneficial because sizing the tape to be wider would result in insulating additional active material thus decreasing battery capacity. *See* Ex. 1005, ¶[0148]; Ex. 2018, ¶¶38-39. Petitioner does not address this disclosure in Sato.

In the ID, the Board explains that a POSITA “would have been motivated to size Sato’s adhesive tape to fully protect the terminal.” ID at 26. But as explained above, Sato discloses, and a POSITA would have understood, sizing the tape such that the tape and the recess have equal widths fully protects the terminal. Ex. 1005, ¶¶[0111], [0113]; Ex. 2018, ¶¶38-39. Even if a POSITA would have been motivated to make the tape larger than the lead to ensure coverage and alignment, there is no teaching or motivation in Sato to make the tape larger than the recess. *See* Ex. 1005, ¶¶[0111], [0113]; Ex. 2018, ¶¶38-39. Further, unlike the *Medichem* and *In re Urbanski* cases, none of the references relied upon by Petitioner here teach the required feature (i.e., tape with a length larger than the length of the recess). *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006); *In re Urbanski*, 809 F.3d 1237, 1244 (Fed. Cir. 2016). Here, neither Sato nor Takemura teach providing tape longer than the recess. Ex. 2018, ¶¶38-40.

Petitioner then asserts that, even though Takemura *does not teach to do so*, a POSITA would *extend* the tape in Figures 8 and 9 of Takemura so that it had “a

length larger than the length of the exposed metal on the negative electrode current collector” for several reasons. Pet., 37. That is, Petitioner is asserting, without support, that a POSITA reading Takemura would *use more tape*. *Xerox Corp.*, IPR No. 2022-00624, Paper 9 at 15. Regardless, each of Petitioner’s alleged reasons for expanding the tape is undercut by Takemura itself. As such, Takemura (and Sato) do not render obvious “a second insulating glue layer” that “has a length larger than a length of the second recess” for the following several reasons. Ex. 2015, ¶71; *see also* Ex. 2018, ¶38.

First, there is no dispute that Takemura is silent about the claimed length of the “second insulating glue layer.” Pet., 38 (“... Takemura does not illustrate that the insulating tape has a length larger than the length of the exposed metal, ...”), 36 (“*Sato is silent* about the adhesive tape having a width larger than a width of the second recess and a length larger than a length of the second recess.”). Takemura

discloses only the cross-sectional view of the battery in the width direction. Ex. 1006, FIGS. 8, 9.⁹

Despite any evidence, Petitioner asserts that a POSITA would have found it obvious to **use more tape** and extend the size of the tape in the **length** direction “to minimize exposing the negative electrode metal to lithium ions released from the positive active material.” Pet., 36; Ex. 2015 ¶74. Petitioner also alleges that it would be obvious to use more tape in a different location than that disclosed in Takemura, a middle portion. But this is inapposite to the clear disclosure of Takemura.

As explained above, Takemura’s solution is to **eliminate** the use of tape—not to **increase** or **expand** its coverage or size. Ex. 1006, ¶¶[0035] (teaching in Figures 8 and 9 that “extra space readily occurs in the innermost portion due to the thickness of current collector terminals 1, 2 and the insulating tape 7” but that when removing tape “in FIG. 7, extra space is less likely to exist”), [0010]; *supra*, Section V.A.1.a.

⁹ Even in the width direction, Takemura fails to disclose the size of its tape because “it is well established that ***patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes*** if the specification is completely silent on the issue.” *Hockerson Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000); *Nystrom v. TREX Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 2005).

As such, a POSITA would not have done the opposite of that taught by Takemura and extended the length of the tape. Petitioner's obviousness theory fails. Ex. 2015, ¶75.

Takemura describes the tape of Figures 8 and 9 in the background and technical problem sections and then teaches not to use the battery design of these figures by making the battery in Figures 3 and 4. Ex. 1006 ¶¶[0002]-[0004], [0035]; Ex. 2015, ¶76; *see also* Ex. 2018, ¶¶27-33. In fact, Takemura uses the battery of Figures 8 and 9 in disfavored Comparative Example 1 against which it shows the benefits of its own invention by comparison. Ex. 1006, ¶¶[0035] (Figure 8 depicts an enlarged portion of Comparative Example 1), [0031] (Figure 9 depicts Comparative Example 1), [0003] (Figure 9 depicts a conventional lithium-ion battery); *see also* Tables 1 and 2 (demonstrating that Comparative Example 1 has a reduced discharge capacity). In Comparative Example 1, the positive active material 3 is covered with masking tape 7. Ex. 1006, ¶[0008]. Takemura expressly disfavors Comparative Example 1, explaining how Takemura's invention, eliminating tape provided with the leads, achieves advantages over this invention including discharge capacity and the rate of deterioration of discharge capacity over time as shown in Tables 1 and 2. Ex. 1006, ¶¶[0033]-[0037], Tables 1, 2.

Takemura teaches that the tape in Comparative Example 1 causes problems. Ex. 2015, ¶77; *see also* Ex. 2018, ¶¶27-33. "For the lithium-ion secondary battery

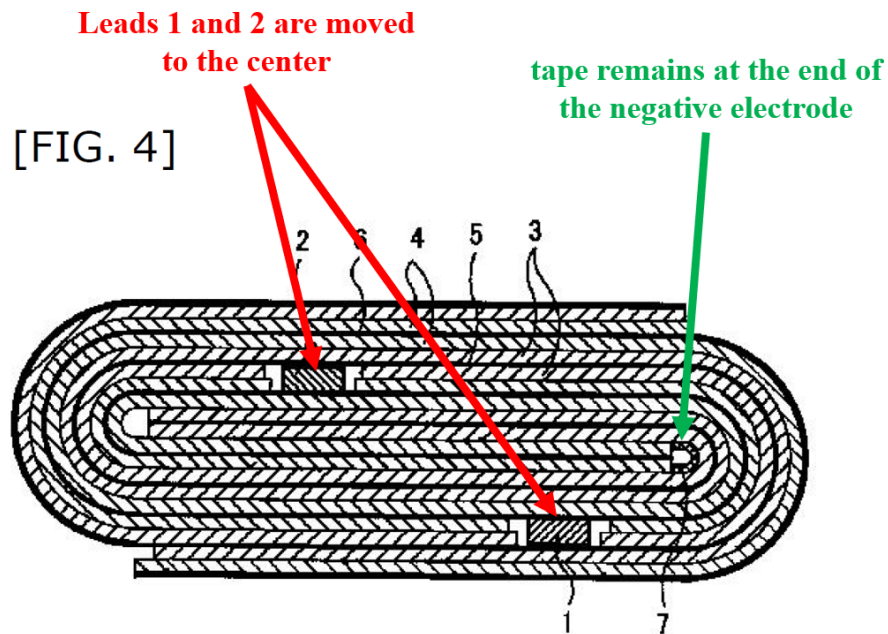
shown in Fig. 9, there has been [a] *demand for improvements ... especially in order to make batteries smaller and thinner.*” Ex. 1006, ¶[0004]. In the “Technical Problem” section, Takemura explains why the battery design of Figures 8 and 9 and insulating tape 7 *are inadequate and prevent batteries from becoming smaller.* *Id.*, ¶[0010]. Indeed, Takemura explicitly teaches that “the presence of extra active material and *masking tape* in [the] positions [of Figures 8 and 9] leads to a decrease in energy density, an increase in the overall thickness of the battery.” *Id.*, ¶[0010]. In the batteries of Figures 8 and 9, “*extra space* readily occurs ... due to the thickness of current collector terminals 1, 2 *and the insulating tape 7.*” *Id.*, ¶[0035].

Second, Petitioner’s assertions are further undercut by the fact that Takemura does not disclose using tape opposed to a recess at all. Ex. 1003, ¶367 (“Takemura does not disclose a first recess in the positive active material layer. . .”), ¶379 (“Takemura does not disclose a second recess in the negative active material layer. . .”); Ex. 2015, ¶78. Instead, Figures 8 and 9 depict tape around a winding end at the “innermost portion.” Ex. 1006, ¶[0035] (“In Comparative Example 1 ... extra space readily occurs in the innermost portion due to the thickness of current collector terminals 1, 2 and the insulating tape 7”). A POSITA would understand that an end

is not a recess.¹⁰ Ex. 2015, ¶77. Indeed, these winding ends are different than the recesses of the '498 Patent, each of which occur in the middle of the electrode. Ex. 1001, 5:24-30 (describing distance between recess and end of electrode), 6:60-7:2 (same), 7:27-36 (same), 7:60-8:3 (same), 8:15-25 (same), Figures 1-5 (showing recesses in middle). Unlike Figures 8 and 9 of Takemura, the recesses of the '498 Patent are bounded on both sides by an active material layer. *Compare id. with* Ex. 1006 ¶[0035], FIGS. 8, 9. Indeed as Claim 1 recites, the active material layer is “provided with” a second recess that has both a “width” and a “length.” In contrast, in the active material layer in Figures 8 and 9 of Takemura, the winding end is entirely outside of the active material layer and therefore has no boundary defining a width. Ex. 1006, ¶[0035], FIGS. 8, 9.

Further, and to underscore the shortcomings of Petitioner’s theory, Takemura’s Figure 4 moves the leads to the central portion of the battery, but the tape remains at the end of the negative electrode (i.e., the tape is not provided with the leads in Figure 4), as illustrated below:

¹⁰ Petitioner’s expert confirms this understanding in his declaration. Ex. 1003, ¶¶[0366]-[0367], [0378]-[0379].



Id., FIG. 4 (annotations added); Ex. 2018, ¶26. Takemura explains that, in Figure 4, “active material layers facing the current collector terminals 1, 2 are not formed ... preventing lithium metal deposition due to excess positive electrode active material.” Ex. 1006, ¶[0022]; Ex. 2018, ¶26.

Third, tape placement and sizing is a complicated matter as it impacts thickness of the battery. Ex. 2015, ¶79. Specifically, thickness is problematic when the tape is not sized and positioned carefully. *Id.*, ¶78. As Takemura also teaches, tape can cause extra thickness (i.e., bulging) around the tape that decreases the density of the battery. *Id.*, ¶78; Ex. 1006 ¶[0010]. Neither Petitioner nor its expert consider these complications and the impact on such complications on the battery

itself.¹¹ Thus, for this additional reason, a POSITA would be dissuaded from adding any more insulating tape. Ex. 2015, ¶79.

In sum, Takemura fails to disclose the length of its tape, let alone disclose or render obvious tape that is longer than the second recess. *Id.*, ¶80; *see also* Ex. 2018, ¶¶38-40.

c. Sato does not disclose a battery with both a “first recess” and a “second recess.”

(i) Sato does not disclose a single battery with centrally located recesses.

Sato never discloses a battery with an electrode having a “first recess” and another electrode having a “second recess”—only two different configurations of batteries, each with only one electrode having a recess: (1) one configuration having a recess on the positive electrode and no recess on the negative electrode and (2) another configuration having a recess on the negative electrode with no recess on the positive electrode. Ex. 2015, ¶81; *see also* Ex. 2018, ¶¶41-45. Petitioner has not and cannot identify a single battery with an electrode having a “first recess” and

¹¹ Takemura explains, even before adding the extra tape that Petitioner proposes, that “the presence of extra active material and *masking tape* in [the] positions [of Figures 8 and 9] leads to a decrease in energy density, an increase in the overall thickness of the battery.” *See* Ex. 1006, ¶[0010].

another electrode having a “second recess.” Petitioner also failed to explain why a POSITA would have combined the two configurations in Sato.¹² Thus, the Petition fails to address the differences between these two configurations or why a POSITA would allegedly combine the different disclosures of different embodiments within Sato or expect success when doing so.

Petitioner erroneously asserts that Sato discloses a battery with both a “first recess” on the positive active material layer and “a second recess” on the negative active material layer. Petitioner relies on a first battery (i.e., Battery 1) of Sato to disclose a positive lead within a recess and claims to map that recess of the first embodiment to the claimed “first recess.” Pet., 26-27. Similarly, Petitioner relies on a different second battery (i.e., Battery 8) of Sato to disclose a negative lead within a recess and claims to map that recess of the second embodiment to the claimed “second recess.” Pet., 29-30.

But contrary to Petitioner’s assertions, Sato describes 11 *separate* embodiments, referring to each as Battery 1, Battery 2, and Battery 3 through Battery 11. Ex. 1005, ¶¶[0104], [0111], [0136]-[0137], [0148]; Ex. 2015, ¶86. These

¹² As discussed *supra*, the Takemura reference is the sole reference in Ground 1 which show a “first recess” and a “second recess” in Figure 4. However, as discussed, Figure 4 disparages the use of tape in the middle portion of the electrode.

embodiments fall into one of two categories of battery configurations. Ex. 2015, ¶86. In the first, describing Batteries 1 through 7 (Ex. 1005, ¶[0101]),¹³ Sato discloses an electrode where the *negative* lead is at the electrode's *end* and the *positive* lead is within the *middle* of the positive electrode. Ex. 1005, ¶[0104], [0111] (describing negative lead on exposed “*outermost portion*”); Ex. 2020, 46:16-22, 47:10-21.

In Batteries 8 through 11, the *negative* lead is in the *middle* of the negative electrode (Ex. 1005, ¶[0107], [0136]-[0137]), while *positive* lead is at the *end* of the positive electrode. *Id.*, ¶[0137] (describing the exposed portion where the positive lead was located as the “*at the innermost portion.*”); Ex. 2020, 60:18-61:3; Ex. 2015, ¶87. However, Petitioner purports to rely on Sato's Battery 1 to teach the location of a “first recess” (positive recess in the middle) and Battery 8 to teach the location of the “second recess” (negative recess in the middle). Pet., 26-27 (citing disclosures for Battery 1 for the first recess), 29 (citing disclosures for Battery 8 for the second recess). Battery 1 and Battery 8 are not the same battery.

¹³ Batteries 2 through 7 have the same location of the exposed portion as Battery 1, which is described in paragraphs [0104] and [0111]. Ex. 1005, ¶[0115] (Battery 2), ¶[0117] (Battery 3), ¶[0119] (Battery 4); ¶[0121] (Battery 5); ¶[0123] (Battery 6); ¶[0125] (Battery 7).

Indeed, Sato confirms that in Battery 8, the positive lead is at the end of the positive electrode. In describing Battery 8, Sato discloses that “a battery 8 was fabricated in the same manner as the battery 1” except for “the processes” specifically disclosed with respect to Battery 8. Ex. 1005, ¶[0137]. In the very same paragraph, Sato explains that “[a]t this time, the [lead]¹⁴ was located *at an end of the positive electrode* such that *the lead was located at the innermost portion.*” *Id.*, ¶[0137] (emphasis added); Ex. 2020, 60:18-61:3 (confirming that Sato discloses “further modification of moving the positive lead to the end of the electrode”). Thus, Battery 8 cannot contain a centrally located recess on the positive electrode plate, because, in Battery 8, the positive lead is expressly moved to the end of the positive electrode. Ex. 1005, ¶[0137]; Ex. 2018, ¶43. Petitioner’s expert, Dr. von Sacken, further confirms that, in Battery 8, the positive lead is moved to the end of the electrode. Ex. 2020, 60:18-61:3. In the ID, the Board explained “[w]e note that, contrary to Patent Owner’s contentions, Sato appears to indicate that this same positive electrode is used in Sato’s battery 8.” ID at 27. The Board highlights Sato’s disclosure that, in Battery 8, “[a] positive electrode plate was formed in the same manner as in Example 1.” ID at 27; *see* Ex. 1005, ¶[0136]. But this statement cannot

¹⁴ Sato contains a typo referring to the “lead” as the “load.” Ex. 1005, ¶[0137]; *see also* Ex. 2020, 58:10-59:9.

trump the clear disclosure of the location of the positive lead at the end of the electrode in ¶[0137]. Moreover, the cited portion of ¶[0136] should be read as referring to the positive electrode itself (i.e., the electrode structure) and not the position of the lead. Sato's Battery 8 expressly changes the locations of both the positive and negative leads. Ex. 1005, ¶[0137].

On cross examination and in view of the clear disclosure regarding Battery 8, Dr. von Sacken now strains credibility as he argues that Sato's Battery 8 is actually two different batteries: one battery with two centrally located recesses and one battery where the positive lead is moved to the end. *See* Ex. 2020, 63:7-64:6. This cannot be true. Regarding Battery 8, Sato explains that "[a]t this time, the [lead] was located at an end of the positive electrode such that the lead was located at the innermost portion." Ex. 1005, ¶[0137]. Sato's Table 2 depicts test results for Batteries 8-11 and contains only a single entry for Battery 8. *Id.*, Table 2; Ex. 2020, 62:15-18 ("Q. And when we look at Table 2, there's a single entry for battery 8, correct? A. Yeah."). Sato's discussion of Battery 8 thus refers to only a single battery and that battery has the positive lead located at an end of the positive electrode. Ex. 2018, ¶¶42-44.

(ii) Petitioner relies on a combination of different embodiments disclosed in Sato.

Petitioner's expert acknowledges that the proposed combination relies on *different embodiments* of Sato. Ex. 1003, ¶136 (Dr. von Sacken stating "the

following annotated figures show Sato's positive electrode plate *according to Battery 1* and negative electrode plate *according to Battery 8*"); *see also Id.*, ¶136, n. 5 (Dr. von Sacken stating "Sato's Battery 8 includes a positive electrode and negative electrode made in the same manner as described in Battery 1 except for the placement of the tabs"). Moreover, even after admitting the presence of different embodiments, Dr. von Sacken merely provides the conclusory statement that a "POSA combining Battery 1 and Battery 8 would understand that this arrangement [of a lead in a recess] is suitable for both positive and negative electrodes and that combining them would reduce the 'current collection resistance.'" *Id.*, ¶102; Ex. 2015, ¶89. Thus, at best, Petitioner's case turns on this lone conclusory statement by Dr. von Sacken, which lacks any underlying support, evidence, or analysis to support the claimed assertion. Failure to provide a motivation to combine the disparate embodiments is fatal. *In re Stepan*, 868 F.3d 1342, 1345-46 n.1 (Fed. Cir. 2017); *NetMoneyIn, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008)).

In contrast, a POSITA would not be motivated by "current collection resistance" because (1) it would frustrate Sato's primary purpose of passing a crush test, (2) nowhere does Sato seek to improve current collection resistance, and (3) current collection resistance is generally a battery trait that is secondary to ionic resistance and energy density. Ex. 2015, ¶89. As such, Petitioner's unsupported theory fails for the following reasons.

First, a POSITA would not have modified Sato at least because it would frustrate Sato's primary purpose: to survive a crush test. Ex. 2015, ¶90. Sato improves the likelihood of passing a crush test by increasing the durability of an electrode at one of its weakest points—the middle. Specifically, Sato teaches the specific “problem” of this prior art is that “the presence of the lead in the middle portion [of the electrode] tends to cause a stress.” Ex. 1005, ¶[0024]. The stress identified by Sato becomes especially problematic if a recess is formed on both sides (i.e., top and bottom) of the active material. *See Id.*, ¶[0024]; Ex. 2015, ¶90. Unlike the '498 Patent, Sato's solution is to improve the structural integrity around the recesses by sizing a recess on top of the electrode with different dimensions than the recess on the bottom of the electrode, such that the edges of the top recess do not align with the edges of the bottom recess. Ex. 1005, ¶[0015]; Ex. 2015, ¶90. As can be seen below, in the comparative example (Figure 3), the edges of the top and bottom recess of an electrode align. Ex. 1005, FIG. 3, ¶[0038]-[0039]; Ex. 2015, ¶90. In Sato's solution, as shown in Figure 4, the edges do not align, due to the relatively larger width of the top recess compared to the width “ γ ” of the bottom recess. Ex. 1005, FIG. 4, ¶[0040].

FIG. 3

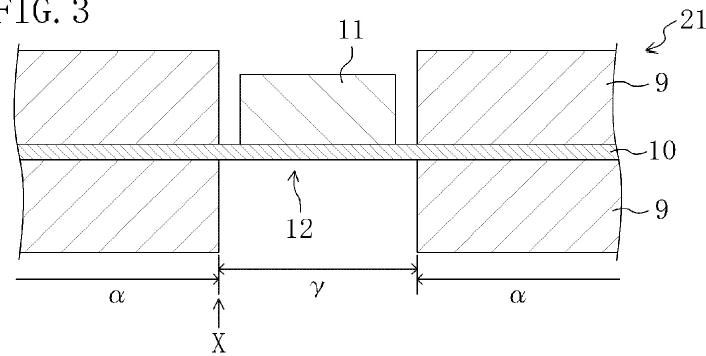
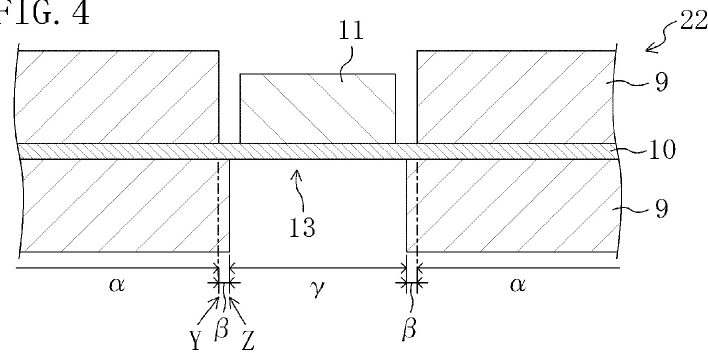


FIG. 4



Id., FIGS. 3, 4.

Modifying Sato to include a recess on each electrode would reduce the likelihood of passing a crush-test. Ex. 2015, ¶91. Sato teaches the specific “problem” of prior art is that “the presence of the lead *in the middle portion* [of the electrode] *tends to cause a stress.*” Ex. 1005, ¶[0024]. Sato’s goal is to *reduce this stress* such that the battery will survive a crush test. Ex. 1005, ¶¶[0008], [0009], [0022]-[0025]; [0042]; Ex. 2015, ¶91. Sato’s solutions, which all have only one lead in the middle portion, overcome the stated problem by minimizing stress. Ex. 1005, ¶[0024]. Sato’s goal is to *reduce this stress* such that the battery will survive a crush test. *Id.*, ¶¶[0008], [0009], [0022]-[0025]; [0042]; Ex. 2015, ¶91. If Sato added an additional

lead in the middle, as Petitioner contends, the additional recess would “tend[] to cause [additional] stress.” Ex. 1003, ¶[0024]; Ex. 2015, ¶91. Therefore, adding an additional recess to accommodate the presence of the lead in the middle portion would be nonobvious to a POSITA, counter to Sato’s acknowledgement that leads in the middle of an electrode increase stress, counter to Sato’s goal of reducing stress, and counter to Sato’s embodiments which all use one recess. Ex. 2015, ¶91.

Second, nowhere does Sato seek to reduce “current collection resistance.” Ex. 2015, ¶92. Sato teaches that the *prior art* has improved current collection by using a recess, but doing so comes with the problem of increased stress and failure of a crush test. Ex. 1005, ¶[0024] (describing that, in Patent Document 2, “when an external force is applied, the presence of the lead in the middle portion tends to cause a stress . . .” but “[t]his problem, however, is not pointed out in Patent Document 2”). This is the very problem Sato intends to solve, but its proposed solution and advantages would be wholly defeated by Petitioner’s proposed modification. *Id.*, ¶¶[0008], [0009], [0022]-[0025], [0042]. Therefore, even assuming a POSITA wanted to improve current collection resistance beyond the prior art, Petitioner fails to explain why doing so would be worth the expense of sacrificing structural integrity in complete disregard of Sato’s primary purpose and advantage. Ex. 2015, ¶92.

Third, current collection resistance is not even a critical problem in most Li-ion cells because “ionic resistance” far dominates over current collection resistance

in cells. Ex. 2015, ¶93. Therefore, a POSITA would generally not be motivated to improve current collection resistance, because such improvements would be minimal compared to the more difficult problem of ionic resistance. Ex. 2015, ¶93.

In sum, Sato does not disclose a battery with “a positive active material layer being provided with a first recess” and a “negative electrode active material layer being provided with a second recess,” and Petitioner does not provide a reasonable explanation for combining one recess from one embodiment with another recess from another embodiment. Ex. 2015, ¶94. Furthermore, a POSITA would not be motivated to combine portions of the different embodiments in Sato in the way Petitioner contends due to Sato’s goal of passing a crush test and limiting stress caused near the leads. Ex. 2015, ¶94. Including two recesses in both the middle of the positive electrode and the middle of the negative electrode would thus defeat the stated purpose and frustrate the alleged improvement of Sato. Ex. 2015, ¶94.

2. Claim 17 is Not Unpatentable

For Claim 17, Petitioner relies on the same arguments discussed above for Claim 1. Pet., § IX.B.1 (addressing Claims 1 and 17 together, starting on page 23). Therefore, for at least the same reasons discussed above for Claim 1 (Section VI.A.1), Petitioner fails to show Sato and Takemura render obvious Claim 17. Ex. 2015, ¶95; *see also* Ex. 2018, ¶¶46.

3. Claims 2-3, 6, 8, and 19 Are Not Unpatentable

Claims 2-3, 6, and 8 are not unpatentable for at least the same reasons as discussed above with respect to Claim 1 and at least because they depend from claim 1. Ex. 2015, ¶96; *see also* Ex. 2018, ¶47. Claim 19 is not unpatentable for at least the same reasons as discussed above with respect to claim 17 and at least because it depends on claim 17. Ex. 2015, ¶96; *see also* Ex. 2018, ¶48. Claims 2-3, and 6 are additionally not unpatentable for the reasons set forth below.

a. Claims 2 and 3 Are Not Unpatentable

With respect to the positive electrode, Petitioner, relying on Sato's Battery 1, argues that "Sato discloses a distance between a center of the first recess ... and one end of the positive active material ... is half of a length of the positive active material." Pet., 39. Likewise, with respect to the negative electrode, Petitioner, relying on Sato's Battery 8, argues that "Sato discloses that a distance between a center of the second recess ... and one end of the negative active material ... is half of a length of the negative active material." Pet., 40. However, as explained with respect to Ground 1, Sato never discloses a battery with an electrode having a "first recess" and another electrode having a "second recess"—only two different configurations of batteries, each with only one electrode having a recess: (1) one configuration having a recess on the positive electrode and no recess on the negative

electrode and (2) another configuration having a recess on the negative electrode with no recess on the positive electrode. Ex. 2015, ¶81; *see also* Ex. 2018, ¶¶49-50.

Even if Sato's Battery 1 and Battery 8 are each found to include the claimed first and second recesses, the position of the leads, and therefore the position of the recesses in Sato, do not satisfy Claims 2 and 3. In Battery 1, Sato discloses an electrode where positive lead is within the middle of the positive electrode and the negative lead is at the electrode's end. Ex. 1005, ¶¶[0104], [0111] (describing the negative lead exposed on the "outermost portion"); Ex. 2020, 46:16-22, 47:10-21. In Battery 8, Sato discloses an electrode where the negative lead is in the middle of the negative electrode (Ex. 1005, ¶¶[0107], [0136]-[0137]) and the positive lead is at the end of the positive electrode. *Id.*, ¶[0137] (describing the exposed portion where the positive lead was located as "at the innermost portion"); Ex. 2020, 60:18-61:3; Ex. 2015, ¶87; *see also* Ex. 2018, ¶¶51.

Specifically, as explained above with respect to Ground 1, Sato discloses that "a battery 8 was fabricated in the same manner as the battery 1" except for "the processes" specifically disclosed with respect to Battery 8. Ex. 1005, ¶[0137]. And with respect to Battery 8, Sato explains that "[a]t this time, the [lead]¹⁵ was located

¹⁵ Sato contains a typo referring to the "lead" as the "load." Ex. 1005, ¶[0137]; *see also* Ex. 2020, 58:10-59:9.

at an end of the positive electrode such that the lead was located at the innermost portion.” *Id.*, ¶[0137] (emphasis added); Ex. 2018, ¶52. Indeed, Petitioner’s expert further confirms that, in Battery 8, the positive lead is moved to the end of the electrode. Ex. 2020, 60:18-61:3. Sato further confirms that where one lead is attached within the electrode plate in the length direction, “[t]he other lead is preferably attached to a position at which short-circuit between leads does not easily occur” (i.e., near the outermost portion of the electrode). Ex. 1005, ¶[0094].

Thus, neither Sato’s Battery 1 nor Sato’s Battery 8 disclose both a distance between a center of the first recess and one end of the positive active material and a distance between a center of the second recess and one end of the negative active material in which both distances are within the $\frac{1}{4}$ to $\frac{3}{4}$ range required by Claim 2 or are equal to one half the length of the respective active material as required by Claim 3. Ex. 2018, ¶53.

To the extent Petitioner argues that a recess can include the ends, such an interpretation would be improper and untimely. With respect to the battery depicted in Takemura’s Figures 8 and 9, in which the positive and negative leads are located at the ends, Dr. von Sacken admits that Takemura does not disclose either a first recess in the positive active material layer or a second recess in the negative active material layer. Ex. 1003, ¶¶367, 378. As such, Petitioner cannot advance new arguments or claim constructions at this stage. *Axonics, Inc. v. Medtronic, Inc.*, 75

F.4th 1374, 1380 (Fed. Cir. Aug. 7, 2023). Regardless, Claims 2 and 3, require the recesses be centrally located (i.e., not at the ends). Ex. 1001, Claims 2-3. Accordingly, Patent Owner incorporates all of its arguments with respect to Claim 1 in its argument with respect to Claims 2-3.

b. Claim 6 Is Not Unpatentable

Petitioner argues that “[t]he thickness of the positive active material on Sato’s positive current collector is 0.071 mm, which corresponds to the thickness of Sato’s first recess.” Pet., 41. Petitioner further argues that “[g]iven the disclosed depth of Sato’s recess and in view of Figures 3 and 5, Sato’s first recess has a depth between 0.005 mm to 0.071 mm larger than the thickness of positive lead 11.” Pet., 41. Petitioner makes a nearly identical argument with respect to the negative electrode. Pet., 42.

Petitioner concludes, without support in Sato’s specification, that the depth of the recesses must be greater than 0.005 mm larger than the leads. *See* Pet., 41-43; Ex. 2018, ¶¶54-56. The ’498 Patent explains that “increase of thickness of a lithium-ion battery due to the lead” is “one of the key actors which limit the energy density of the lithium-ion battery.” Ex. 1001, 1:44-47; Ex. 2018, ¶60. It is thus beneficial and critical that the depth of the recesses be 0.005 mm to 0.1 mm larger than the thickness of the leads. Ex. 2018, ¶60. Sato, however, is silent as to the thickness of the top and bottom portions of the active material layer in relation to the thickness

of the leads and thus does not disclose that the thickness of the recesses must be 0.005 mm to 0.1 mm larger than the thickness of the leads. Ex. 2018, ¶¶57-59. This lack of disclosure is fatal to Petitioner's arguments with respect to the critical range recited in Claim 6. Ex. 2018, ¶61.

B. Ground 2: Sato, Takemura, and Nakamura Do Not Render Obvious Claims 4, 5, 7, and 18

Petitioner asserts that Sato, Takemura, and Nakamura render obvious Claims 4, 5, 7, and 18. Pet., 44-57. These claims are not obvious for the same reasons discussed above with respect to Claims 1 and 17. *Supra*, Sections V.A.1-2; Ex. 2018, ¶¶62-64.

1. Claims 4 and 5 are Not Unpatentable

Claim 4 requires that the first and second recess have a length of 1-100 mm less than a length of the positive and negative leads, respectively. Claim 5 requires that the first and second recess have a length of 1-100 mm less than a width of the positive and negative electrode active material layer, respectively. Petitioner admits that Sato is silent about these requirements. Pet., 47-54. Indeed, the exposed portions in Sato's Battery 1 and Battery 8 are exposed because there is no active material on the current collector. Ex. 1005, ¶[0036] ("The exposed portion extends *perpendicularly to the length direction* of the positive electrode plate 4 or the negative electrode plate 5 *in the shape of a band.*") (emphasis added); Ex. 2018,

¶67. By contrast, the claimed recesses in the '498 Patent require a length dimension. Ex. 1001, Claims 4-5; Ex. 2018, ¶67.

To address the deficiencies of Sato, Petitioner proposes modifying the length of Sato's exposed portions as taught by Nakamura such that "the length of Sato's first and second" exposed portions are formed "to be 1-100 mm less than a length of the positive and negative leads" (Claim 4) and "1-100 mm less than a width of the positive and negative active material mixture layers" (Claim 5). Pet., 47-54. Modifying Sato in this way, however, would introduce fundamental problems in Sato's batteries. The "band" shape of Sato's exposed portions are critical to ensuring that Sato's cylindrical battery can easily bend. Ex. 2018, ¶68. Further, modifying Sato in this way would introduce increased pressure at the innermost portion of the cylinder (i.e., the location where the negative and positive leads are located in Sato's Battery 1 and Battery 8, respectively (*see* Ex. 1005, ¶¶[0111], [0137])), and the increased pressure may cause cracking. Ex. 2018, ¶68.

A POSITA would therefore not be motivated to combine Sato and Nakamura in the manner suggested by Petitioner and Petitioner's expert. Ex. 2018, ¶68-69. In fact, such modifications would undercut the stated purpose of Sato. *Medtronic, Inc. v. Teleflex Innovations SARL*, 69 F.4th 1341, 1349–50 (Fed. Cir. 2023); *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068–69 (Fed. Cir. 2016) (affirming Board's finding that it would not have been obvious to "substitute the recessed barbs of Samuels

'851 with the protuberances of Todd" when "the barbs were the primary objective of the reference").

C. Ground 3: Sato, Takemura, Oh-539, and Oh-144 Do Not Render Obvious Claims 20 and 22

Petitioner asserts that Sato, Takemura, Oh-539, and Oh-144 render obvious Claims 20 and 22. Pet., 57-65. These claims are not obvious for the same reasons discussed above with respect to Claims 1 and 17. *Supra*, Sections V.A.1-2; Ex. 2018, ¶¶70-72.

D. Ground 4: Sato, Takemura, and Kobayashi Do Not Render Obvious Claims 9-11, 14, and 16

Petitioner asserts that Sato, Takemura, and Kobayashi render obvious Claims 9-11, 14, and 16. Pet., 65-72. For Claim 9, Petitioner relies wholly on its Ground 1 analysis for Claim 1 for all similar elements appearing in Claim 9, which make up a majority of the claim language. Pet., 68-69; *see also* Pet., 114-116. Additionally, Claims 10, 11, 14, and 16 depend from Claim 9. Therefore, Ground 4 fails for the same reasons identified for Ground 1 with respect to Claim 1. *Supra*, Section V.A.1; Ex. 2015, ¶¶99-100; *see also* Ex. 2018, ¶73-74.

Further, for Claims 10, 11, 14, and 16, Petitioner relies on its Ground 1 analysis for Claims 2, 3, 6, and 8, respectively. Pet., 72. Therefore, these claims are not obvious for the same reasons discussed above with respect to Claims 2, 3, 6, and 8. *Supra*, Section V.A.3; Ex. 2015, ¶100; *see also* Ex. 2018, ¶75.

E. Ground 5: Sato, Takemura, Kobayashi, and Nakamura Do Not Render Obvious Claims 12, 13, and 15

Petitioner asserts that Sato, Takemura, Kobayashi, and Nakamura render obvious Claims 12, 13, and 15. Pet., 72-78. Claims 12, 13, and 15 depend from Claim 9. Petitioner relies wholly on its Ground 1 analysis for Claim 1 for all similar elements appearing in Claim 9, which make up a majority of the claim language. Pet., 68-69; *see also* Pet., 114-116. Therefore, Ground 5 fails for the same reasons identified for Ground 1 with respect to Claim 1. *Supra*, Section V.A.1; Ex. 2015, ¶¶99, 101; *see also* Ex. 2018, ¶¶76-77.

1. Claims 12 and 13 are Not Unpatentable

Petitioner's analysis for Claims 12 and 13 is identical to its analysis for Claims 4 and 5. *Compare* Pet., 47-54 *with* Pet., 72-76. Accordingly, Claims 12 and 13 are not unpatentable for at least the same reasons as discussed above with respect to Claims 4 and 5. *See* Section V.B.1, *supra*; *see also* Ex. 2018, ¶¶62-69, 78-82.

F. Ground 6: Sato, Takemura, Kobayashi, Oh-539, and Oh-144 Do Not Render Obvious Claim 21

Petitioner asserts that Sato, Takemura, Kobayashi, Oh-539, and Oh-144 render obvious Claim 21. Pet., 79-82. Claim 21 depends from Claim 9. Petitioner relies wholly on its Ground 1 analysis for Claim 1 for all similar elements appearing in Claim 9, which make up a majority of the claim language. Pet., 68-69; *see also* Pet., 114-116. Therefore, Ground 6 fails for the same reasons identified for Ground

1 with respect to Claim 1. *Supra*, Section V.A.1; Ex. 2015, ¶¶99, 102; *see also* Ex. 2018, ¶¶83-84.

G. Ground 7: Takemura, Oh-539, and Kobayashi Do Not Render Obvious Claims 1-3, 9-11, and 17

Petitioner asserts that Takemura, Oh-539, and Kobayashi render obvious Claims 1-3, 9-11, and 17 of the '498 Patent. Pet., 82-105. This ground fails for at least the reasons set forth below. Ex. 2015, ¶¶103-118; *see also* Ex. 2018, ¶¶85-99.

1. The Petition Fails to Show That Takemura, Oh-539, and Kobayashi Render Obvious Claim 1

Petitioner alleges that a POSITA, starting with the disclosure of Takemura having leads attached at the ends of the positive and negative electrodes, would move these positive and negative leads into recesses formed in the positive and negative active materials solely to reduce current flow distance and improve battery discharge rate. Pet., 83-85. Petitioner then proposes that the relocated positive lead (and associated recess) would be covered in insulating tape based on the disclosure of Kobayashi. *Id.* at 86-88. Finally, Petitioner and its expert propose that the insulating tape of Takemura, not that of Kobayashi, would be divided into two pieces and placed “on a surface of the positive electrode active material layer across the separator from the second recess, with the first piece above and the second piece below the second recess.” Ex. 1003, ¶395; Pet. 98-100. But Petitioner and its expert pick between the references without any rational reason to do so. *InTouch Techs.*,

Inc. v. VGo Communs., Inc., 751 F.3d 1327, 1352 (Fed. Cir. 2014). Worse, Petitioner relies on modifications that are specifically disparaged by the references themselves. Petitioner's Ground 7 must fail.

a. Takemura does not render obvious a “second insulating glue layer” that “has a length larger than a length of the second recess.”

As an initial matter, Takemura does not render obvious “a second insulating glue layer” that “has a length larger than a length of the second recess.” Ex. 2015, ¶110; *see also* Ex. 2018, ¶88. Petitioner relies entirely on unsupported expert testimony to allegedly render this limitation unpatentable. Pet., 102-103. But as explained in Section V.A.1.b (and as Petitioner admits), Takemura fails to disclose a second insulating glue layer having “a length larger than a length of the second recess” and, in fact, teaches away from such a solution. Therefore, Ground 7 fails for the same reasons as identified for Grounds 1 and 4. Ex. 2015, ¶110; *see also* Ex. 2018, ¶88.

b. Takemura teaches away from the proposed arrangement of tape in Figures 8 and 9.

Petitioner relies on the Takemura reference and asserts that the POSITA would relocate the leads of Figures 8 and 9 and place tape not only on or opposite these leads, but expand the tape disclosed by Takemura. But Takemura instructs a POSITA *not* to expand the tape of Figures 8 and 9—the very opposite of what

Petitioner claims a POSITA would be motivated to do. *Supra*, Section V.A.1.a; Ex. 2015, ¶105; *see also* Ex. 2018, ¶¶87.

Petitioner relies on Takemura as a primary reference allegedly teaching claim elements such as a “battery,” a “positive electrode,” a “negative electrode,” and a “separator.” Pet., 88-89, 91-92, 95-96. Petitioner relies on Oh-539 to disclose a first recess (Pet., 90-91) and a second recess (Pet., 93-95). Like Grounds 1 and 4, Petitioner relies wholly on Takemura’s Figures 8 and 9 to disclose tape with a width and length greater than a width and length of the second recess. Pet., 102-103. For the same reasons as discussed above in Grounds 1 and 4, Takemura teaches away from Oh-539 and its combination with Oh-539 fails. Ex. 2015, ¶106; *see also* Ex. 2018, ¶¶20-37, Section V.A.1.a.i, *supra*.

Petitioner argues a POSITA would be motivated to use “the width of Takemura’s insulating tape” which it argues is “greater than the width of the recess formed in the negative active material of Takemura’s negative electrode to cover all exposed metal.” Pet., 103; Ex. 1003, ¶¶397-398, 432-434, 460-462. Petitioner further asserts that “a POSA would have made the length of Takemura’s tape (measured along the electrode’s width) larger than the length of the current collector’s exposed surface in the Takemura-Oh-539 battery to avoid exposing

negative electrode metal to lithium plating (or, at least, found this obvious).”¹⁶ Pet., 103, Ex. 1003, ¶398.

But this alleged motivation is undercut by Takemura itself for the same reasons discussed above with regard to Grounds 1 and 4. Takemura disparages the use of tape in Figures 8 and 9, seeking to solve the problems that tape causes by *eliminating* tape provided with the leads. *Supra*, Section V.A.1.a. Takemura specifically enumerates the benefits of using its proposed solution and disparages the use of tape as in the battery of 8 and 9 because “[t]he presence of extra active material and masking tape ... leads to a decrease in energy density, an increase in the overall thickness of the battery, and an increase in cost due to an increase in production steps.” Ex. 1006, ¶[0010]; *Chemours*, 4 F.4th at 1376-77. Takemura explicitly disfavors Comparative Example 1, explaining how its invention achieves advantageous increases in discharge capacity and the rate of deterioration of discharge capacity after cycling as compared to Comparative Example 1. Ex. 1006, ¶¶[0033]-[0037], [0035]. Due to the problems associated with Comparative Example 1 (the battery of Figures 8 and 9 that Petitioner is relying on), Takemura disclosed

¹⁶ As discussed above in Section V.A.1.b, Petitioner’s argument is solely based on unsupported expert testimony and, thus, fails. *Xerox Corp.*, IPR No. 2022-00624, Paper 9 at 15.

eliminating the use of tape with the leads. Ex. 2015, ¶¶64; *see also* Ex. 2018, ¶¶27-33. Thus, a POSITA would not have made the length of Takemura's tape *larger* in the length direction as is asserted by Petitioner. Ex. 2018, ¶33.

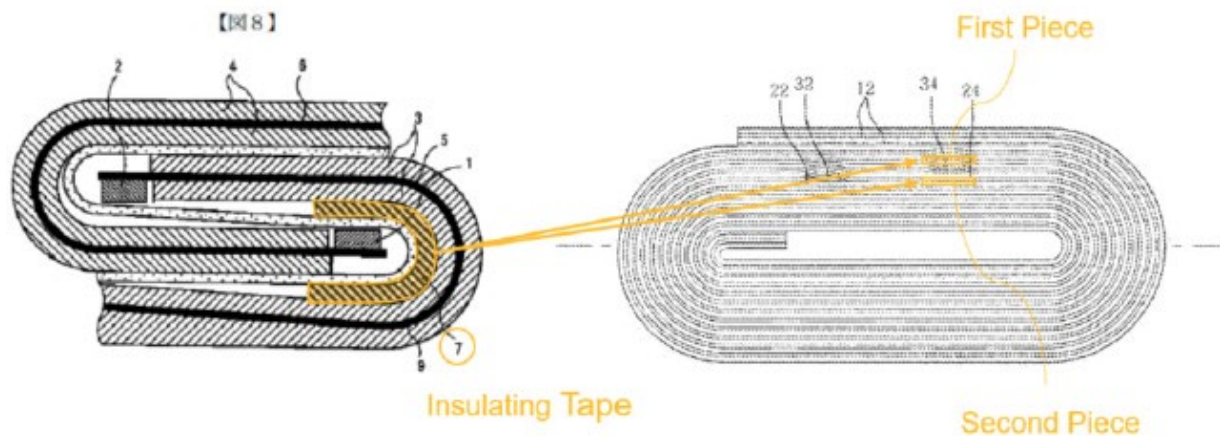
Petitioner's unsupported allegation finds no support in Oh-539. Unlike the claims of the '498 Patent, Oh-539 has nothing to do with preventing lithium deposition or using tape—Oh-539 never mentions either. Ex. 2015, ¶108. Oh-539 identifies a problem with the prior art, namely, that a "conventional lithium secondary battery is problematic in that its high-rate discharging characteristics are not good because the distance the electric current moves is long." Ex. 1007, ¶[0006]. To solve this high discharging rate problem, Oh-539 discloses "decreasing the distance the electric current moves" in a battery. *Id.*, ¶[0007]. Oh-539 achieves this decreased distance by forming non-coated portions such that "tab 32 is connected of the cathode center non-coated portion." *Id.*, ¶¶[0047]-[0048]; *see also id.*, ¶¶[0058]-[0060] (discussing center non-coated portions for the anode). As such, the sole benefit taught by Oh-539 and relied upon by the Petitioner is that the current no longer has to travel from one end of the electrode to the other. *Id.*, ¶¶[0047]-[0048].

As Dr. Kaschmitter explains, a POSITA would not be motivated to combine Takemura's disparaged tape size from Figures 8 and 9 with Oh-539. Ex. 2015, ¶¶108-09; *see also* Ex. 2018, ¶¶20-37. The motivation cannot be found in Oh-539—especially not a motivation that overcomes the disparagement of tape in Takemura—

because Oh-539 never mentions lithium deposition, lithium plating, or tape. *See, generally*, Ex. 1007. Indeed, as discussed *infra*, Takemura itself already disclosed a solution that provided all of the benefits of Oh-539, solving the high discharging rate problem by centrally locating its lead, while also achieving advantageous increases in discharge capacity and the rate of deterioration of discharge capacity after cycling. Ex. 1006, ¶¶[0033]-[0037], [0035]. Absent hindsight, Takemura and Oh-539 would not have been combined as proposed by Petitioner.

c. Figure 4 of Takemura demonstrates that the Petition relies on impermissible hindsight.

Petitioner argues a POSITA would be motivated to combine Takemura and Oh-539 and “shift[] Takemura’s [Figure 8 and 9] tape on the surface of positive active material layer to remain opposite the negative lead connection to shield the exposed metal surfaces of the negative lead connection from lithium plating.” Pet., 99-100, Ex. 1003, ¶394. Petitioner argues “[s]pecifically, a POSA would have placed Takemura’s tape on the positive material layer surface opposite the second recess of Takemura-Oh-539 battery.” Pet., 100; Ex. 1003, ¶394. When combining Takemura’s tape with Oh-539’s central lead placement, Petitioner asserts a POSITA would place the tape in the central portions of the electrodes (as shown on the right-hand side in Petitioner’s annotated figures below). Pet., 99-100; Ex. 1003, ¶395.



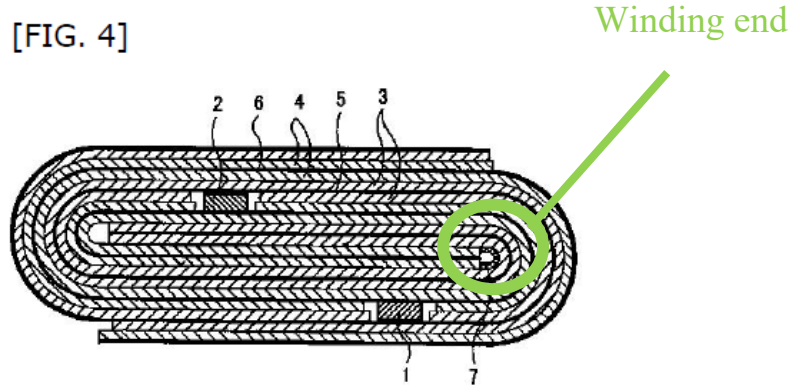
Petitioner and Dr. von Sacken assert that “In combining Oh-539’s central placement of the negative lead connection with Takemura, a POSITA would have likewise shifted Takemura’s tape on the surface of the positive active material layer to remain opposite the negative lead connection *to shield the exposed metal surfaces of the negative lead connection from lithium plating.*” Pet., 99-100; Ex. 1003, ¶¶394-95. Dr. von Sacken further asserts that:

To prevent lithium plating at the exposed metal located on the top and bottom side of the second recess in the Takemura-Oh-539 battery, a POSA would have been motivated to *divide* Takemura’s insulating tape 7, which is bent around top and bottom sides at an end of the electrode, into two pieces as shown above. The two pieces would be located at the second location as recited in element [1.H] of the ’498 patent—namely on a surface of the positive electrode active material layer across the separator from the second recess, with the first piece above and the second piece below the second recess.

Ex. 1003, ¶395. But Petitioner’s combination is the epitome of hindsight as it turns a blind eye to the teachings of its own prior art.

Petitioner’s hypothetical combination of Takemura’s tape with the central recesses of Oh-539 is undercut by what Takemura actually did at the time—using a minimal amount of tape in a battery with centrally located recess. Ex. 2015, ¶115; *see also* Ex. 2018, ¶¶89-91. For example, in Takemura Figure 4—the only Takemura disclosure that includes leads in a recess, like Oh-539 is claimed to (and a disclosure that Petitioner ignores)—Takemura teaches placing *tape only at the winding end* (i.e., not with the leads) to prevent lithium deposition.¹⁷ Ex. 1006, ¶[0022] (“The positive electrode active material layer 3 opposite the beginning of the winding end of the negative electrode is covered with insulating tape 7 to prevent lithium metal deposition.”); Ex. 2020, 82:4-83:4. No other insulating tape is disclosed in Figure 4. Ex. 1006, FIG. 4; Ex. 2020, 83:5-84:2 (“Figure 4 shows Takemura’s preferred solution, which is to remove any excess positive material so that there’s no need for tape except for that one small spot at the beginning of the winding. ...”). The minimal insulating tape 7 can be seen at the winding end of the electrode in Figure 4 below.

¹⁷ As discussed *supra*, Oh-539 does not teach or suggest the use of tape at all.



Ex. 1007, FIG. 4; Ex. 2015, ¶115; *see also* Ex. 2018, ¶90. Takemura explains that, in Figure 4 and *instead of using tape*, “active material layers facing the current collector terminals 1, 2 are not formed ... preventing lithium metal deposition due to excess positive electrode active material.” Ex. 1006, ¶[0022]. A POSITA would therefore understand that combining Takemura’s teachings with Oh-539, as Petitioner proposes, would only lead to a structure like that in Figure 4 of Takemura. Ex. 2018, ¶90.

Instead of following Takemura’s teachings with respect to Figure 4, in which the leads are moved to the central portion of the battery, and instead of following the disclosures of Takemura and Oh-539 where no tape is placed opposite the negative lead, Petitioner pivots to (1) Oh-539 for disclosing centrally located recesses and (2) relies on unsupported expert testimony regarding the position and size of the tape. Pet., 93-95. When prompted as to why he chose Oh-539 and not the battery of Figure 4 of Takemura, Dr. von Sacken admitted that *his approach was to satisfy the claims*

any way he could (i.e., by selecting Oh-539 for disclosure of recesses without needing to add tape back into the combination). *See* Ex. 2020 88:19-90:2 (“Q. So Dr. von Sacken, can you help me understand why you did not choose Figure 4 in a third embodiment of Takemura but instead, chose Oh-539 to support moving Takemura’s positive and negative leads to recesses formed in the positive and negative electrode material layers? A. *We want to show how the existing prior art discloses all the elements of the – patent*, so we had – we can use Takemura’s comparative example, which has the tape, and show how that can be combined with Oh, how that would have advantages. *If we started with Takemura’s Figure 4, then we would have to explain how – if you did not want to use Takemura’s invention but used a conventional tape, how it would be necessary to add tape back to Takemura’s Figure 4.*”). In fact, Dr. von Sacken was so motivated to find the invention of the ’498 Patent that he was willing to add additional tape wherever needed in Takemura’s Figure 4, even though there was no motivating reason to do so in either reference. Dr. von Sacken’s testimony is the epitome of hindsight and entitled to no weight. *Id.*

Therefore, adding tape where Petitioner alleges—in the middle of Oh-539—would cause additional “extra space” at the locations of Oh-539, something which Takemura teaches a POSITA to avoid. Ex. 1006, ¶[0035]; Ex. 2015, ¶¶115-16; *see also* Ex. 2018, ¶91. Instead, Takemura specifically disclosed not placing tape

“opposite” a recess. Ex. 1006, ¶[0035]; Ex. 2015, ¶¶115-16; *see also* Ex. 2018, ¶91. Indeed, Takemura teaches removing active material to form “an active material uncoated portion ... which prevents lithium metal deposition.” Ex. 2015, ¶114; Ex. 1006, ¶[0019]; *see also* Ex. 2018, ¶91. Thus, Petitioner’s rationale could only have been gleaned from the disclosure in the patent at issue and not from the art itself. *Iriusrisk, Inc. v. Threatmodeler Software Inc.*, No. IPR2023-00656, Paper 33, 50 (P.T.A.B. Oct. 2, 2024).

d. Kobayashi’s disclosure further undercuts Petitioner’s combination.

Oddly, Petitioner’s proposed combination relies on Kobayashi as providing the motivation “to apply insulating tape to the positive lead and associated recess of the Takemura-Oh-539 battery” but does not rely on Kobayashi’s teachings regarding the negative leads. Pet., 87. Petitioner notes that “protecting leads and regions surrounding them from short-circuits was well known” and notes that “Kobayashi affixed insulating tape ‘at potential short-circuit locations where such short-circuits can be expected to occur in order to prevent short-circuits due to contact with the opposing electrode at potential short-circuit locations.’” Pet., 86 (citing Ex. 1008, ¶[0005]; Ex. 1003, ¶358). But Petitioner’s rationale for the combination regarding the positive lead apply equally to the negative lead. The only reason for Petitioner to ignore Kobayashi’s teachings regarding the negative lead is hindsight.

There is no dispute that Kobayashi teaches covering the negative lead and *not* putting tape on the opposite lead. Ex. 1008, ¶¶[0007], [0015], [0035]; Ex. 2020, 98:12-19. Thus, even in the proposed Takemura-Oh-539-Kobayashi combination, a POSITA would have covered the negative lead as taught by Kobayashi instead of putting tape on the opposite surface. Ex. 2018, ¶¶93-95. As such, in the proposed combination, Takemura discloses removing active material and disparages tape, Oh-539 does not require tape, and Kobayashi, the only references that discloses tape proximate the negative lead, discloses its placement on the lead and not opposite the lead as claimed by the patent at issue. Ex. 2018, ¶¶96.

At bottom, it is impermissible to ignore certain teachings of the cited references themselves while picking and choosing only those parts that support the proposed combination. *In re Wesslau*, 353 F.2d 238, 241 (C.C.P.A. 1965); *see also*, e.g., *Google LLC et al v. AGIS Software Development LLC*, IPR2018-01087, Paper 14 at 23 (Jan. 9, 2019). Petitioner's hindsight driven combination thus fails.

2. Claims 9 and 17 are Not Unpatentable

For Claim 9 and 17, Petitioner relies on the same arguments discussed above for Claim 1. Pet., Section XV.C (addressing Claims 1, 9, and 17 together on pages 88-100). Therefore, for at least the same reasons discussed above for Claim 1 (*supra*, Section V.G.1), the Petition fails to show Takemura, Oh-539, and Kobayashi render obvious Claims 9 and 17. Ex. 2015, ¶117; *see also* Ex. 2018, ¶97.

3. Claims 2, 3, 10, and 11 are Not Unpatentable

Claims 2 and 3 are not unpatentable for at least the same reasons as discussed above with respect to Claim 1 and at least because they depend from Claim 1. Ex. 2015, ¶118; *see also* Ex. 2018, ¶99. Claims 10 and 11 are not unpatentable for at least the same reasons as discussed above with respect to Claim 9 and at least because they depend from Claim 9. Ex. 2015, ¶118; *see also* Ex. 2018, ¶99.

As discussed above with respect to Ground 1 and to the extent Petitioner changes its interpretation of “recess,” Claims 2 and 3, require the recesses be centrally located (*i.e.*, not at the ends). Ex. 1001, Claims 2-3. Accordingly, Patent Owner incorporates all of its arguments with respect to Claim 1 in its argument with respect to Claims 2-3.

H. Ground 8: Takemura, Oh-539, and Oh-144 Do Not Render Obvious Claims 20-22

Petitioner asserts that Takemura, Oh-539, and Oh-144 render obvious Claims 20-22. Pet., 105-109. Claims 20, 21, and 22 depend from Claims 1, 9, and 17, respectively. These claims are not obvious for the same reasons discussed above with respect to independent Claims 1 (Ground 1), 9 (Ground 4), and 17 (Ground 1). *Supra*, Sections V.A.1-2, V.D; Ex. 2015, ¶119; Ex. 2018, ¶¶100-101.

VI. CONCLUSION

Patent Owner respectfully submits that the Board should find all Challenged Claims not patentable.

Dated: December 10, 2025

Respectfully submitted,

By: /Christopher TL Douglas/

Christopher TL Douglas

Reg. No. 56,950

CERTIFICATION UNDER 37 C.F.R. §42.24

Pursuant to 37 C.F.R. §42.24(d), I certify that this response complies with the type-volume limits of 37 C.F.R. §42.24(b)(1) because it contains 13,869 words, according to the word-processing system used to prepare this response, excluding the parts of this response that are exempted by 37 C.F.R. §42.24(b) (including a table of contents, a table of authorities, a listing of facts which are admitted, a certificate of service or this certificate word count, and appendix of exhibits).

Dated: December 10, 2025

By: /Christopher TL Douglas/
Christopher TL Douglas

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), the undersigned hereby certifies that true and correct copies of the foregoing **PATENT OWNER'S RESPONSE and NINGDE AMPEREX TECH. EXHIBITS 2018-2020** were served in their entirety on December 10, 2025 by filing this document through the PTAB's P-TACTS Filing System as well as delivering true and correct copies by electronic mail on Petitioner's lead and backup counsel at the following email addresses (as agreed by counsel for Petitioner):

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