

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZHUHAI COSMX BATTERY CO., LTD.
Petitioner

v.

NINGDE AMPEREX TECHNOLOGY LIMITED,
Patent Owner

Case IPR2026-00409
U.S. Patent No. 12,278,330

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 12,278,330**

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PETITIONER'S EXHIBIT LIST

<i>Exhibit #</i>	<i>Description</i>
1001	U.S. Patent No. 12,278,330 B2 to Tao (“the ’330 patent”)
1002	Prosecution File History of U.S. Patent No. 12,278,330 B2 (“’330 File History”)
1003	Declaration of Ulrich von Sacken, Ph.D.
1004	<i>Curriculum Vitae</i> of Ulrich von Sacken, Ph.D.
1005	U.S. Patent App. Pub. No. 2011/0111276 to Sato <i>et al.</i>
1006	Japanese Patent Pub. No. 2000-67907 to Takemura <i>et al.</i>
1007	Japanese Patent Pub. No. 2004-303590 to Kodama <i>et al.</i>
1008	Japanese Patent Pub. No. 2010-55906 to Kobayashi <i>et al.</i>
1009	Japanese Patent Pub. No. 10-326629 to Maejima <i>et al.</i>
1010	Japanese Patent Pub. No. 11-26008 to Yamauchi <i>et al.</i>
1011	Japanese Patent Pub. No. 2000-285902 to Mizutani <i>et al.</i>
1012	Japanese Patent Pub. No. 2003-068271 to Nakamura <i>et al.</i>
1013	Japanese Patent Pub. No. 2007-165224 to Yoneda <i>et al.</i>
1014	U.S. Patent App. Pub. No. 2006-0051662 to Kwak <i>et al.</i>
1015	U.S. Patent App. Pub. No. 2007-0172736 to Fujikawa <i>et al.</i>
1016	Japanese Patent Pub. No. 2008-171593 to Aoki <i>et al.</i>
1017	U.S. Patent App. Pub. No. 2010-0035144 to Oh <i>et al.</i>
1018	Korean Patent Pub. No. 2013-0085202 to Lee <i>et al.</i>
1019	Agubra <i>et al.</i> , “Lithium Ion Battery Anode Aging Mechanisms.” <i>Materials</i> (2013) 6, 1310-1325; doi: 10.3390/ma6041310
1020	Smart <i>et al.</i> , “Effects of Electrolyte Composition on Lithium Plating in Lithium-Ion Cells.” <i>J. Electrochem. Soc.</i> (2011) 158 A379-A389.

<i>Exhibit #</i>	<i>Description</i>
1021	Ratnakumar <i>et al.</i> , “Lithium Plating Behavior in Lithium-ion Cells.” <i>ECS Trans.</i> (2010) 25 (36) 241-252.
1022	Eberman <i>et al.</i> , “Material and Design Options for Avoiding Lithium-Plating during Charging.” <i>ECS Trans.</i> (2010) 25 47-58.
1023	Wen <i>et al.</i> , “A Review on Lithium-Ion Battery Safety Issues: Existing Problems and Possible Solutions.” <i>Mater. Express</i> (2012) Vol. 2, No. 3, 197-212.
1024	Complaint and Exhibit N filed in <i>Ningde Amperex Technology Ltd. V. Zhuhai CosMX Battery Co., Ltd.</i> , Case No. 2:24-ccv-728 (E.D. Tex.)
1025	Complaint and Exhibit 9 filed in <i>Ningde Amperex Technology Ltd. V. Zhuhai CosMX Battery Co., Ltd.</i> , Case No. 2:26-cv-00139 (E.D. Tex.)
1026	U.S. Patent App. Pub. No. 2011/0104539 to Oh <i>et al.</i>
1027	U.S. Patent App. Pub. No. 2004/0096735 to Komatsu
1028	Prosecution File History of U.S. Patent No. 11,923,498 B2 (“498 File History”)
1029	Prosecution File History of Application No. 17/407,081 B2 (“081 File History”)
1030	Prosecution File History of Application No. 16/113,938 B2 (“938 File History”)
1031	Prosecution File History of U.S. Patent No. 10,541,441 B2 (“441 File History”)
1032	<i>Intentionally Left Blank</i>
1033	U.S. Patent App. Pub. No. 2010/0178559 to Mao <i>et al.</i>
1034	U.S. Patent App. Pub. No. 2009/0305120 to Blomgren <i>et al.</i>
1035	U.S. Patent App. Pub. No. 2013/0101896 to Rich <i>et al.</i>
1036	U.S. Patent App. Pub. No. 2011/0136000 to Moon <i>et al.</i>

<i>Exhibit #</i>	<i>Description</i>
1037	U.S. Patent App. Pub. No. 2006/0003221 to Yeo
1038	U.S. Patent App. Pub. No. 2013/0244073 to Fujimoto
1039	Deposition Transcript of James Kaschmitter, February 20, 2026, in IPR2025-00389.
1040	U.S. Patent App. Pub. No. 2005/0003264 to Oh <i>et al.</i>
1041	<i>Intentionally left blank</i>
1042	U.S. Patent App. Pub. No. 2014/0120258 to Anderson
1043	U.S. Patent No. 6,423,446 to Miyazaki

I. INTRODUCTION

Petitioner Zhuhai CosMX Battery Co., Ltd. (“Petitioner” or “CosMX”) requests *inter partes* review (“IPR”) and cancellation of claims 1-20 of U.S. Patent No. 12,278,330 (“the ’330 patent”) to Ningde Amperex Technology Ltd (“Patent Owner”). These claims are unpatentable under 35 U.S.C. § 103(a) in view of the prior art.

The ’330 patent is a continuation of U.S. Patent No. 11,923,498 (“the ’498 patent”), instituted for review by the Board in IPR2025-00398. Accordingly, much of the same prior art is applied here and this Petition likewise warrants institution.

As in the ’498 patent, the ’330 patent claims lithium-ion batteries having an anode (negative electrode) and a cathode (positive electrode), each having recesses formed in the electrodes’ active material to connect the battery’s leads to the exposed portion of the electrodes’ current collector.

The only meaningful substantive addition recited in the ’330 patent claims is a feature not even expressly described in the specification, but which was known in the art a decade before the ’330 patent: exposed portions of the current collectors extending in a direction opposite to the current collector surface connected to the lead tab. Indeed, this simple technique for accommodating lead tabs in electrodes was already known, as evidenced herein. EX1003, ¶¶[0039], [0115]-[0121]; EX1007, ¶¶[0018], [0028]. Thus, claims 1-20 would have been obvious to a skilled

artisan. The Board should grant institution and ultimately find the claims unpatentable.

II. GROUNDS FOR STANDING (37 C.F.R. § 42.104(A))

The '330 patent is available for IPR. Petitioner is not barred or estopped from requesting IPR.

III. PRECISE RELIEF REQUESTED (37 C.F.R. § 42.22(a) AND IDENTIFICATION OF CHALLENGE (37 C.F.R. § 42.104(b))

The Board should institute IPR under 35 U.S.C. §§ 311-319 and 37 C.F.R. §§ 42.1-.80 and 42.100-42.123, and find all claims of the '330 patent unpatentable under AIA 35 U.S.C. § 103(a) based on the following combinations:

Ground	Combination	Claims
1	Sato-Takemura-Kodama	1-3, 6, 8, 10-13, 16, 18
2	Sato-Takemura-Kodama-Nakamura	4, 5, 7, 14, 15, 17
3	Sato-Takemura-Kodama-Kobayashi	9, 19, 20

The '330 patent claims priority to CN 201420030319.4, filed January 17, 2014, its earliest possible priority date. All applied art qualifies under at least § 102(a)(1):

- **Sato, US 2011/0111276**, published May 12, 2011;
- **Takemura, JP 2000-067907**, published March 3, 2000;
- **Kodama, JP 2004-303590**, published October 28, 2004;
- **Nakamura, JP 2003-068271**, published March 7, 2003; and

- **Kobayashi, JP 2010-055906**, published March 11, 2010.

This Petition is supported by the expert declaration of Ulrich von Sacken, Ph.D., P.E., an expert in the field of battery materials, construction, and operation; manufacture; testing; and reliability and safety. EX1003, ¶¶[0001]-[0026], [0030].

IV. PERSON OF ORDINARY SKILL IN THE ART (“POSA”)

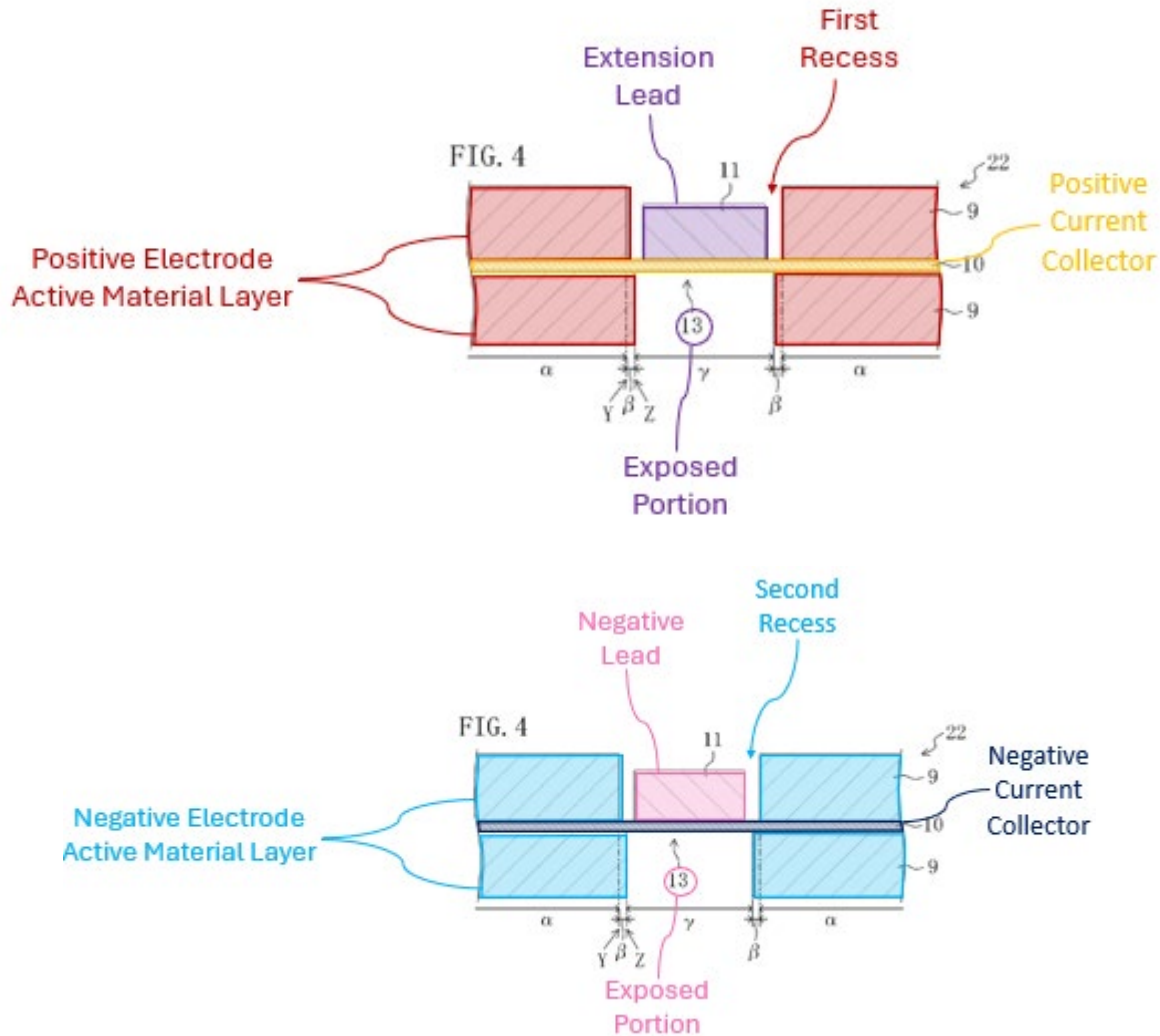
A POSA is presumed to be aware of all pertinent art. The POSA possesses the “understandings and knowledge reflected in the prior art” and thinks along conventional wisdom. *See Abbott Lab ’ys v. Andrx Pharms., Inc.*, 452 F.3d 1331, 1336 (Fed. Cir. 2006).

For the ’330 patent, a POSA at the time of the alleged invention would have had a Bachelor’s Degree in Physics or an Engineering field relevant to battery technology (e.g., Electrical or Mechanical Engineering) and at least two years of industry experience in lithium-ion battery manufacturing and/or design. EX1003, ¶¶[0027]-[0029].

V. BACKGROUND OF THE ART

Conventional lithium-ion batteries include a cathode and an anode immersed in an electrolyte and separated by a separator. EX1003, ¶¶[0031], [0034]-[0035]. Both the cathode and the anode typically include a metal current collector coated with an active material layer—such as a lithium composite oxide on a positive electrode foil for the cathode and graphite on a negative electrode foil for the anode.

Id., ¶¶[0032]-[0033]. In each case, an electrode lead is attached to a portion of the electrode plate that is not coated with active material, as shown below. *Id.*

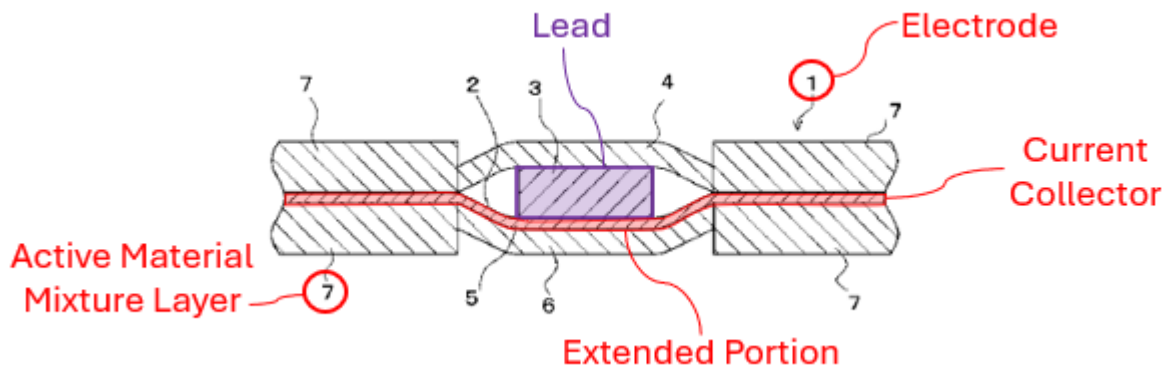


EX1005, FIG. 4 (annotated).

Lead tabs can introduce irregularities along an electrode's profile, which can create stress when the electrodes are wound during manufacturing or subjected to external forces. EX1003, ¶¶[0037]-[0038]. While attaching a lead tab to the current collector that does not protrude beyond the height of the active material layer can minimize these profile irregularities, reducing the size of the lead tab increases

internal resistance to current flow between the electrode and the battery terminal.

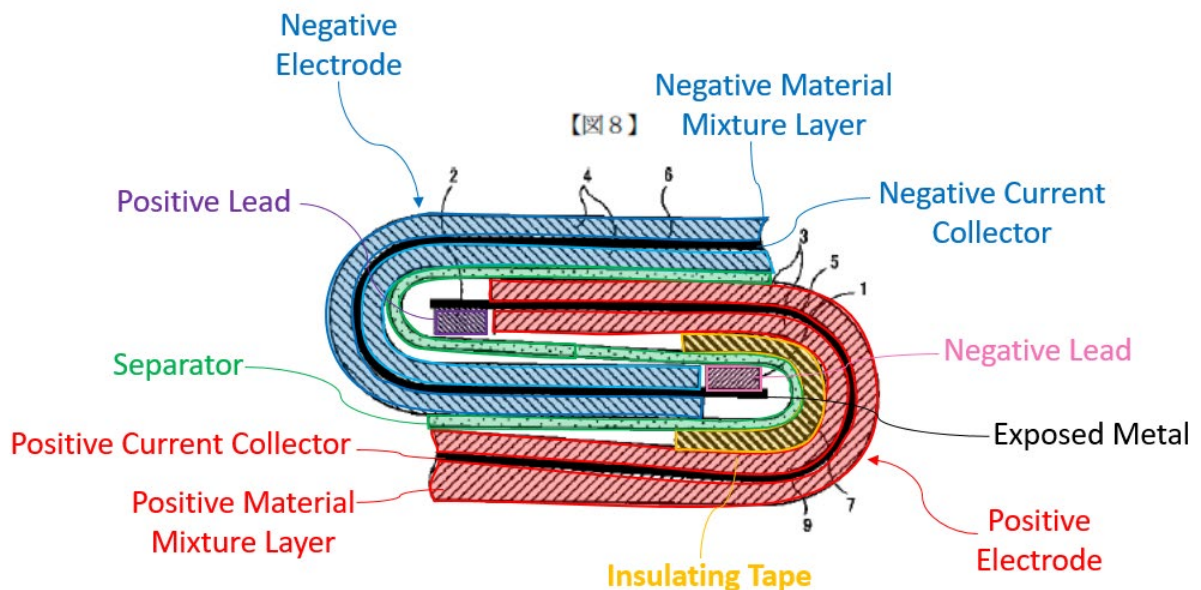
Id., ¶[0038]. To address these competing concerns, a known approach was to leave both surfaces of the exposed portion of the current collector free from active material and deflect the exposed portion in a direction opposite the lead-attachment surface, as shown below. EX1007, ¶[0026]-[0028]. This configuration provides additional space to accommodate a larger lead tab that remains below the active material layer, thereby improving current flow while enhancing the electrode's mechanical reliability. EX1003, ¶[0036], [0039].



EX1007, FIG. 3 (annotated).

Lithium-ion batteries can overheat or fail if internal components are not adequately protected from chemical or mechanical issues. EX1003, ¶[0040]-[0043]; EX1039, 27:4-28:2. For example, unintended lithium plating, deposition, and precipitation (collectively, “lithium plating”) can cause short circuits between the cathode and anode. EX1009, ¶[0002]; EX1016, ¶[0010]; EX1019, 1318; EX1021, 242; EX1022, 47; EX1023, 201. To mitigate these risks, it was known to

incorporate internal protective layers that shield conductive surfaces from active materials. *See generally* EX1006; EX1008-EX1018; EX1039, 21:4-16, 28:3-7, 30:13-24. These layers are positioned within wound batteries to address safety and performance concerns, including short-circuiting, lithium plating, and thermal expansion. EX1003, ¶¶[0044]-[0077].



EX1006, FIG. 9 (annotated).

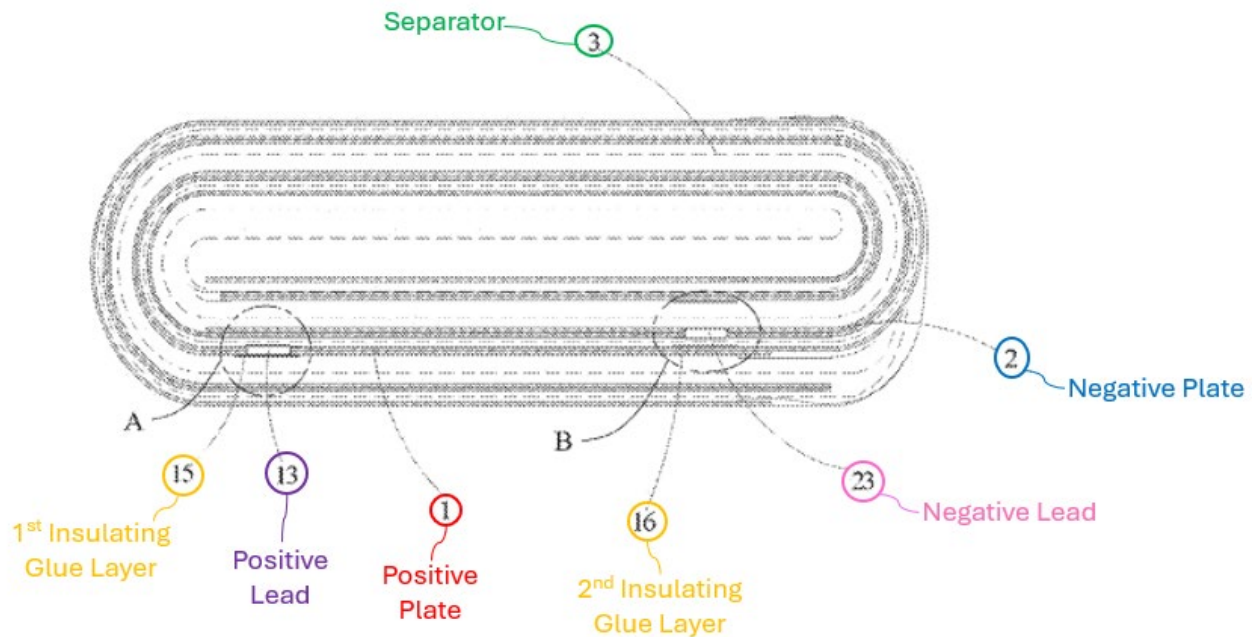
VI. THE '330 PATENT

The '330 patent claims to have invented a lithium-ion battery that improves the “energy density of the lithium-ion battery” by having the positive and negative leads “entirely seated” in the electrodes’ recess. EX1001, 2:64-3:8. The '330 patent claims a known technique—extending the exposed portion of the current collector in a direction opposite the surface attached to the lead—to “not induce thickness increase[s]” in the electrodes’ profile. EX1001, 3:2-7; EX1003, ¶¶[0079]-[0087],

[0093]. This technique was known in the art a decade before the '330 patent, as evidenced, for example, by Kodama. EX1003, ¶¶[0039], [0115]-[0121], [0145]-[0149]; EX1007, ¶¶[0018], [0028].

A. Specification

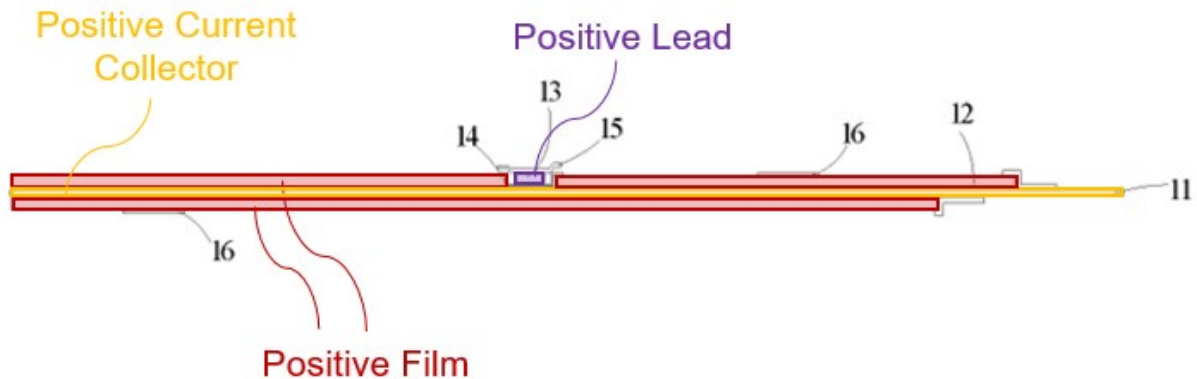
The '330 patent discloses a lithium-ion battery that “includes a positive plate 1, a negative plate 2, a separator 3 disposed between the positive plate 1 and the negative plate 2, and electrolyte.” EX1001, 5:8-13; EX1003, ¶¶[0079]-[0081].



EX1001, FIG. 5a (annotated).

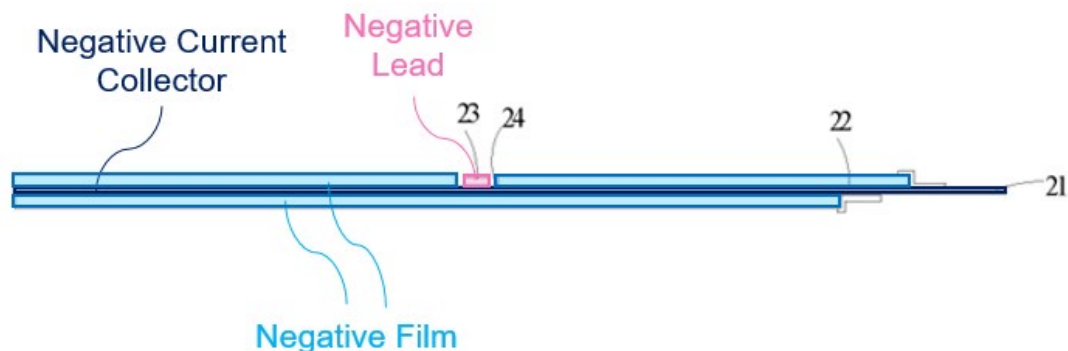
The “positive plate 1 includes a positive current collector 11, a positive film 12 provided on the positive current collector 11, and a positive lead 13,” shown below. EX1001, 5:13-15. A portion of positive current collector 11 is exposed by

“defin[ing] a first recess 14” in positive film 12, where positive lead 13 is “seated” on positive current collector 11. EX1001, 5:18-19; EX1003, ¶[0082].



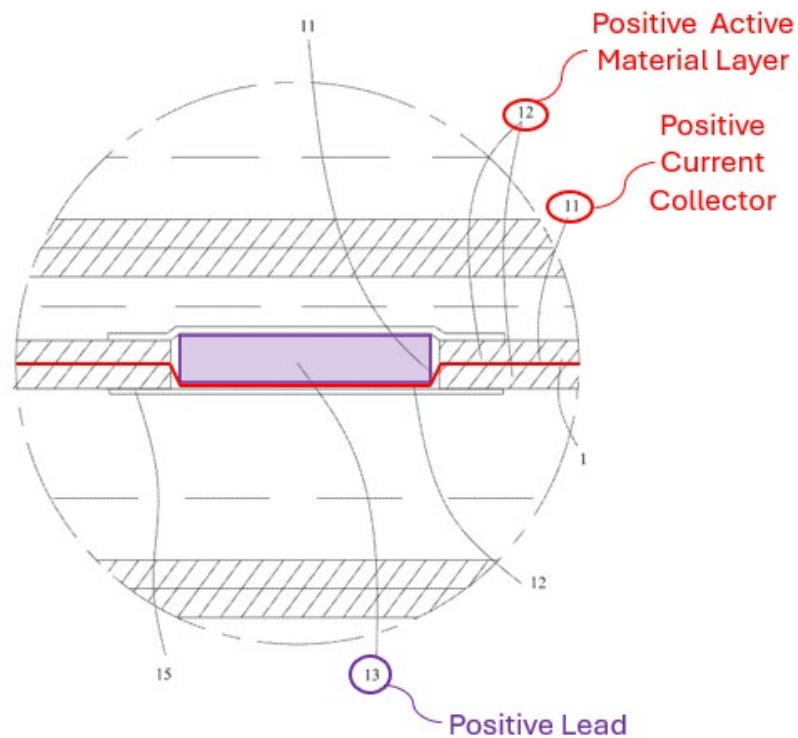
EX1001, FIG. 1 (annotated).

“[N]egative plate 2 includes a negative current collector 21, a negative film 22 provided on the negative current collector 21, and a negative lead 23,” shown below. EX1001, 5:16-17. A portion of negative current collector 21 is also exposed by “defin[ing] a second recess 24” in negative film 22, where negative lead 23 is “seated” on negative current collector 21. EX1001, 5:19-21; EX1003, ¶[0083].

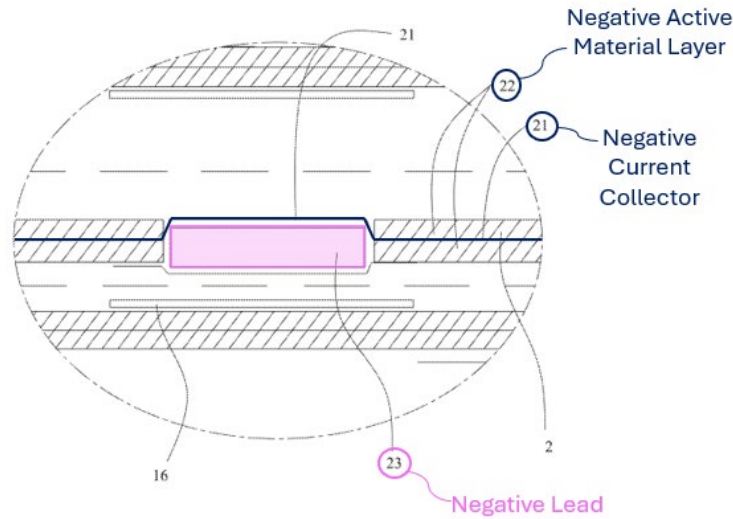


EX1001, FIG. 3 (annotated).

The '330 patent shows enlarged views of the lead connection to the electrodes in Figures 5B and 5C. EX1003, ¶[0084]. Figure 5B shows positive lead 13 connected to a surface of positive current collector 11 facing the battery's center, where the exposed portion of positive current collector 11 extends away from the battery's center. EX1001, FIG. 5B. Figure 5B shows negative lead 23 connected to a surface of negative current collector 21 facing away from the battery's center, where the exposed portion of negative current collector 21 extends toward the battery's center. EX1001, FIG. 5C; EX1003, ¶[0084].

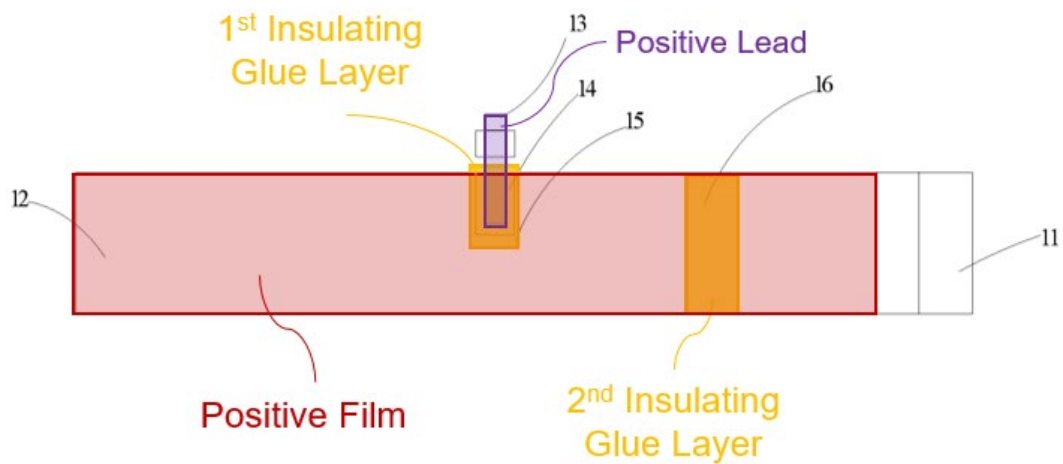


EX1001, FIG. 5B (annotated).



EX1001, FIG. 5C (annotated).

To prevent short-circuiting and lithium precipitation, the '330 patent describes pasting a first insulating layer 15 on the upper and lower surfaces of positive lead 13 and a second insulating layer 16 on the surface of positive film 12 that is opposite second recess 24. EX1001, 3:57-65, 5:22-26; EX1003, ¶¶[0085]-[0087].



EX1001, FIG. 2 (annotated).

Extending exposed current collector portions to accommodate lead tabs and insulating the lead connections in lithium-ion batteries were well known. EX1003, ¶¶[0188]-[0205].

B. Prosecution History

The application that issued as the '330 patent was filed as Application No. 18/532,841 (the '841 application) on December 7, 2023. EX1002, 322-68. Claims 1-20 as originally filed were similar to the issued (presently challenged) claims. EX1002, 359-363; EX1003, ¶[0088].

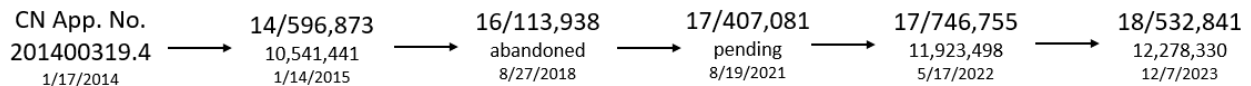
The Office issued a single Office Action during prosecution. The Examiner rejected independent claims 1 and 11 as anticipated by Japanese Patent Application Publication JP 2014-225326 to Sugita. EX1002, 58-68; EX1003, ¶[0089].

In response, Patent Owner made only minor editorial amendments to claims 1 and 11. EX1002, 44-54. Patent Owner argued that Sugita fails to disclose or suggest “a portion of the negative current collector where the negative lead is disposed extends towards the center of the battery.” EX1002, 51. According to Patent Owner, Sugita’s negative electrode includes an active substance layer on the side of the negative current collector opposite the negative tab, which purportedly prevents the negative current collector from extending toward the center of the battery as claimed. EX1002, 52; EX1003, ¶[0090].

Subsequently, the Office issued a Notice of Allowance, noting the cited art disclosed “anode and cathode leads” that “are disposed on current collector surfaces that extend towards and face away from the center of the battery,” but stating that “there is no teaching or suggestion of accommodating recesses that would correspond to such positions or be combined with such positions as required by the claims.” EX1002, 20; EX1003, ¶¶[0091]–[0092]. However, having portions of current collectors extend away from or toward the battery’s center to accommodate a lead tab was known, as evidenced below. EX1007, ¶¶[0026]–[0028].

C. Priority Claim

The ’330 patent claims priority to January 17, 2014, through a chain of non-provisional and foreign applications.



Notably, none of these applications mentions the purported patentable feature “a portion of the negative current collector where the negative lead is disposed extends towards the center of the battery.” *See generally* EX1028; EX1029; EX1030; EX1031. Nor do the original figures label any portion of the current collector extending toward or away from the battery’s center. *Id.* The claim language directed to the extended current collector portion does not appear in any application prior to the ’841 application that became the ’330 patent.

It appears that Patent Owner draws support for the claimed feature from Figures 5B and 5C—but notably, these Figures were never included in the parent applications. *See* EX1028; EX1029; EX1030; EX1031. Figures 5B and 5C purport to be enlarged views of electrode-lead connections in the battery shown in Figure 5. The extended portions of the current collectors are not labeled in Figure 5, and the parent applications do not identify or describe these structures.

VII. CLAIM CONSTRUCTION

In IPR, claims are “construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). Claim terms must be given their ordinary and customary meaning as understood by a POSA at the time of the invention, in light of the specification and prosecution history. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (*en banc*); 83 Fed. Reg. 51,340 (Oct. 11, 2018).

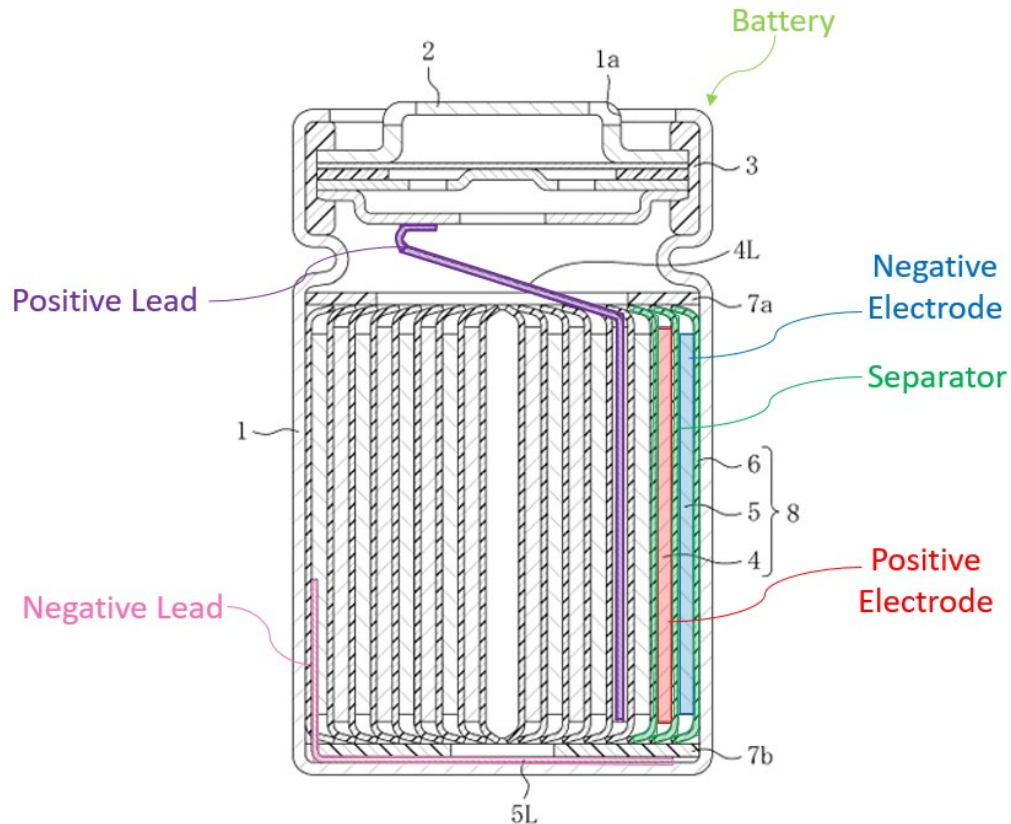
Without waiver, Petitioner does not believe any claim terms require specific construction and thus should receive their plain and ordinary meaning, in the context of the ’330 patent specification, under *Phillips*.

VIII. APPLIED REFERENCES

A. Sato

Sato discloses a lithium-ion battery containing similar materials, wound structure, and electric lead connections, as recited in the ’330 patent claims. EX1005, ¶¶[0027]-[0034]; EX1003, ¶¶[0094]-[0095]. As shown in Figure 1 below, Sato’s

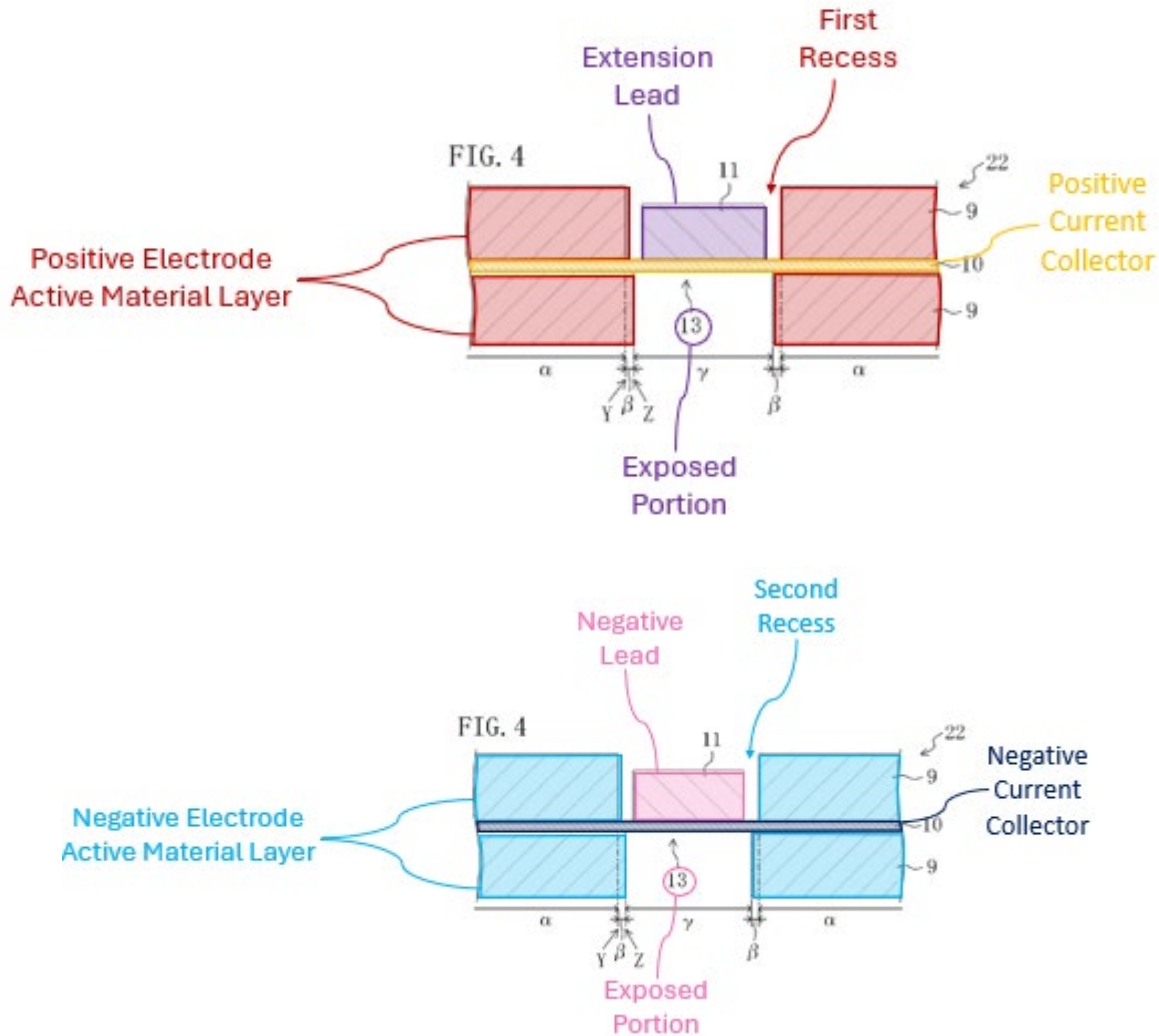
“electrode group 8 includes: a positive electrode plate 4; a negative electrode plate 5; and a porous insulating layer (i.e., a separator) 6.” EX1005, ¶[0030].



EX1005, FIG. 1 (annotated).

Sato discloses that “at least one of the positive electrode plate 4 and the negative electrode plate 5” defines a recess (exposed portion 13) where “the mixture layer is not formed on one surface of the current collector connected to the lead (i.e., a first surface) and on the other surface (i.e., a second surface) of the current collector.” EX1005, ¶[0036], *see also* ¶[0094]. A recess formed in mixture layer 9 to accommodate lead 11 on current collector 10 is shown below in Sato’s Figure 4. EX1005, ¶¶[0035]-[0044]. A POSA would have understood that the arrangement of

mixture layer 9 and extension lead 11 on current collector 10 in Figure 4 represents the mixture layer and lead on the current collectors of both positive electrode plate 4 and negative electrode plate 5 shown in Figure 2. EX1003, ¶¶[0096]-[0098].



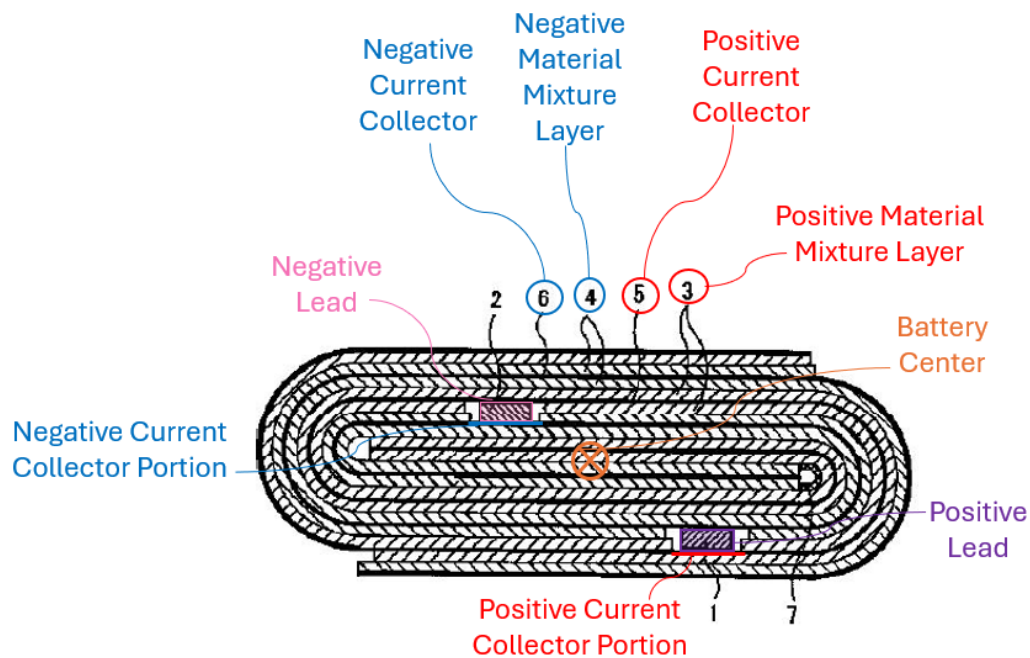
EX1005, FIG. 4 (annotated).

A top surface of Sato's positive lead is provided with an insulating layer (polypropylene adhesive tape). EX1005, ¶[0113]; EX1003, ¶[0099]. Sato places an additional insulating tape on "the positive electrode surface facing the negative electrode lead...in order to prevent lithium deposition." EX1005, ¶[0137]. Sato's

additional insulating tape is attached to a portion of the positive electrode's active material. EX1005, ¶[0148]; EX1003, ¶[0099].

B. Takemura

Takemura discloses multiple battery embodiments with similar fabrication attributes as Sato and the '330 patent. EX1003, ¶[0100]-[0101]. Takemura's battery shown in Figure 4 places a negative lead 2 on a surface of a negative current collector 6 facing away from the battery center; and a positive lead 1 on a surface of a positive current collector 5 facing toward the battery center. EX1006, ¶[0003], FIGS. 4, 8-9; EX1003, ¶[0102]-[0104].

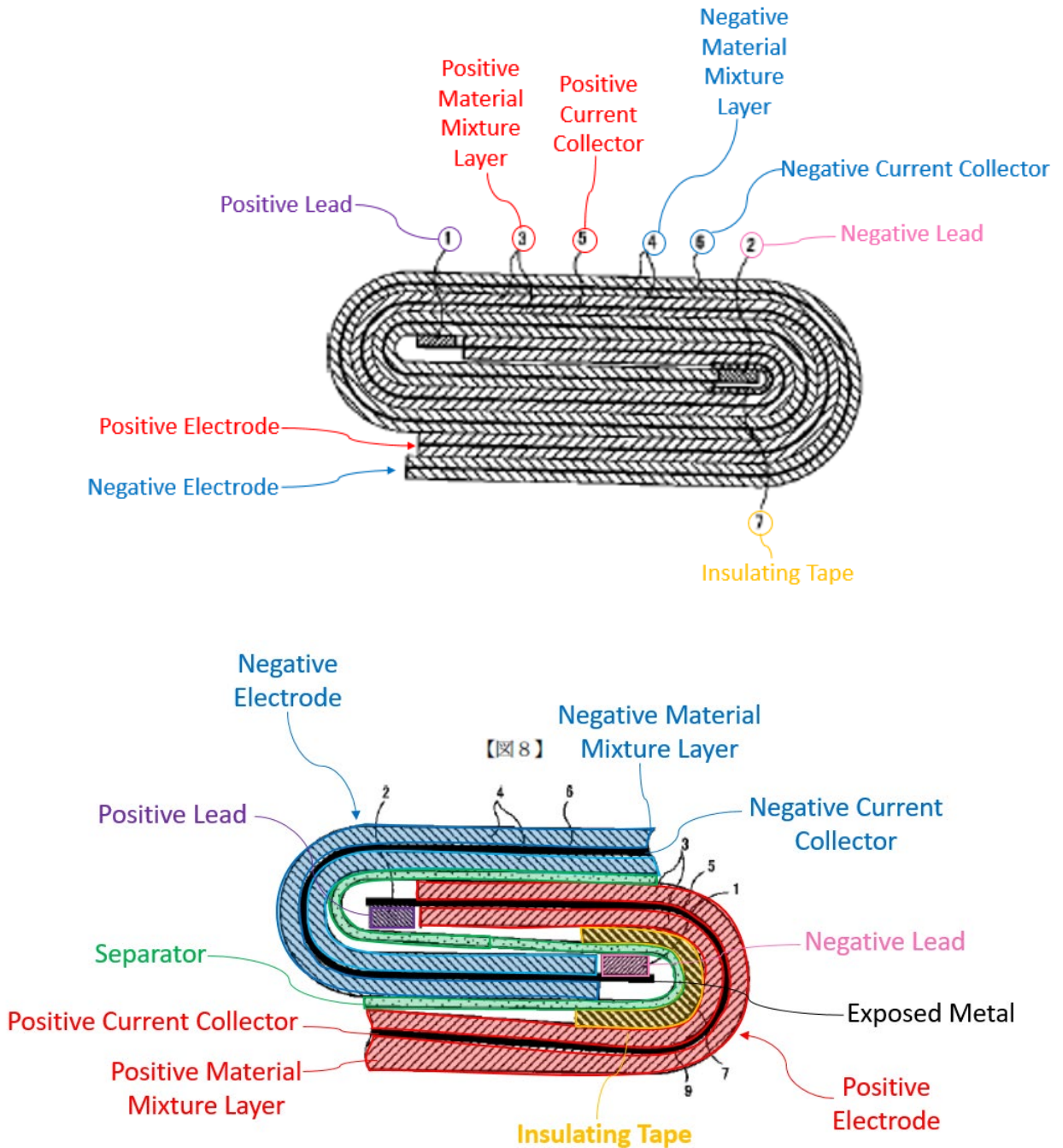


EX1006, FIG. 4 (annotated).

In another battery embodiment shown in Figures 8 and 9, Takemura places an insulating tape 7 on the positive active material 3 adjacent to a negative electrode

current collecting lead 2 and bare portion of the negative current collector 6.

EX1006, ¶[0003]; EX1003, ¶[0105].

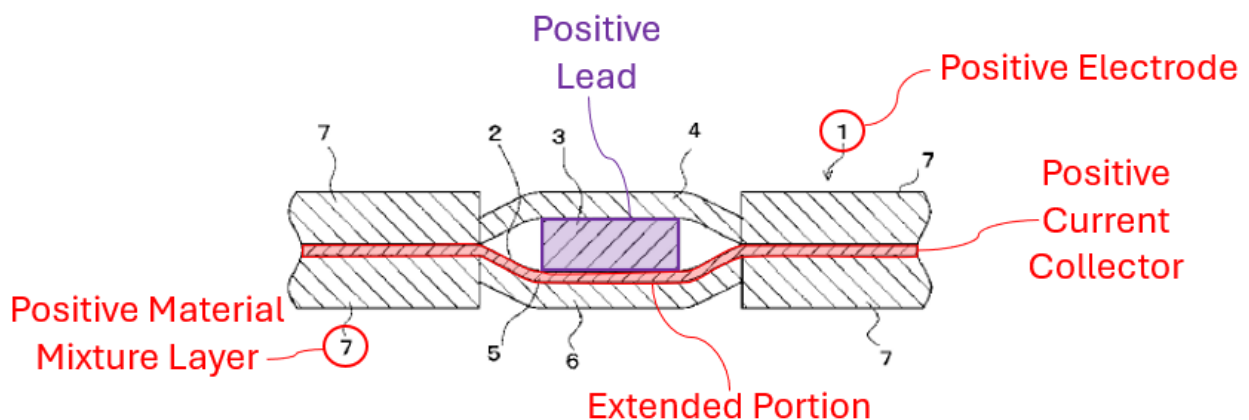


EX1006, FIGS. 8, 9 (annotated).

Locating insulating glue layer 7 around the negative lead 2 prevents short-circuiting caused by lithium plating on the negative current collector's exposed metal. EX1006, ¶[0008]; EX1003, ¶[0105].

C. Kodama

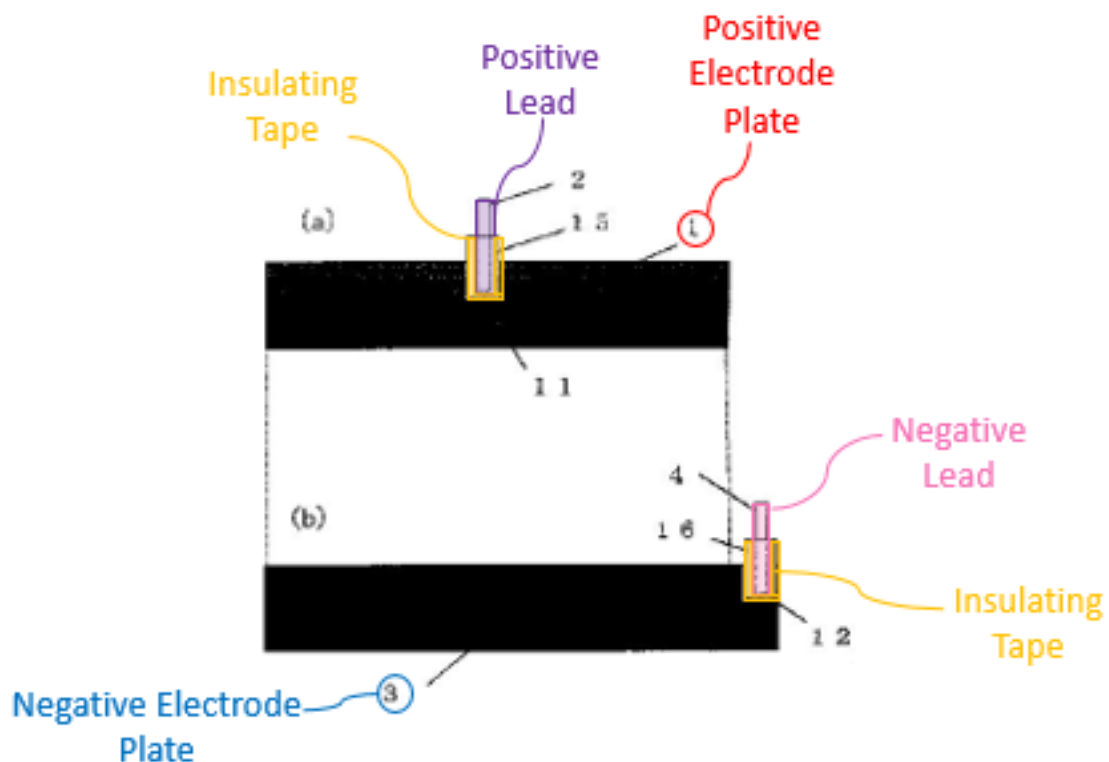
Kodama discloses a “lithium laminated battery” similar to Sato, Takemura, and the '330 patent. EX1007, ¶[0031]; EX1003, ¶¶[0106]-[0107]. Kodama's positive electrode 1 “has uncoated portions 2 of the positive electrode mixture 7 on both sides near the center of the longitudinal direction of the positive electrode 1.” EX1007, ¶[0026]. Kodama's “positive electrode tab 3 is welded to these uncoated portions 2.” EX1007, ¶[0026]. Kodama teaches extending (e.g., deflecting or indenting) uncoated portion 2 of positive electrode 1 in a direction opposite the lead tab-attachment surface—the purportedly patentable feature—as shown below in Figure 3, to provide “a space equal to the thickness of both sides of the mixture” for the tab connection. EX1007, ¶[0028]; EX1003, ¶[0108].



EX1007, FIG. 3 (annotated).

D. Nakamura

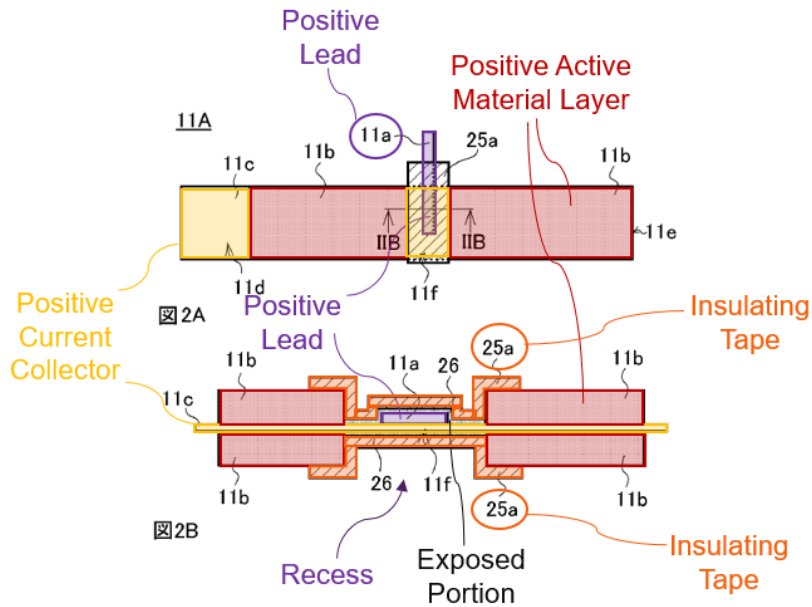
Nakamura discloses a “lithium secondary battery” similar to Sato, Takemura, Kodama, and the '330 patent. EX1012, ¶[0007]; EX1003, ¶¶[0209]-[0210]. A positive electrode plate 1 is formed by a positive electrode current collector and a positive active material applied to the positive current collector's surfaces. EX1012, ¶[0012]. Likewise, negative electrode plate 3 is formed by a negative electrode current collector and a negative active material applied to the negative current collector's surfaces. EX1012, ¶[0029]. A positive electrode lead 2 is connected to positive electrode plate 1 and a negative electrode lead 4 is connected to negative electrode plate 3. EX1012, ¶¶[0026]-[0027], [0034]; EX1003, ¶¶[0210]-[0212].



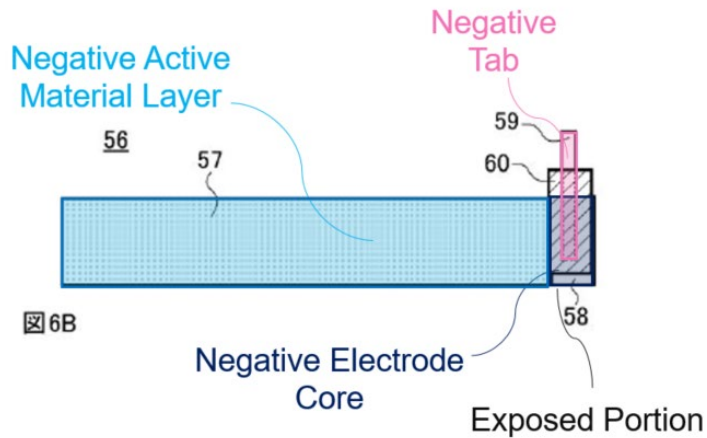
EX1012, FIG. 1 (annotated).

E. Kobayashi

Kobayashi discloses a lithium-ion, non-aqueous electrolyte secondary battery similar to Sato, Takemura, Nakamura, and the '330 patent. EX1008, ¶[0013]; EX1003, ¶¶[0250]-[0251]. Kobayashi's battery has a positive electrode plate 11A with positive electrode core 11c and a positive active material 11b; a negative electrode plate 56 with a negative electrode core 58 and a negative active material 57; and a separator 13 disposed between the plates. EX1008, ¶[0007], [0013], [0028], [0034]-[0035], FIGs. 2A-2B, 6B. The positive electrode plate 11A has an exposed portion 11f of metal foil and a positive current collecting tab 11a attached to exposed portion 11f. EX1008, ¶¶[0013], [0034]. Similarly, negative electrode plate 56 has an exposed portion 58 of metal foil and a negative current collecting tab 59 attached to exposed portion 58 of the metal foil. EX1008, ¶¶[0007], [0013]; EX1003, ¶[0252].



EX1008, FIGs. 2A-2B (annotated).



EX1008, FIG. 6B (annotated).

To protect exposed portion 11f from short-circuiting, Kobayashi places tapes 25a on the top and bottom surface of exposed portion 11f of positive electrode plate 11A. EX1008, ¶¶[0034]-[0035], FIGs. 2A-2B; EX1003, ¶[0253].

IX. GROUND 1: CLAIMS 1-3, 6, 8, 10-13, 16, AND 18 WOULD HAVE BEEN OBVIOUS IN VIEW OF SATO, TAKEMURA, AND KODAMA.

A. Motivation to Combine Takemura with Sato and Kodama

In view of Takemura, a POSA would have been motivated to locate Sato's negative lead on a surface of the negative current collector facing away from the center of the battery and locate the positive lead on a surface of the positive current collector facing a center of the battery to provide a compact electrode assembly. EX1003, ¶¶[0109]-[0112]; EX1006, ¶[0022], FIG. 4.

Sato, Takemura, Kodama, and the '330 patent are from the same field of endeavor—lithium-ion batteries. EX1001, Abstract; EX1005, ¶¶[0010], [0113]; EX1006, ¶[0006]; EX1007, ¶¶[0001], [0017]; EX1003, ¶[0109]. Similar to Sato, Kodama, and the '330 patent, Takemura's battery shown in Figure 4 includes a recess formed in a middle portion of the positive electrode to accommodate a positive lead 1; and a recess in a middle portion of the negative electrode to accommodate a negative lead 2. EX1006, ¶[0022], FIG. 4. Takemura further discloses a specific orientation of those leads relative to the battery center: the negative lead is disposed on a surface of the negative current collector facing away from the center of the battery, while the positive lead is disposed on a surface of the positive current collector facing toward the center of the battery. EX1003, ¶[0109].

Although Sato discloses recessed positive and negative leads attached to the respective current collectors, Sato does not specify which surface of each current

collector the lead is attached to relative to the center of the battery. In Sato (and generally any other battery), as would have been readily understood by a POSA, there are only a finite number of predictable options for attaching a lead to a current collector: (1) to the current collector surface facing toward the battery's center, or (2) to the current collector surface facing away from the battery's center. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007); EX1003, ¶[0110]. Where, as here, the prior art provides a limited set of known alternatives and teaches the suitability of one of those alternatives for the same application, selecting that alternative is a matter of routine design choice well within the level of ordinary skill. *KSR*, 550 U.S. at 421; *Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339-1341 (Fed. Cir. 2020) (holding that where only two known, finite, predictable options exist, selecting between them is an obvious design choice). EX1003, ¶[0110].

Moreover, a POSA would have been motivated to implement the lead orientation explicitly disclosed in Takemura with Sato's recessed-lead structure because Takemura demonstrates that this arrangement is compatible with recessed electrodes. EX1006, ¶¶[0022]-[0024]; EX1003, ¶[0111]. Takemura's disclosure confirms that attaching the negative lead to the outward-facing surface of the negative current collector and attaching the positive lead to the inward-facing surface of the positive current collector is a viable and predictable configuration that can be readily implemented without meaningfully altering the fundamental electrode

construction taught by Sato. EX1003, ¶[0111]. Thus, this modification would have simply been applying a known technique (orienting the negative tab to face away from the battery's center and the positive tab to face toward the battery's center) to a known device (Sato's battery) to yield predictable results (placing lead tabs in a known orientation). EX1003, ¶[0111]; *KSR*, 550 U.S. at 417.

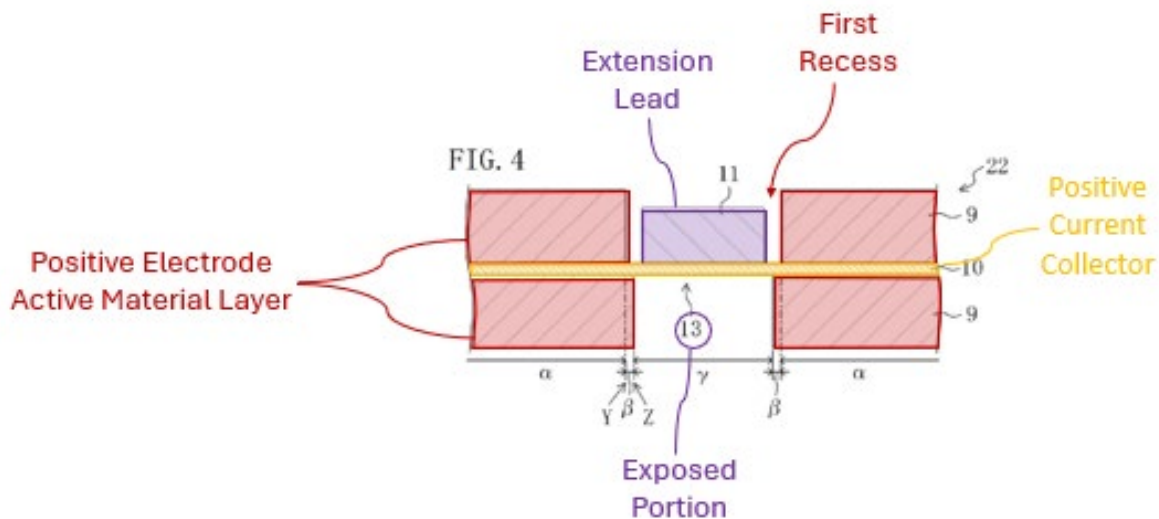
A POSA would have also had a reasonable expectation of success combining Takemura's teachings with Sato (and Kodama). EX1003, ¶[0112]. Because Takemura's lead orientation is implemented in a similar type of electrode structure disclosed by Sato—namely, recessed positive and negative electrodes coupled to planar current collectors—a POSA would have understood that applying Takemura's lead placement to Sato's design would not require significant changes to electrode geometry, materials, or manufacturing processes. EX1003, ¶[0111]-[0112]. Takemura demonstrates that the claimed orientation operates successfully in a comparable battery configuration without any impact on battery performance, reliability or safety. Thus, a POSA would have reasonably expected that including Takemura's lead-orientation teachings in Sato would function as intended and yield a predictable, operable battery assembly. EX1003, ¶[0112].

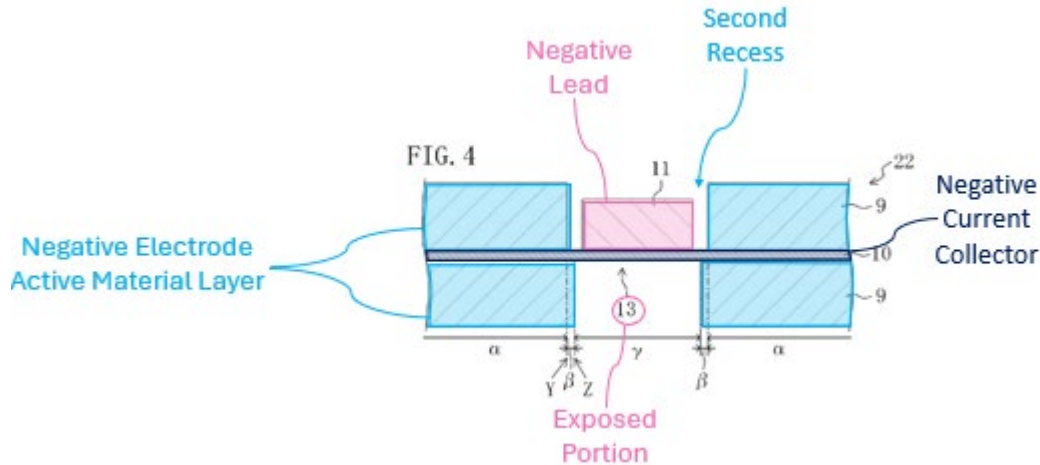
B. Motivation to Combine Kodama with Sato and Takemura

In view of Kodama, a POSA would have been motivated to extend the exposed portion of Sato's negative current collector in a direction opposite the surface

connected to the lead tab to accommodate a thicker lead tab while maintaining a smooth electrode profile. EX1003, ¶¶[0113]-[0121].

Sato, Takemura, Kodama, and the '330 patent are from the same field of endeavor—lithium-ion secondary batteries. EX1001, Abstract; EX1005, ¶¶[0010], [0113]; EX1006, ¶[0006]; EX1007, ¶¶[0001], [0017]; EX1003, ¶[0113]. Sato, Takemura, Kodama, and the '330 patent disclose recesses—an exposed portion of the current collector without active material—formed in a middle portion of the electrode to receive a lead tab. EX1003, ¶[0113]; EX1005, ¶¶[0036]-[0039]; EX1006, ¶[0022]; EX1007, ¶[0028]. Sato recognizes concerns about stress concentrations at the lead connections in the middle portion of the electrode due to abrupt thickness changes between the active material layers and the exposed current collector. EX1005, ¶[0024]. To minimize this transition, Sato discloses staggering the edges of the active material layers located on opposite sides of the current collector. EX1005, ¶[0040].

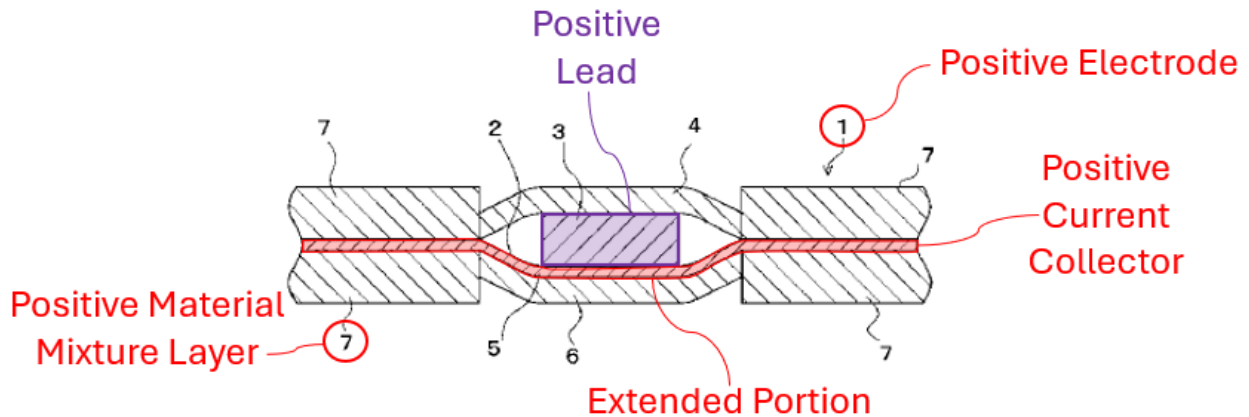




EX1005, FIG. 4 (annotated).

Sato does not expressly disclose extending the exposed portion of the current collector in a direction opposite the current collector surface attached to the lead tab. Absent such an extension, the thickness of the lead tab is typically minimized to prevent the tab from protruding above the active material layer, which in turn limits the available cross-sectional area for current flow from the electrode to the battery's terminal. EX1003, ¶[0114]. Conversely, increasing the lead tab's thickness to improve current flow would cause the tab to protrude above the active material layer, creating localized discontinuities that concentrate stress during winding and flattening operations that can damage the separator. EX1003, ¶[0114]. Thus, a POSA would have recognized the desirability for a lead-attachment configuration that accommodates a thicker lead tab while minimizing discontinuities in the electrode profile. EX1003, ¶[0114].

Kodama provided a known way to secure a lead tab approximately as thick as the overall electrode—thicker than Sato’s disclosed lead tab—within a centrally-located recess while minimizing discontinuities along the electrode’s profile. EX1003, ¶[0115]; EX1007, ¶¶[0015], [0018], [0028] (“[T]he tab 3 portion of the positive electrode 1 has the mixture removed, so a space equal to the thickness of both sides of the mixture is secured.”) As shown below in Figure 3, Kodama’s electrode 1 includes a recess—a non-coated portion 2 of current collector 5—connected to lead tab 3. The current collector’s non-coated portion 2 extends in a direction opposite the surface attached to lead tab 3, allowing lead tab 3 to have a thickness that is approximately equal to the overall thickness of electrode 1 without protruding above the active material layer 7. EX1007, ¶¶[0015], [0018], [0028]. By accommodating a thicker lead tab within an indented recess of the current collector, Kodama reduces electrical resistance while avoiding abrupt thickness changes along the electrode’s surface. EX1003, ¶[0115]; EX1033, ¶[0002]; EX1034, ¶[0013]; EX1036; ¶[0077]. Increasing the lead tab’s thickness also enables it to better withstand deformation, fatigue, and failure under manufacturing and operational stresses, thereby enhancing overall battery reliability. EX1003, ¶[0116]; EX1035, ¶[0026].



EX1007, FIG. 3 (annotated).

In view of Kodama, a POSA would have recognized that extending Sato's exposed current-collector portion in a direction opposite the surface attached to the lead tab would allow Sato's electrode to employ a thicker lead tab while avoiding known disadvantages associated with tab protrusion above the active material layer. EX1003, ¶¶[0117]. Accommodating a thicker lead tab increases the available cross-sectional area for current flow and reduces resistive losses caused by tab heating. *Id.*, ¶¶[0116]-[0117]. Moreover, this modification would have prevented localized profile discontinuities, reduced mechanical stress during winding and flattening, and protected the separator from concentrated loading. *Id.* A POSA therefore would have been motivated to combine the teachings of Kodama's recessed lead tab configuration with Sato's electrodes to accommodate a thicker lead tab while maintaining a smooth electrode profile, thereby improving electrical performance, mechanical robustness, manufacturability, and reliability. *Id.*

Although Kodama expressly describes this configuration in the context of a positive electrode, a POSA would have readily understood that the same principles and advantages apply to recesses formed in the middle portion of negative electrodes as well. EX1003, ¶[0118]. Because negative electrodes in lithium-ion batteries are routinely constructed with the same basic layered structure (current collector with active material coatings) and are subject to the same manufacturing processes (e.g., winding and flattening), Kodama's technique would function in an analogous manner when applied to a negative electrode with a centrally-located lead tab, such as Sato's negative electrode. *Id.* The same issues (and solutions) addressed by Kodama—namely, accommodating thicker lead tabs while avoiding profile discontinuities and associated mechanical stresses—arise in both positive and negative electrodes in lithium-ion batteries. *Id.*, ¶¶[0118]-[0119]. Accordingly, a POSA would have been motivated to extend (e.g., deflect or indent) the exposed portion of Sato's negative current collector toward the battery center when the negative lead tab is facing away from the battery center to accommodate a thicker lead tab. *Id.* Similarly, a POSA would have also been motivated to extend (e.g., deflect or indent) the exposed portion of Sato's positive current collector away from the battery center when the positive lead tab is facing the battery center to accommodate a thicker lead tab. *Id.*

A POSA would have had a reasonable expectation of success in combining Kodama's teachings with Sato because this modification would not alter the

fundamental electrochemical operation of Sato's battery. EX1003, ¶[0120]. The same electrode materials, current collectors, separator, and electrolyte would be used, and the current collector would continue to perform its conventional current-collection function. *Id.* Thus, this modification represents the application of a known technique (extending the non-coated portion of the current collector in a direction opposite the lead tab) to a known device (Sato's battery) to yield predictable results (providing a more robust electrode with reduced internal resistance without producing discontinuities). *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 416-17 (2007); EX1003, ¶[0120]. Moreover, this modification would have been a simple substitution of one known element (an indented current collector) for another (flat current collector), obtaining the predictable result of reducing internal current resistance while maintaining a smooth electrode profile. EX1003, ¶[0120]; *KSR*, 550 U.S. at 417.

Furthermore, a POSA would have understood how to maintain the active material layers' staggered edges on Sato's current collector while extending the current collector's exposed portion in a direction opposite to the lead tab-attachment surface. EX1003, ¶[0121]. As shown in Figures 4 and 5, Sato recognizes that the width of the active material layer located on the surface of the current collector opposite to the lead tab may differ, provided that "the width of the no-mixture-layer portion on the surface connected to the lead is preferably larger than that of the no-mixture-layer portion on the surface opposite the surface connected to the lead."

EX1005, ¶[0043]. Thus, it would have been well within the level of ordinary skill in the art to make the active material layer opposite the lead tab wider than the active material layer adjacent to the lead tab, while still extending the exposed portion of Sato's current collector in a direction opposite the lead tab-attachment surface to preserve the staggered active material edge arrangement. EX1003, ¶[0121].

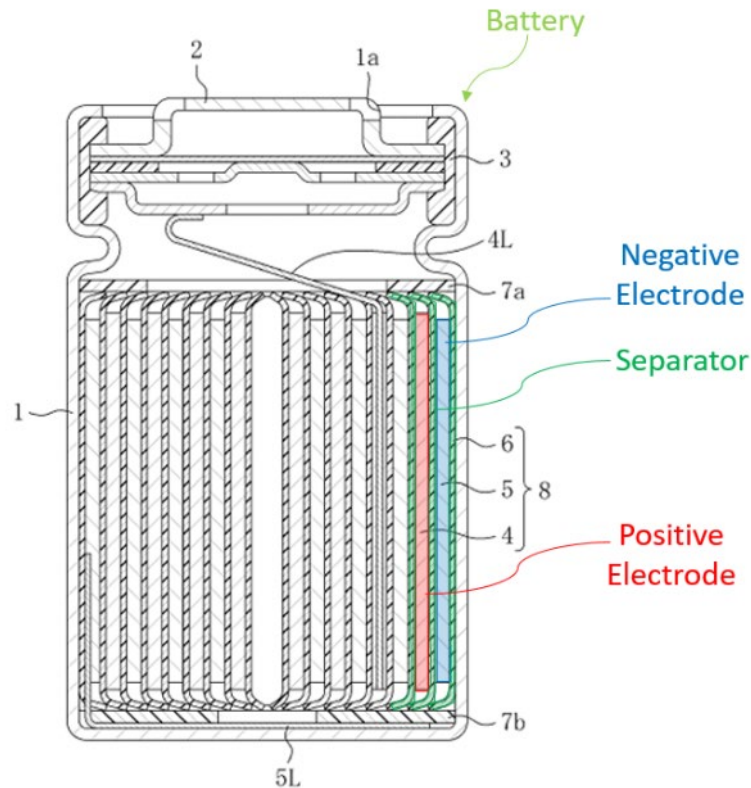
C. Independent Claims 1 and 11

1. [1.P]/[11.P] A lithium-ion battery, comprising:

Sato discloses a lithium-ion battery.¹ EX1005, ¶[0027]; EX1003, ¶[0122].

Sato discloses various examples of lithium-ion batteries, including Batteries 1-11 described, for example, in paragraphs [0099]-[0143]. Electrodes having dimensions as described for Sato's Battery 1 and Battery 8 are referred to herein for context. EX1003, ¶[0122].

¹ Whether or not the preambles are limiting, the prior art discloses them.

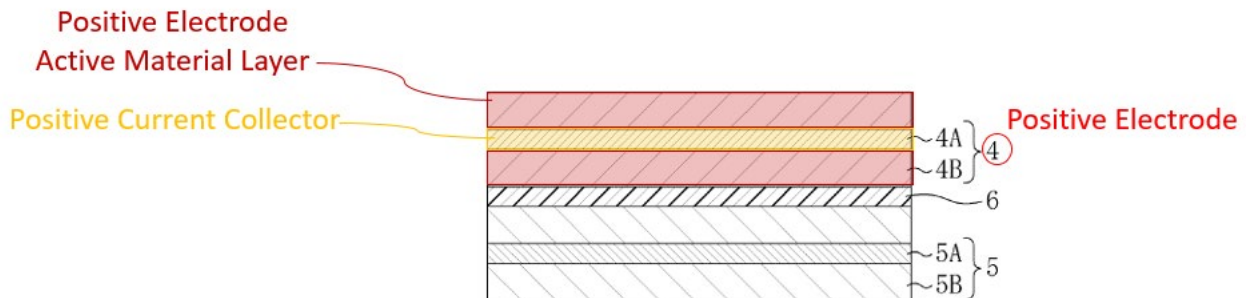


EX1005, FIG. 1 (annotated).

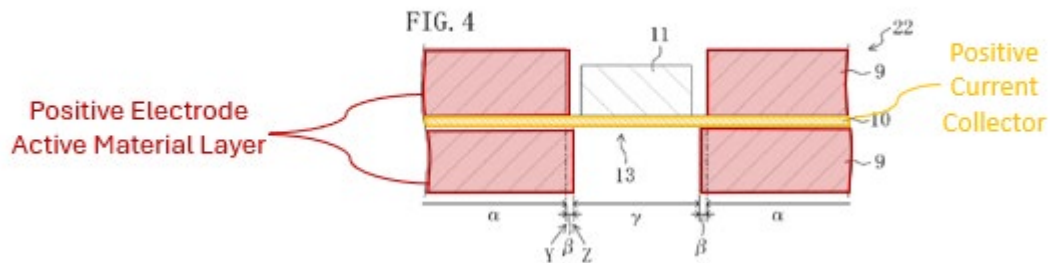
2. [1.A]/[11.A] a positive electrode comprising a positive current collector and a positive electrode active material layer [containing lithium cobalt oxide, wherein the positive electrode active material layer is / being] formed on the positive current collector, and

Sato discloses the recited “positive electrode” of claims 1 and 11 as positive electrode plate 4. EX1005, ¶[0030]. Sato discloses the recited “positive current collector” and “positive electrode active material layer” of claims 1 and 11 as a positive electrode current collector 4A/10 and electrode material mixture layer 4B/9,

respectively.² EX1005, ¶¶[0033], [0036]-[0040]. Sato's "electrode material mixture layer 4B is provided on each surface of the positive electrode current collector 4A." EX1005, ¶[0033]. With respect to claim 1, Sato's positive active material layer "contains a positive electrode active material (e.g., lithium composite oxide)." EX1005, ¶ [0051] ("Examples...include LiCoO_2 [lithium cobalt oxide]."), [0104], [0136]; EX1003, ¶¶[0123]-[0126].



² A POSA would have understood that current collector 10 (Figure 4) is representative of positive electrode current collector 4A and negative electrode current collector 5A (Figure 2). EX1003, ¶[0098]; EX1005, ¶¶[0036]-[0040]. A POSA would have also understood that electrode material mixture layer 9 is representative of positive electrode material mixture layer 4A and negative electrode material mixture layer 4B. EX1003, ¶[0098].



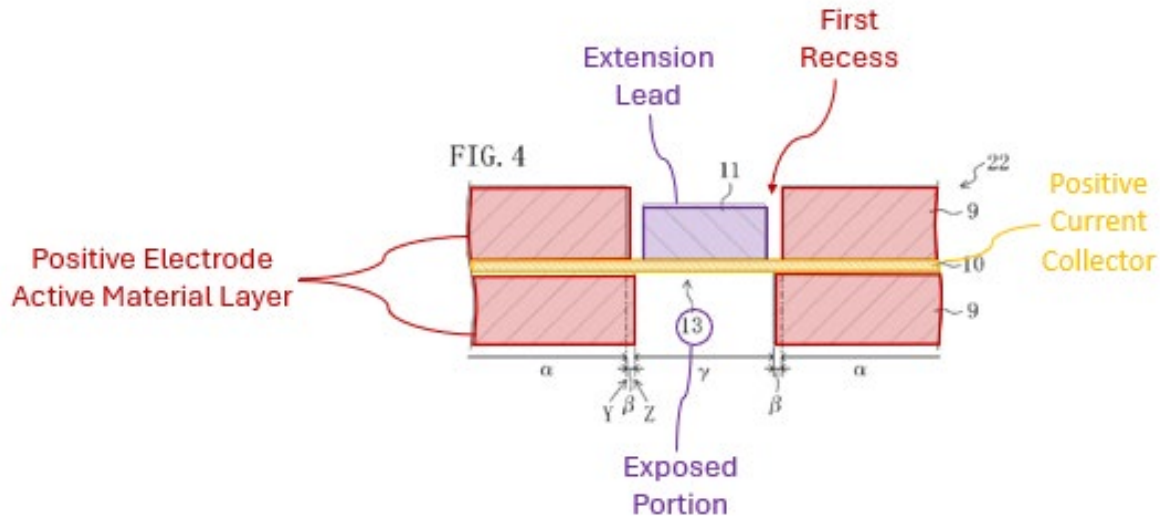
EX1005, FIGs. 2, 4 (annotated).

3. [1.B]/[11.B] [wherein] the positive electrode active material layer is provided with a first recess accommodating a positive lead being coupled with the positive current collector;

Sato provides the positive active material layer (4B/9) with a first recess with an exposed portion 13 defined where “the mixture layer 9 is not formed on each of both surfaces of the current collector 10.” EX1005, ¶[0039], *see also* ¶¶[0036]-[0040]. Sato’s positive lead is coupled to positive electrode 4 by an extension lead 11/4L “connected to one of the surfaces of the exposed portion” of current collector 10.³

³ A POSA would have understood that Sato’s extension lead 11 (Figure 4) is representative of a positive lead and a negative lead. EX1003, ¶[0098]; EX1005, ¶[0093] (“A lead is connected in order to take current and Voltage from the positive electrode plate 4 and the negative electrode plate 5. In this connection, a portion of the current collector to which the lead is attached needs to be exposed beforehand.”).

EX1005, ¶¶[0036], [0039]-[0040], [0093]-[0094], [0111]-[0113], [0136]; EX1003, ¶¶[0127]-[0129].

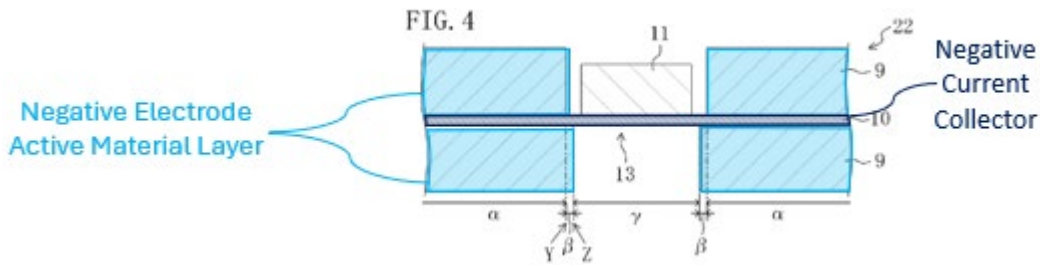
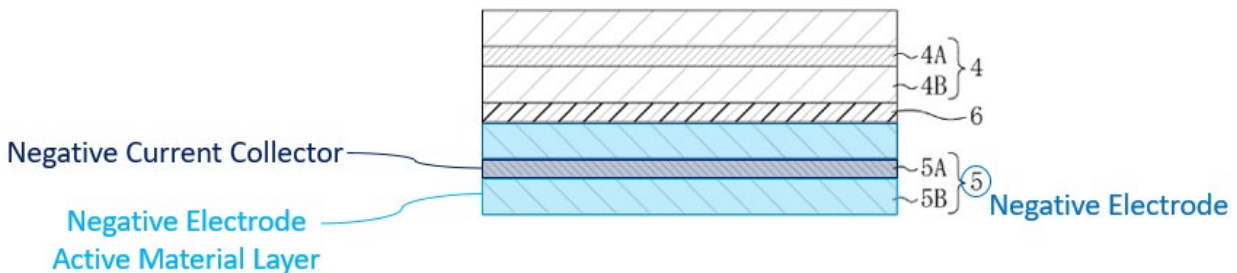


EX1005, FIG. 4 (annotated).

4. [1.C]/[11.C] a negative electrode comprising a negative current collector and a negative electrode active material layer [containing graphite or silicon, wherein the negative electrode active material layer is / being] formed on the negative current collector,

Sato discloses the recited “negative electrode” of claims 1 and 11 as negative electrode plate 5. EX1005, ¶[0030]. Sato discloses the recited “negative current collector” and “negative electrode active material layer” of claims 1 and 11, as a negative electrode current collector 5A/10 and a negative electrode material mixture layer 5B/9, respectively. EX1005, ¶¶[0034], [0036]-[0041]. Sato’s “negative electrode material mixture layer 5B is provided on each surface of the negative electrode current collector 5A.” EX1005, ¶[0034]. With respect to claim 1, Sato’s negative active material includes silicon or a carbon compound. EX1005, ¶[0066]

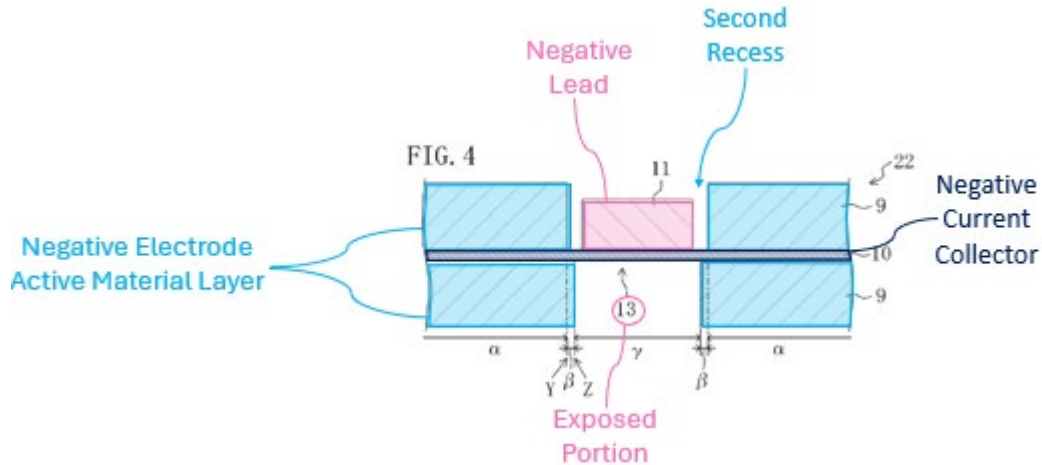
(“[N]egative electrode active material include[s]...a carbon material [and]...silicon compound.”); EX1003, ¶¶[0130]-[0133].



EX1005, FIGs. 2, 4 (annotated).

5. [1.D]/[11.D] [wherein] the negative electrode active material layer [is / being] provided with a second recess accommodating a negative lead being coupled with the negative current collector; and

Sato provides the negative active material layer (5B/9) with a second recess with exposed portion 13 defined where “the mixture layer 9 is not formed on each of both surfaces of the current collector 10.” EX1005, ¶[0039]. Sato’s negative lead is coupled to negative electrode 5 by an extension lead 11/5L “connected to one of the surfaces of the exposed portion” of current collector 10. EX1005, ¶¶[0039], [0093]-[0094], [0137]; EX1003, ¶¶[0134]-[0135].



EX1005, FIG. 4 (annotated).

To the extent Patent Owner contends that Sato does not disclose a specific battery embodiment having a first recess in the positive electrode and a second recess in the negative electrode, Sato expressly states the lead attachment position “is preferably located in the region from 1/4 to 3/4” of the electrode and “*at least one* of the positive electrode and the negative electrode satisfies [these] conditions for the lead attachment position.” EX1005, ¶[0094]. That is, *both* the positive and negative electrodes can have a recess for accommodating a lead. EX1003, ¶[0136]; EX1039, 127:23-128:11 (Mr. Kaschmitter admitting that Sato’s paragraph [0094] means “one or both” of the positive electrode and the negative electrode have a recess). This understanding is reinforced throughout Sato’s summary, detailed description, and claims, and would have been clear to a POSA. EX1005, ¶¶[0013], [0036], claim 6; EX1003, ¶[0136]; EX1039, 117:22-118:2, 121:14-19, 122:12-19 (acknowledging “at least one” in claim 6, ¶13, ¶36 means “one or both”). Thus, Sato discloses both a “first

recess” in the positive electrode and a “second recess” in the negative electrode, as claimed. EX1003, ¶[0137].

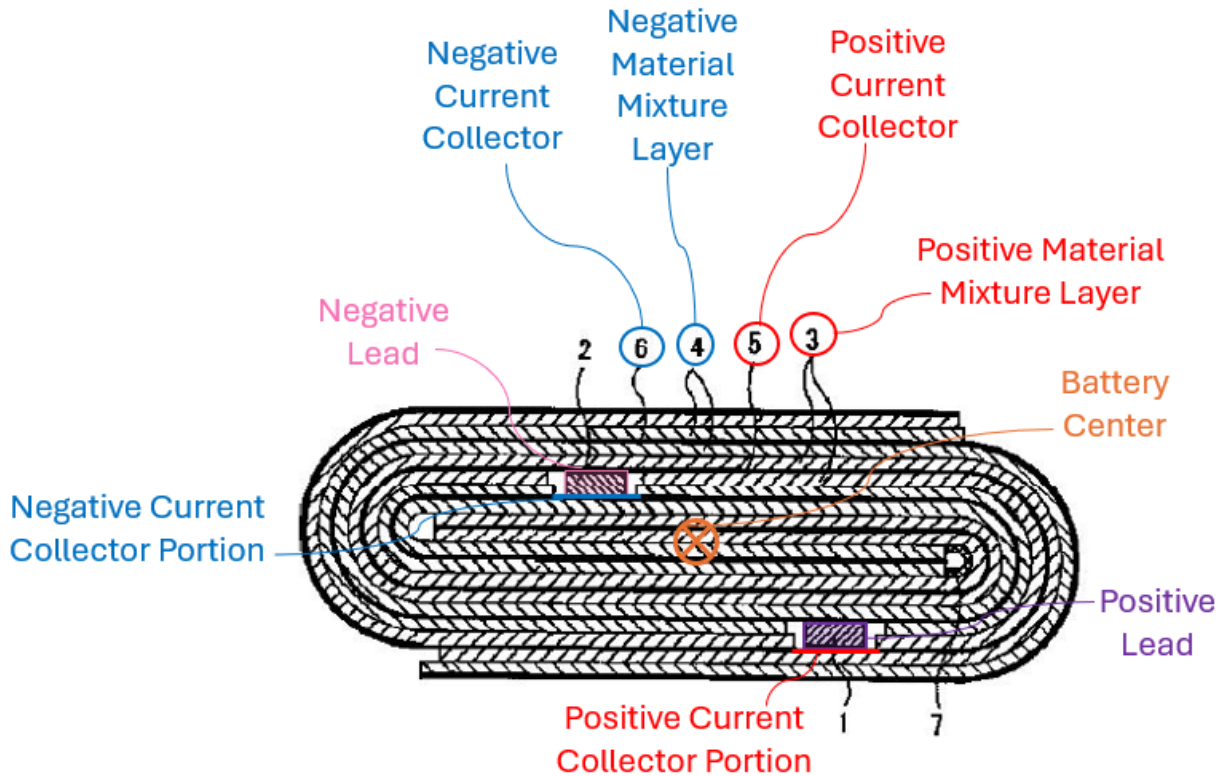
6. [1.E]/[11.E] the negative lead is disposed on a surface of the negative current collector facing away from the center of the battery; and

(a) Sato

Sato is silent about which surface of the negative current collector is attached to the negative lead relative to the direction of the battery’s center. EX1003, ¶[0138]. However, there are finite options for which way it can face (toward or away). EX1003, ¶[0138].

(b) Takemura

Takemura discloses a negative lead 2 disposed on a surface of the negative current collector 6 facing away from the center of the battery, as shown below in Figure 4. EX1006, ¶[0022]. A POSA would have understood Takemura’s configuration as one of two straightforward, conventional options for attaching a lead tab to a current collector—attachment on either the surface facing toward the battery’s center or the surface facing away from the battery’s center. EX1003, ¶¶[0139]-[0140].



EX1006, FIG. 4 (annotated).

(c) Sato-Takemura-Kodama Combination

Given the finite number of predictable solutions—attachment on one surface or the opposite surface—it would have been obvious to locate Sato’s negative lead on the negative current collector surface facing away from the center of the battery, as taught by Takemura and discussed in Section IX.A. EX1003, ¶[0141]. A POSA would have been motivated to implement the lead orientation disclosed in Figure 4 of Takemura with Sato’s battery because, for example, Takemura demonstrates that this arrangement is fully compatible with recessed electrodes of lithium-ion batteries. EX1003, ¶[0141]; EX1006, ¶¶[0022]-[0024]. A POSA would have had a reasonable expectation of success in doing so because this modification would not

alter the fundamental electrochemical operation of Sato's battery. EX1003,

¶¶[0142]-[0143].

7. **[1.F]/[11.F] a portion of the negative current collector where the negative lead is disposed extends towards the center of the battery;**

(a) Sato-Takemura

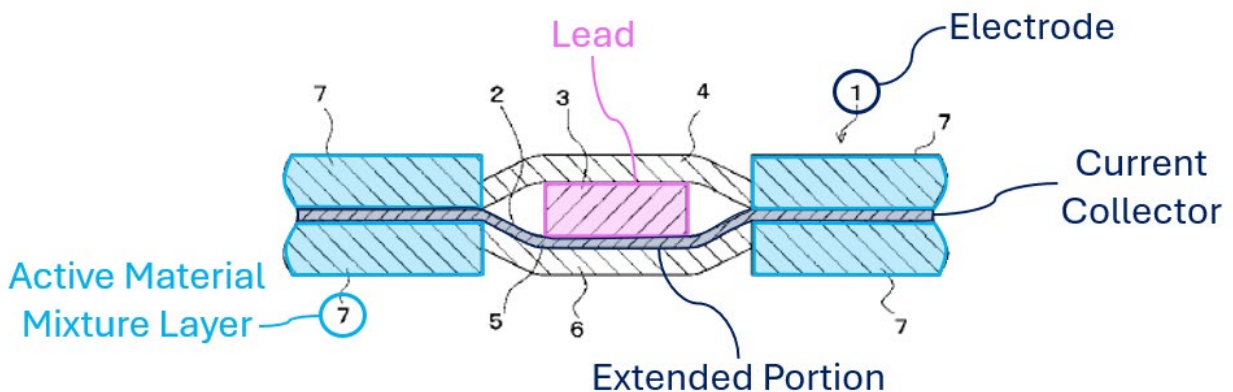
Sato, or as modified by Takemura, does not expressly disclose that the exposed portion of the negative current collector extends toward the battery center. But this was known long before the '330 patent. EX1003, ¶[0144].

(b) Kodama

Kodama discloses a non-coated portion 2 of a current collector 5 extending (e.g., indented or deflected) in a direction opposite the current collector surface attached to lead tab 3 to accommodate a thicker lead tab that does not protrude above the active material layer 7. EX1007, ¶¶[0018] (“a space equal to the thickness of the mixture on both sides is secured in the tab portion”), [0028]; EX1003, ¶[0145]. Kodama's disclosure (e.g., paragraphs [0018] and [0028]) reflects that the current collector portion at the tab location is indented or deflected relative to the surrounding active material layer to create “a space equal to the thickness of the mixture on both sides” of the current collector to receive the lead tab. EX1007, ¶¶[0018], [0028]; EX1003, ¶[0146]. In this manner, the thicker lead (3) does not protrude above (or below) Kodama's active material layer (7). EX1007, ¶¶[0018], [0028]. Because Kodama discloses extending the non-coated portion 2 in a direction

opposite the surface to which the lead tab is attached, a POSA would have understood that, when the negative lead is disposed on a surface of the current collector facing away from the battery center, the non-coated portion extends toward the battery center. EX1003, ¶[0146].

Although Kodama expressly describes this configuration in the context of a positive electrode, a POSA would have readily understood that the same principles and advantages apply to recesses formed in the middle portion of negative electrodes as well. EX1003, ¶[0147]. Given the structural similarities between negative and positive electrodes with centrally-located recesses, Kodama's technique would function in an analogous manner when applied to a negative electrode with a centrally-located lead tab. *Id.*



EX1007, FIG. 3 (annotated).

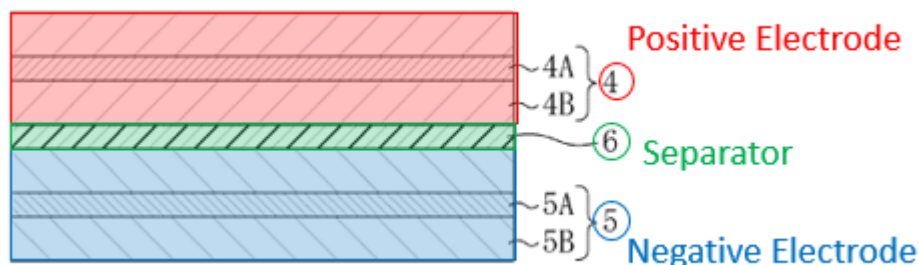
(c) Sato-Takemura-Kodama Combination

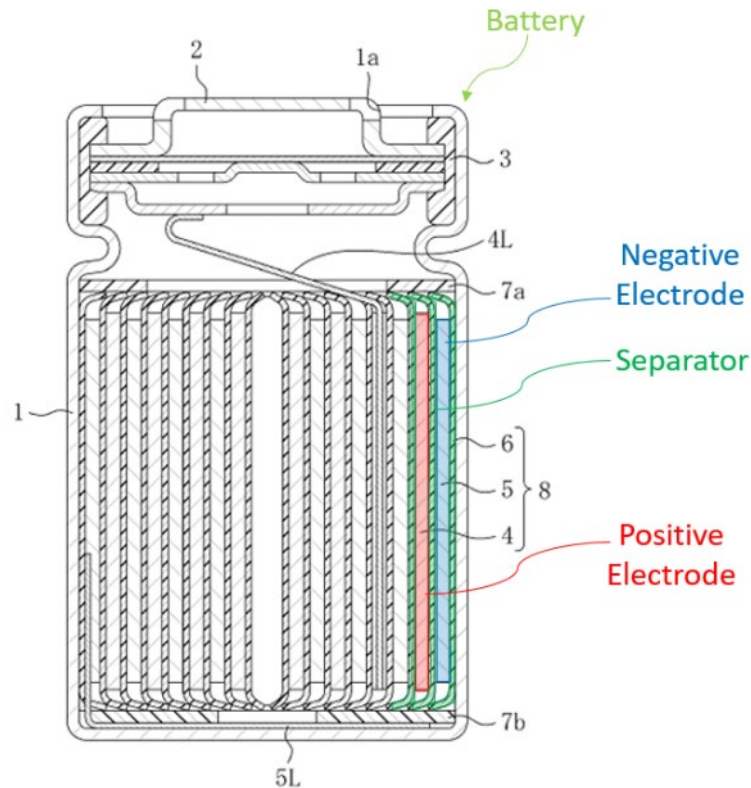
In the combined Sato-Takemura-Kodama configuration, the negative lead would be disposed on the surface of the negative current collector facing away from

the battery center. With that configuration, a POSA would have been motivated to have the exposed portion of Sato's negative current collector extend toward the center of the battery, as taught by Kodama, for the reasons discussed in Section IX.B. EX1003, ¶[0148]. For example, a POSA would have recognized that doing so provides additional space to accommodate a thicker lead tab, thereby increasing the available cross-sectional area for current flow, reducing electrical resistance associated with tab heating, and avoiding protrusion of the tab above the active material layer. EX1003, ¶[0148]. A POSA would have had a reasonable expectation of success in doing so because Kodama expressly teaches this approach as a solution for accommodating thicker lead tabs while maintaining a smooth electrode surface. EX1003, ¶¶[0148]-[0149].

8. [1.G]/[11.G] a separator disposed between the positive electrode and the negative electrode; and

Sato discloses a “separator” as “a porous insulating layer (i.e., a separator) 6” interposed between positive electrode plate 4 and negative electrode plate 5. EX1005, ¶¶[0030], [0035], [0044], [0071], [0113]; EX1003, ¶¶[0150]-[0151].





EX1005, FIGs. 1, 2 (annotated).

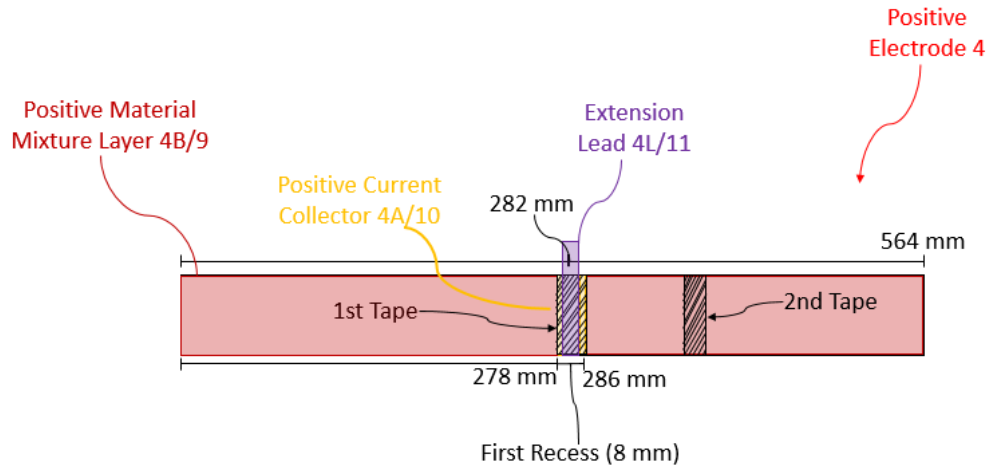
9. [1.H]/[11.H] an electrolyte

Sato discloses the recited “electrolyte” as a “nonaqueous electrolyte,” e.g., “a gelled nonaqueous electrolyte, or a solid nonaqueous electrolyte.” EX1005, ¶¶[0028], [0044], [0074]-[0084]; EX1003, ¶¶[0152]-[0153].

D. Claims 2/12

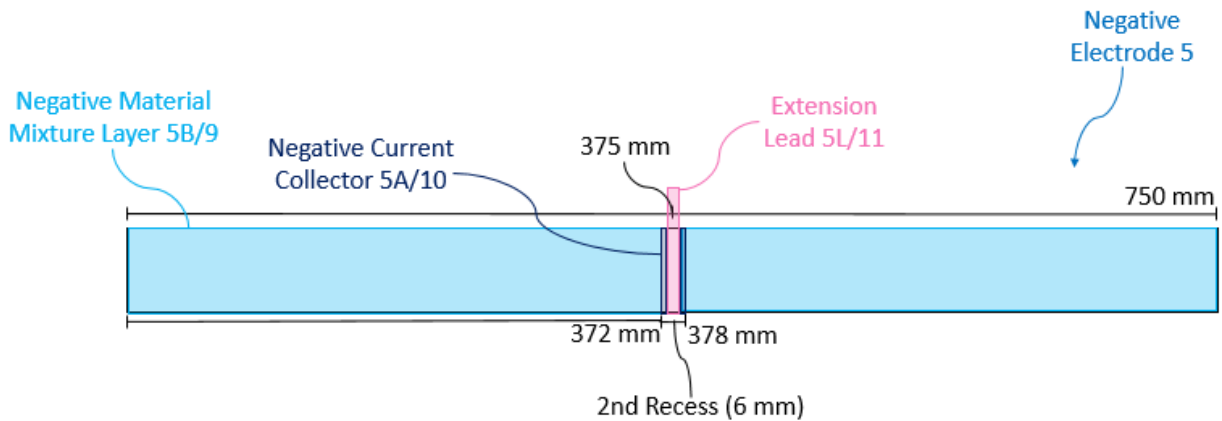
Sato discloses a distance between a center of the first recess (exposed portion 13 where the positive lead 11 is attached to plate 4) and one end of the positive active material (layer 4B/9) is half of a length of the positive active material (layer 4B/9)—falling within the recited $\frac{1}{4}$ to $\frac{3}{4}$ range of claim 2. EX1005, ¶¶[0104], [0111]-[0113] (positive electrode plate has “length of 564 mm” and distance from

center of first recess to positive active material end is 282 mm); EX1003, ¶¶[0154]-[0156]. A POSA would have understood that the positive active material begins at the end of the electrode plate in view of Sato's positive electrode manufacturing process. EX1005, ¶[0104]; EX1003, ¶[0155].



Sato's Positive Electrode, EX1003, ¶[0155].

Similarly, Sato discloses that a distance between a center of the second recess (exposed portion 13 where the negative lead 11 is attached to plate 5) and one end of the negative active material (layer 5B/9) is half of a length of the negative active material—falling within the recited $\frac{1}{4}$ to $\frac{3}{4}$ range of claim 2. EX1005, ¶¶[0094], [0104], [0136], [0137] (negative electrode plate has “length of 750 mm” and distance from center of second recess to negative active material end is 375 mm). A POSA would have understood that the negative active material begins at the end of the electrode plate in view of Sato's negative electrode manufacturing process. EX1005, ¶[0137]; EX1003, ¶¶[0157]-[0159].



Sato's Negative Electrode, EX1003, ¶[0156].

E. Claims 3/13

1. [3.A]/[13.A] wherein, the positive lead is disposed on a surface of the positive current collector facing a center of the battery

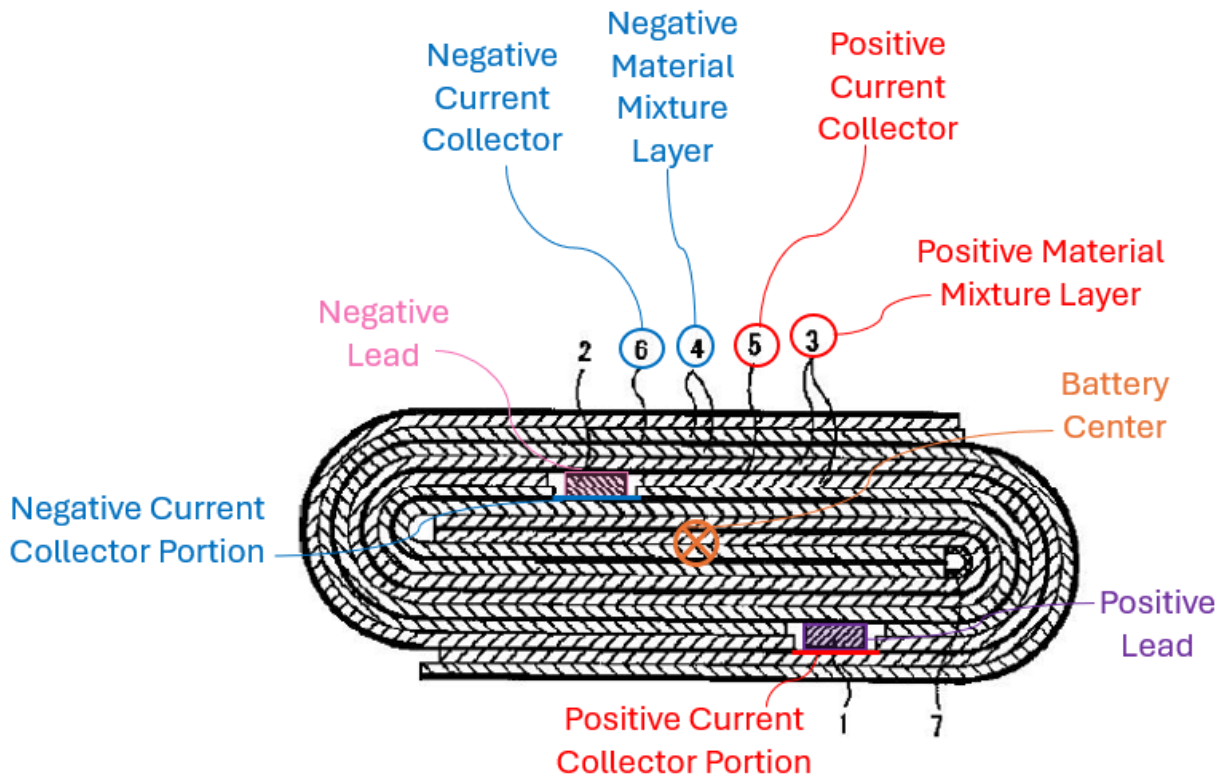
(a) Sato

Sato is silent about which surface of the positive current collector is attached to the positive lead relative to the direction of the battery's center. EX1003, ¶[0160]. However, there are finite options for which way it can face (toward or away).

(b) Takemura

Takemura's battery includes a positive lead 1 disposed on a surface of the positive current collector 5 facing toward the battery's center, as shown below in Figure 4. EX1006, ¶[0022]. A POSA would have understood Takemura's configuration as one of two straightforward and conventional options for attaching a lead tab to a current collector—attachment on either the surface facing toward the battery's center or the surface facing away from the battery's center. EX1003,

¶¶[0161]-[0162]; *see* Section IX.C.6.



EX1006, FIG. 4 (annotated).

(c) Sato-Takemura-Kodama Combination

Given the finite number of predictable solutions—attachment on one surface or the opposite surface—it would have been obvious to locate Sato’s positive lead on the positive current collector surface facing toward the battery’s center, as taught by Takemura and discussed in Section IX.A. EX1003, ¶[0163]. A POSA would have been motivated to implement the lead orientation disclosed in Figure 4 of Takemura with Sato’s battery because Takemura demonstrates that this arrangement is fully compatible with recessed electrodes in lithium-ion batteries. EX1003, ¶[0163]; EX1006, ¶¶[0022]-[0024]. A POSA would have had a reasonable

expectation of success in doing so because this modification would not alter the fundamental electrochemical operation of Sato's battery. EX1003, ¶¶[0164]-[0165].

2. [3.B]/[13.B] a portion of the positive current collector where the positive lead is disposed extends away from the center of the battery

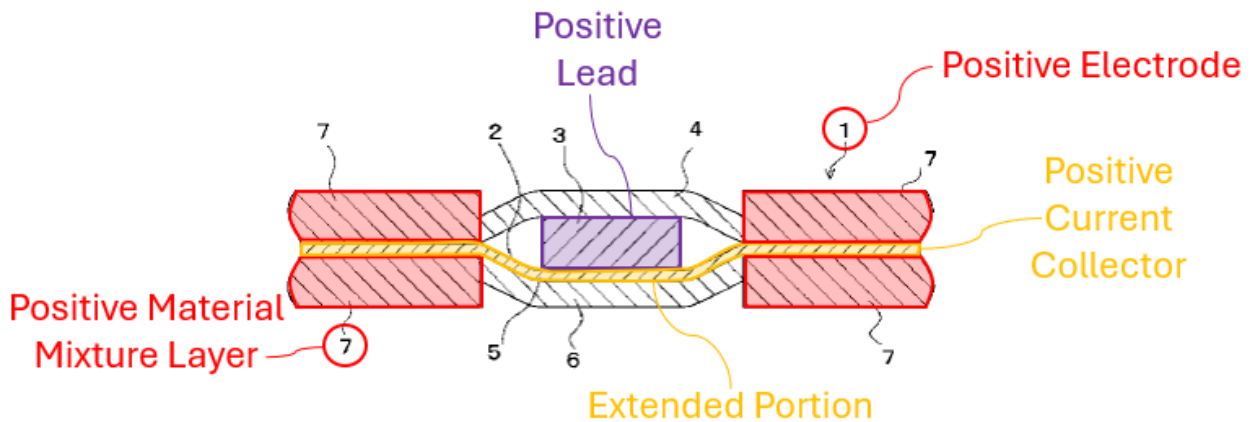
(a) Sato

Sato does not expressly disclose extending the exposed portion of the positive current collector away from the center of the battery. EX1003, ¶[0166]. But this was known long before the '330 patent. EX1003, ¶[0166].

(b) Kodama

Kodama discloses a non-coated portion 2 of a current collector 5 extending in a direction opposite the current collector surface attached to lead tab 3 to accommodate a thicker lead tab that does not protrude above the active material layer 7. EX1007, ¶¶[0018] (“a space equal to the thickness of the mixture on both sides is secured in the tab portion”), [0028]. Kodama's disclosure (e.g., paragraphs [0018] and [0028]) reflects that the current collector portion at the tab location is indented or deflected relative to the surrounding active material layer to create “a space equal to the thickness of the mixture on both sides” of the current collector to receive the lead tab. EX1007, ¶¶[0018], [0028]; EX1003, ¶[0168]. In this manner, the thicker lead (3) does not protrude above (or below) Kodama's active material layer (7). EX1007, ¶¶[0018], [0028]. Because Kodama discloses extending the non-coated portion 2 in a direction opposite the surface to which the lead tab is

attached, a POSA would have understood that, when the positive lead is disposed on a surface of the current collector facing the battery center, the non-coated portion extends away from the battery center. EX1003, ¶¶[0167]-[0168].



EX1007, FIG. 3 (annotated).

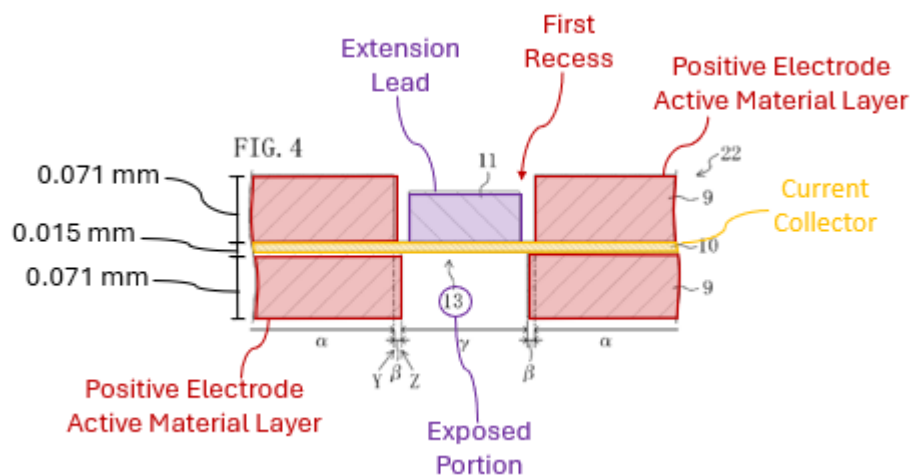
(c) Sato-Takemura-Kodama Combination

In the combined Sato-Takemura-Kodama configuration, the positive lead is disposed on the surface of the positive current collector facing toward the battery center. Given that configuration, a POSA would have been motivated to extend the exposed portion of Sato's positive current collector away from the battery's center, as taught by Kodama, for the reasons discussed in Section IX.B. EX1003, ¶[0169]. For example, a POSA would have recognized that doing so provides additional space to accommodate a thicker lead tab, thereby increasing the available cross-sectional area for current flow, reducing electrical resistance associated with tab heating, and avoiding protrusion of the tab above the active material layer.

EX1003, ¶[0169]. A POSA would have had a reasonable expectation of success in doing so because Kodama expressly teaches this approach as a solution for accommodating thicker lead tabs while maintaining a smooth electrode surface. EX1003, ¶¶[0169]-[0170].

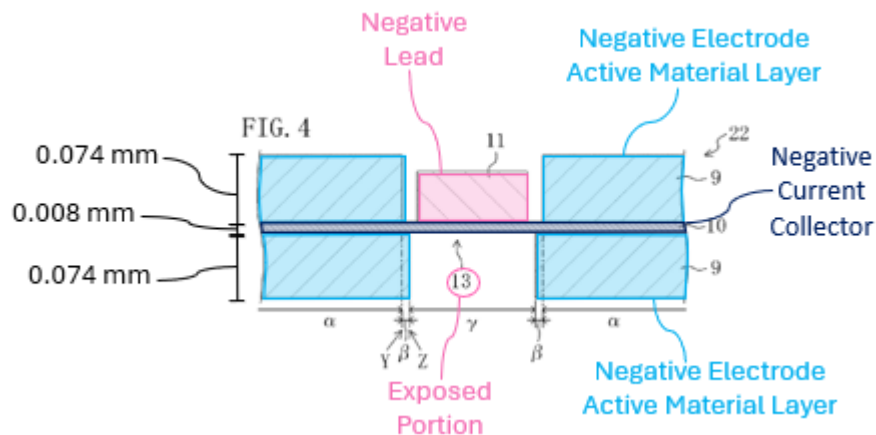
F. Claims 6/16

The thickness of Sato's two positive active material layers is 0.142 mm, which corresponds to the maximum depth of the first recess when extending Sato's positive current collector in a direction opposite the lead tab-attachment surface, as modified by Kodama. EX1005, ¶[0104]. Given the disclosed depth of Sato's recess and Kodama's teaching to keep the lead tab within the boundary of the active material layers, it would have been obvious to form Sato's first recess at a depth between 0.005 mm to 0.1 mm larger than the thickness of the positive lead. EX1003, ¶¶[0171]-[0172].



EX1005, FIG. 4 (annotated).

The thickness of Sato's two negative active material layers is 0.148 mm, which corresponds to the maximum depth of the second recess when extending Sato's negative current collector in a direction opposite the lead tab-attachment surface, as modified by Kodama. EX1005, ¶[0107]. Given the disclosed depth of Sato's recess and Kodama's teaching to keep the lead tab within the boundary of the active material layers, it would have been obvious to form Sato's first recess at a depth between 0.005 mm to 0.1 mm larger than the thickness of the negative lead. EX1003, ¶¶[0173]-[0174].

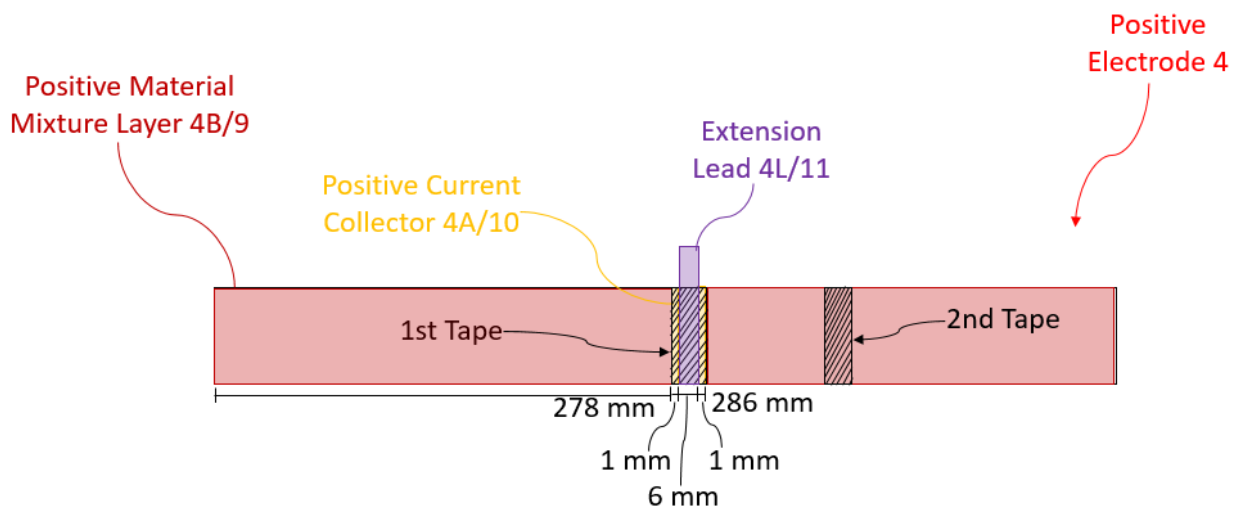


EX1005, FIG. 4 (annotated).

Furthermore, given the finite number of predictable solutions—lead thickness greater than, less than, or equal to recess depth—it would have been obvious to form Sato's lead 0.005-0.1 mm shorter than the recess depth. *KSR*, 550 U.S. at 421; *Powers-Kennedy Contracting Corp. v. Concrete Mixing & Conveying Co.*, 282 U.S. 175, 185 (1930); EX1003, ¶[0175].

G. Claims 8/18

Sato discloses a width (6 mm) of a portion of the positive lead in the first recess (exposed portion 13) is greater than a width (1 mm) of a remaining portion of the first recess not occupied by the positive lead located on one side of the positive lead. EX1005, ¶¶[0094], [0111]-[0112] (positive electrode's exposed portion has “width of 8 mm” and positive electrode lead has “width of 6 mm”). EX1003, ¶¶[0176]-[0178].



Sato's Positive Electrode, EX1003, ¶[0176].

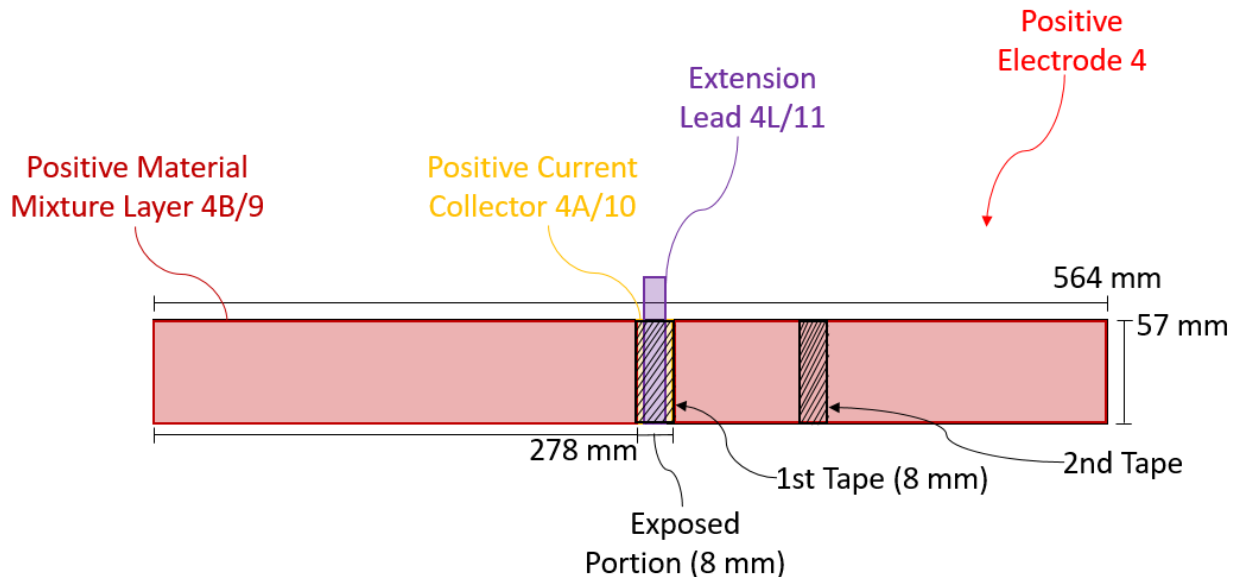
H. Claim 10

1. [10.A] wherein a top surface of the positive lead is provided with a first insulating glue layer

Sato discloses a “first insulating glue layer” as a polypropylene adhesive tape attached on the top surface of extension lead 11. EX1005, ¶[0113] (“[L]eads...protected and insulated by a polypropylene adhesive tape with a width

of 8 mm in the positive electrode plate and by a polyethylene adhesive tape in the negative electrode plate.”). A POSA would have understood that Sato’s polypropylene adhesive tape is located on top of the positive lead 4L/11 to “protect[] and insulate[]” all the exposed portions of positive lead 4L/11 from the negative electrode. EX1003, ¶[0179].

Given the disclosed locations of the exposed portion and lead connection of Sato’s positive electrode, for example, according to Sato’s example Battery 1, EX1005, ¶¶[0104], [0111]-[0113], a POSA would have understood that Sato’s polypropylene adhesive tape (1st tape) is located on Sato’s positive lead 4L/11, as shown in Dr. von Sacken’s illustration. EX1003, ¶¶[0180]-[0182].



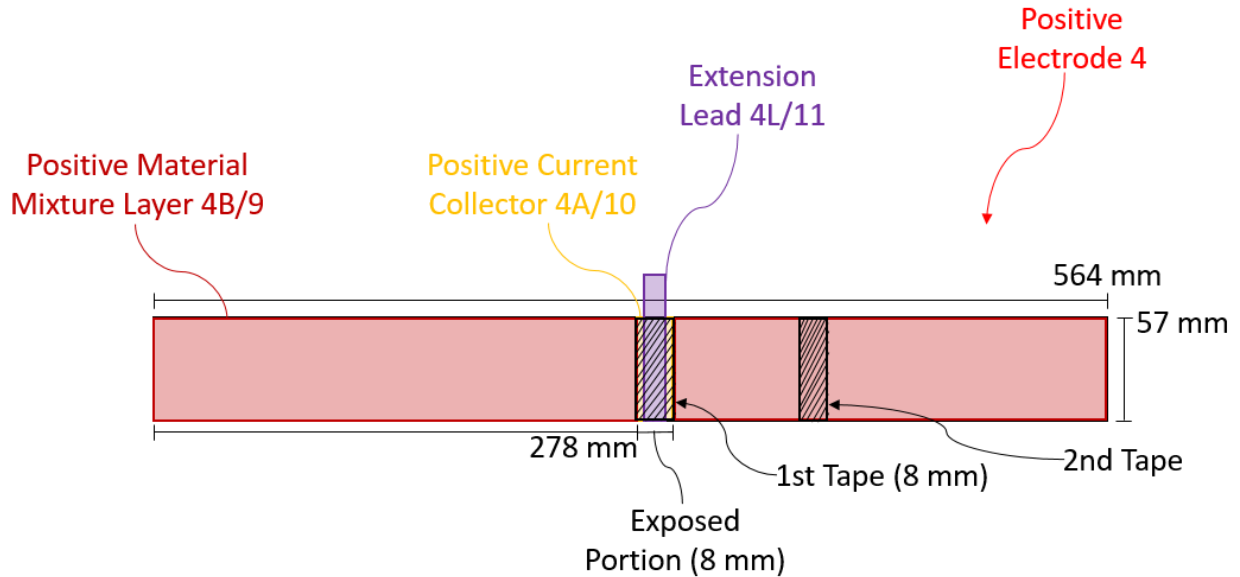
Sato’s Positive Electrode, EX1003, ¶[0181].

2. [10.B] a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer

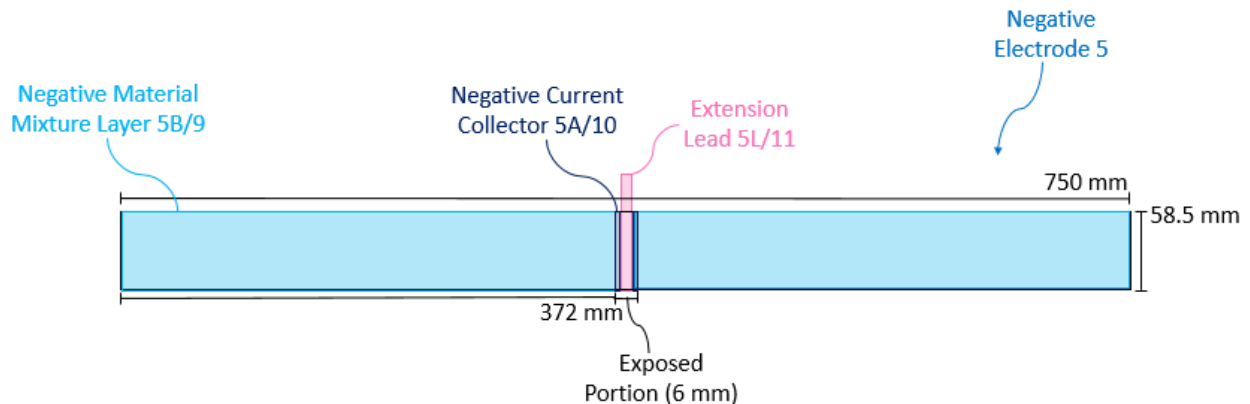
(a) Sato

Sato discloses the “second insulating glue layer” as a polypropylene adhesive tape. EX1005, ¶[0137] (“Positive electrode surface facing the negative electrode lead position [is] insulated by a polypropylene adhesive tape in order to prevent lithium deposition.”). Sato’s additional polypropylene adhesive tape covers a portion of the positive active layer (4B/9). EX1005, ¶[0148]; EX1003, ¶[0183]. For Sato’s additional tape to prevent lithium deposition, EX1005, ¶¶[0107], [0112], [0137], a POSA would have understood that Sato’s additional polypropylene adhesive tape is located on Sato’s positive active material (4B/9) in a position that overlaps the exposed portion 13 (recess) where Sato’s negative lead 11 is located, as shown below in Dr. von Sacken’s illustrations. EX1003, ¶[0183]; EX1039, 132:3-12.

The only logical place for Sato’s additional polypropylene adhesive tape on the positive active material to prevent lithium plating is opposite the recess in the negative active material across the separator. EX1003, ¶¶[0184]-[0187]. Indeed, this section is most susceptible to lithium plating during the battery’s charging cycle. *Id.*



Sato's Positive Electrode, EX1003, ¶[0184].



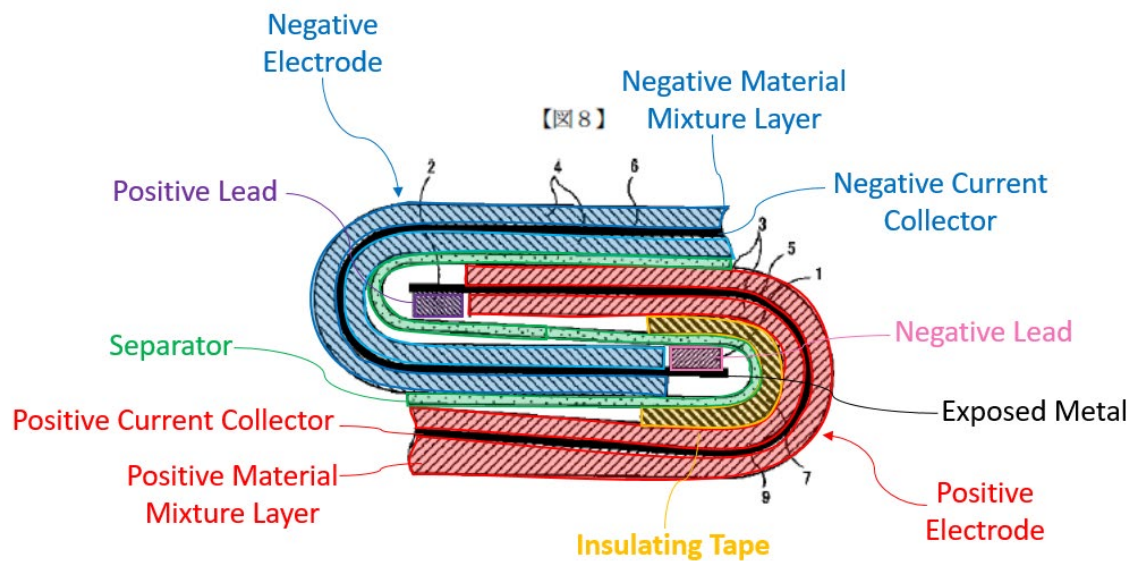
Sato's Negative Electrode, EX1003, ¶[0185].

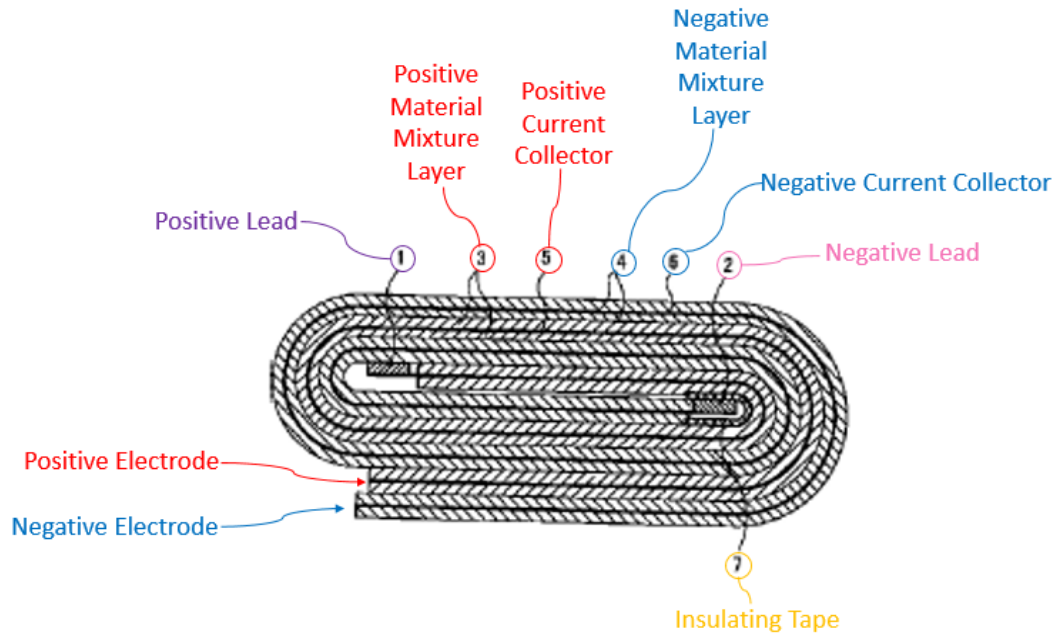
(b) Takemura

To the extent Sato does not explicitly disclose locating the additional adhesive tape “corresponding to the second recess,” Takemura discloses this. EX1003, ¶[0188]. Specifically, Takemura discloses that “if there is no opposing negative electrode active material 4, such as the positive electrode active material 3 arranged around the negative electrode current collector terminal 2 in FIG. 9, the surface of the positive

electrode active material 3 has to be covered with masking tape 7.” EX1006, ¶[0008].

In its battery embodiment shown in Figures 8 and 9, Takemura locates an insulating tape 7 on the positive electrode’s active material 3 across a separator 8 opposite a negative lead 2. EX1006, ¶[0003], FIGs. 8-9. Thus, the location of Takemura’s insulating tape corresponds to the recited position of the “second insulating tape.” EX1003, ¶¶[0188]-[0189].





EX1006, FIGs. 8, 9 (annotated).

(c) Sato-Takemura-Kodama Combination

In view of Takemura, it would have been obvious to locate Sato's additional polypropylene adhesive tape on its positive active material corresponding to the negative lead connection, to prevent lithium plating on the negative electrode, thereby reducing short-circuiting and improving reliability. EX1003, ¶¶[0190]-[0193]; EX1006, ¶[0008]. Specifically, a POSA would have understood that the exposed surface of Sato's negative electrode current collector is susceptible to lithium plating because lithium ions flowing across the separator will precipitate on the negative current collector's exposed surface during battery charging. EX1003, ¶¶[0190]-[0193]; EX1009, ¶[0003]; EX1016, ¶¶[0008], [0012]. Accordingly, a POSA would have been motivated to apply Takemura's known technique of placing

insulating tape on the positive active material opposite the lead connection of the negative electrode to prevent lithium plating in Sato's battery. *KSR*, 550 U.S. at 417; EX1003, ¶¶[0193]-[0194]. This modification would have simply been applying a known technique (Takemura's placement of insulating tape) to a known device (Sato's battery) to yield predictable results (prevent lithium plating). EX1003, ¶¶[0193]-[0194].

Furthermore, POSA would have understood that Takemura's teachings regarding lead tab orientation (Fig. 4) and insulating tape placement (Figs. 8-9) are both readily applicable to Sato's battery. EX1003, ¶[0195]. Takemura's lead tab orientation (Fig. 4) and insulating tape placement (Figs. 8-9) are discrete, well-understood battery design variables—lead configuration and mitigation of lithium plating. EX1003, ¶[0195]. Given that Sato's lead orientation is unspecified, a POSA would have understood that there are a finite number of predictable lead tab configurations (toward or away from the battery center). As explained in Section IX.A, implementing Takemura's lead tab configuration shown in Figure 4 for Sato's battery amounts to nothing more than choosing from a small set of known, predictable options with a reasonable expectation of success. EX1003, ¶¶[0110], [0141].

Regardless of the specific orientation of the negative lead tab, a POSA would have recognized from Sato and Takemura that lithium plating occurs where exposed

negative electrode metal faces positive active material. EX1003, ¶¶[0190]-[0196]; EX1005, ¶[0137]; EX1006, ¶[0008]. And Sato already discloses the use of insulating tape to prevent lithium plating. EX1005, ¶[0137]. This known risk would have motivated a POSA to look to other prior art teachings on tape placement, including Takemura's teachings on insulating tape placement (i.e., location and sizing). EX1003, ¶¶[0194]-[0195], [0198]. As discussed in Section IX.A, Takemura expressly teaches that insulating tape must be positioned on the positive active material opposite exposed metal on the negative current collector to effectively prevent lithium plating. EX1006, ¶[0008]. Given Takemura's teachings, a POSA would have understood that appropriate placement of the insulating tape is critical to achieving this intended safety benefit. EX1003, ¶[0196].

A POSA would have also understood that there are practical advantages to using Takemura's insulating tape technique in Figures 8-9 instead of removing active material, as shown in Takemura's Figure 4. EX1003, ¶[0197]. These advantages include ensuring safety in battery performance while avoiding the problematic processing steps associated with removing active material. EX1003, ¶[0197]; EX1010, ¶¶[0007], [0032]; EX1039, 30:13-24, 42:8-10, 46:2-10, 46:22-47:25; EX1042, ¶¶[0004]-[0008] (describing difficulties in selectively removing active material without creating uneven edges and burrs); EX1043, 2:32-4:22 (Mr. Kaschmitter acknowledging the common usage of taping and the problems

associated with active material removal). Accordingly, a POSA would have been motivated to implement Takemura's insulating tape placement of Figures 8 and 9, instead of removing active material. EX1003, ¶¶[0196]-[0197]. Indeed, locating Sato's insulating tape on the positive active material layer opposite the recess in the negative electrode prevents lithium-plating while avoiding the added fabrication steps necessary for removing active material. EX1003, ¶¶[0196]-[0197].

A POSA would have had a reasonable expectation of success in combining Takemura's tape placement shown in Figures 8 and 9 with Sato's modified battery because doing so would not alter the underlying interface between the lead tab and the current collector. EX1003, ¶[0199]. Insulating tapes were widely used in lithium-ion batteries, including Sato's battery, to cover exposed metal and mitigate short-circuiting risks. EX1003, ¶[0199]; *see* Section V. Because Takemura teaches placing such tape at the location(s) where lithium plating is known to occur, a POSA would have had confidence that implementing this known placement in Sato would perform its intended function without modifying the interface between the lead tab and the current collector. EX1003, ¶[0199].

3. [10.C] the second insulating glue layer has a width larger than a width of the second recess, and the second insulating glue layer has a length larger than a length of the second recess

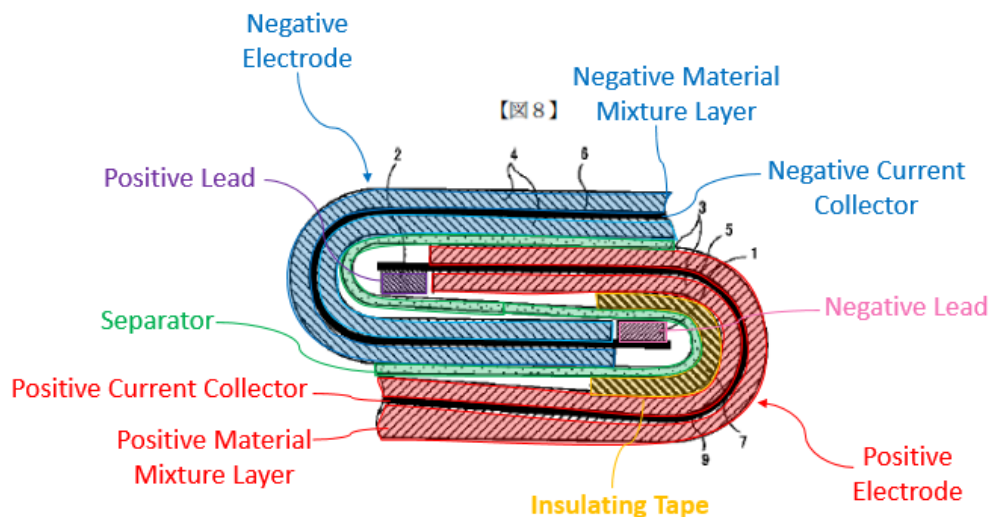
(a) Sato

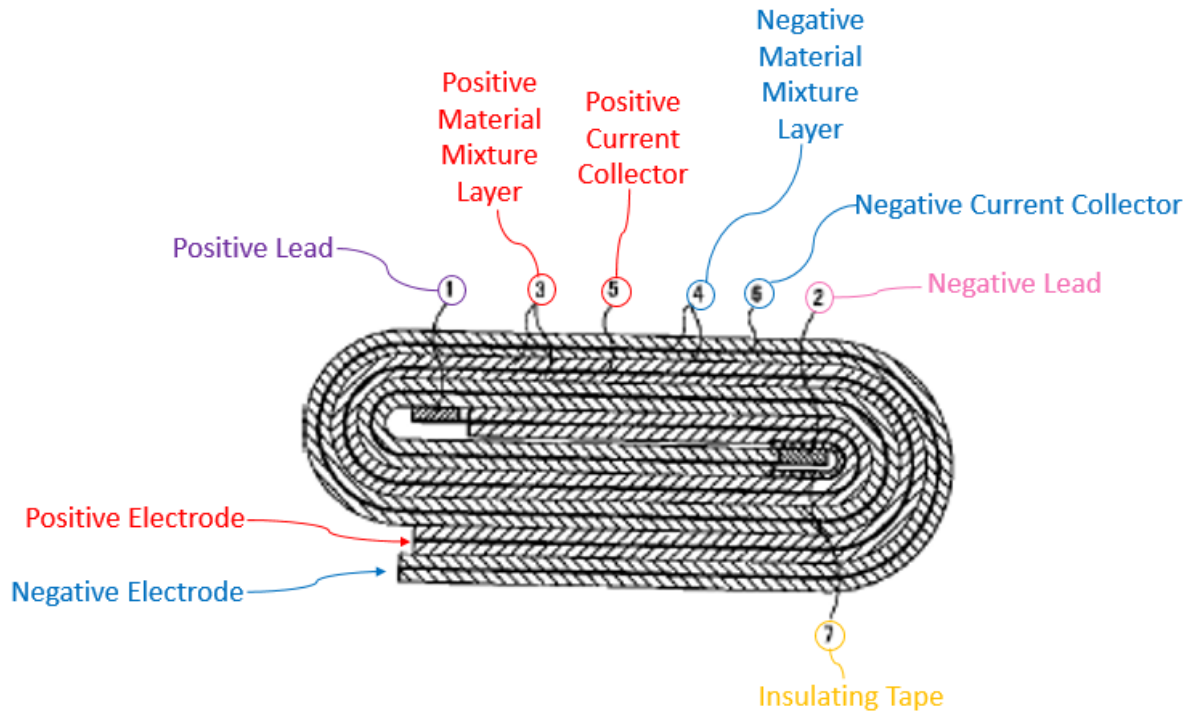
As discussed for [10.B], Sato discloses an additional polypropylene adhesive tape. EX1005, ¶[0137]; EX1003, ¶[0200]. Sato is silent about the adhesive tape

having a width larger than a width of the second recess and a length larger than a length of the second recess. However, this insulating tape sizing was known, as Takemura disclosed. EX1003, ¶[0200].

(b) Takemura

In Figures 8-9, Takemura's insulating tape 7 is sized such that it overlaps (i) *all* the exposed metal on the negative current collector 6 and (ii) the edge of the negative active material 4 above and below the negative lead 2, to insulate exposed metal and prevent lithium plating. EX1006, ¶[0008]. Thus, Takemura's insulating tape has a width (measured along the length of the negative electrode cross-section in Figures 8-9) larger than the exposed metal on the negative electrode current collector. EX1003, ¶¶[0201]-[0202]; EX1039, 141:14-142:2, 142:3-12, (admitting Takemura extends tape wider than the recess to be "cautious").





EX1006, FIGs. 8, 9 (annotated).

Although Takemura's drawings do 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. EX1003, ¶[0203]; EX1022, 51. Indeed, Takemura teaches that when positive active material faces an exposed negative current collector surface/lead, the active material "has to be covered with masking tape" to prevent lithium plating. EX1006, ¶[0008].

Furthermore, sizing Takemura's tape to be longer than the exposed metal provides a safety tolerance ensuring metal is not exposed due to alignment

variances. EX1022, 51; EX1010, ¶[0019] (tape wider to insulate even if placement “deviates slightly relative to the position of the second electrode tab”); EX1003, ¶[0203]. Additional prior art underscores what Takemura’s teachings convey to a POSA: extend tape beyond the recess’s width and length, ensuring insulation even with misalignment. EX1003, ¶[0203]; EX1008, Figures 2A-B (insulating tape extends beyond recess length and width); EX1010, ¶[0019], EX1027, ¶¶[0227]-[0228], FIGS. 23, 25. Furthermore, in IPR2025-00389 of the related ’498 patent, Patent Owner’s declarant Mr. Kaschmitter admitted that it was common practice to “increas[e] the sizing of tape” in lithium-ion batteries to “account for potential misalignment” between the electrodes to avoid the catastrophic risk of short-circuiting. EX1039, 38:23-39:8, 25:18-21, 27:4-28:2 (“lithium plating” can lead to “catastrophic situation”), 40:3-15, 73:20-74:1 (admitting to use “bigger” tape to account for “tolerancing”), 77:7-13 (“want to block around the edges of that recess”). Thus, it would have been illogical to apply a tape smaller than the second recess to cover the exposed metal from the positive active material. EX1003, ¶[0203].

(c) Sato-Takemura-Kodama Combination

It would have been obvious to apply Sato’s additional polypropylene adhesive tape wider and longer than the width and length of the second recess formed in Sato’s negative active material 5B/9—a well-known technique for covering exposed

current collector surfaces. EX1003, ¶[0204]; EX1008, FIGs. 2A-2B; EX1012, ¶[0052]. Prioritizing safety above other design considerations, a POSA would have been motivated to size Sato's tape wider and longer than the recess in the negative electrode to prevent lithium plating and short-circuiting even if there are misalignments. EX1003, ¶¶[0204]-[0205]; EX1039, 24:9-17, 28:15-25 (Patent Owner's declarant in related '498 patent IPR admitting to prioritize preventing short-circuiting over performance parameters "in almost all cases"). A POSA would have had a reasonable expectation of success extending Sato's tape slightly beyond its opposing recess boundary because doing so is a proven way to prevent lithium-plating. EX1003, ¶¶[0204]-[0205].

Additionally, 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. *Fox Factory, Inc. v. SRAM LLC*, 813 F. App'x 539, 542 (Fed. Cir. 2020) ("[A] mere change in proportion ... involve[s] no more than mechanical skill" (quoting *Powers-Kennedy Contracting Corp. v. Concrete Mixing & Conveying Co.*, 282 U.S. 175, 185 (1930))); *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1322 (Fed. Cir. 2004); *Gardner v. TEC Sys., Inc.*, 725 F.2d 1338, 1349 (Fed. Cir. 1984); EX1003, ¶¶[0204]-[0205].

X. GROUND 2: CLAIMS 4, 5, 7, 14, 15, AND 17 WOULD HAVE BEEN OBVIOUS IN VIEW OF SATO, TAKEMURA, KODAMA, AND NAKAMURA.

A. Motivation to Combine Nakamura with Sato-Takemura-Kodama

Sato, Takemura, Kodama, Nakamura, and the '330 patent are from the same field of endeavor—lithium-ion batteries. EX1005, ¶[0001]; EX1006, ¶[0001]; EX1012, ¶[0007]; EX1003, ¶[0213].

Nakamura discloses recess dimensions on the positive and negative electrodes within certain ranges to minimize the active material removed when forming “material-free portions” (recesses), while exposing enough surface of the current collector to spot-weld the lead. EX1012, ¶¶[0027], [0052]-[0053]; EX1003, ¶[0214]. Preserving active material on the current collector increases the battery’s storage capacity and minimizes insulating tape material, reducing manufacturing costs. EX1012, ¶¶[0005]-[0008], [0034], [0069]-[0073]; EX1003, ¶[0214]. For example, Nakamura discloses a positive active material-free portion 11 (recess) with a length (measured along Nakamura’s electrode plate’s width) of 5-15 mm and a width (measured along Nakamura’s electrode plate’s length) of 6 mm for a “positive electrode plate 1 with a width dimension of 38 mm and a length dimension of 355 mm.” EX1012, ¶¶[0027], [0052]; EX1003, ¶[0215]. Nakamura discloses a negative active material-free portion 12 (recess) with a length (measured along Nakamura’s electrode plate’s width) of 10.0 mm and a width (measured along Nakamura’s electrode plate’s length) of 5.0 mm for “a negative electrode plate 3 with a width



- 65 -

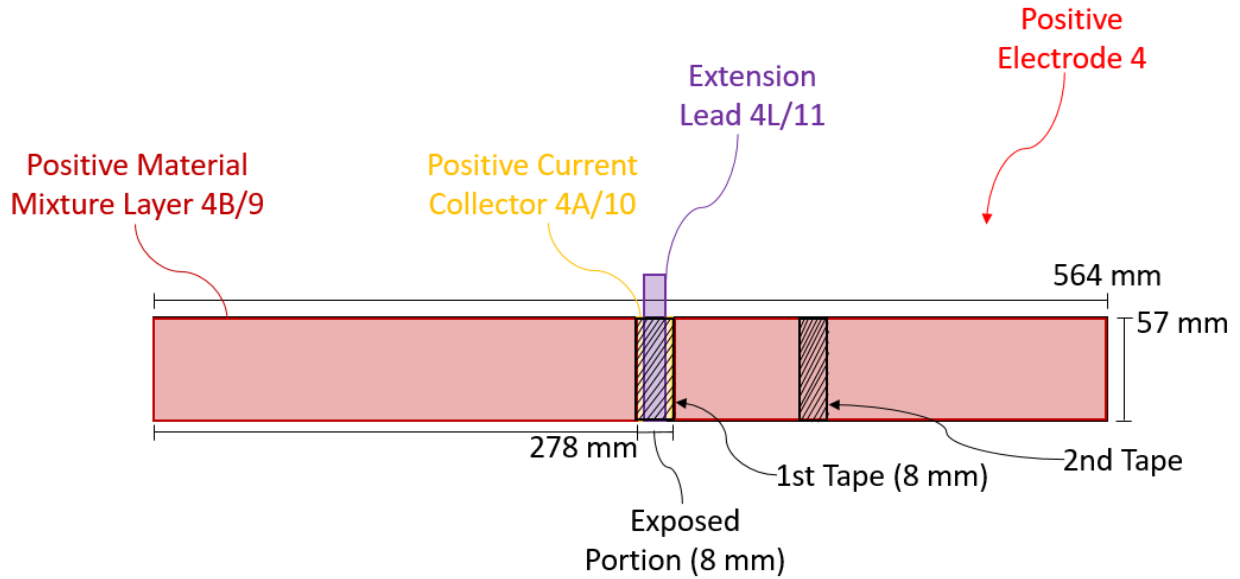
a POSA would have been motivated to combine Nakamura's recess dimensions with Sato-Takemura-Kodama because doing so would have increased Sato's battery's storage capacity and reduced manufacturing costs. EX1003, ¶[0217].

A POSA would also have had a reasonable expectation of success in combining Nakamura's teachings with Sato-Takemura-Kodama because modifying the active material dimensions on the current collector was common in lithium-ion batteries. EX1003, ¶[0218]; EX1012, ¶¶[0005]-[0008], [0069]-[0073]. A POSA would have expected Sato's electrodes, as modified by Takemura-Kodama-Nakamura, to perform their intended function of exchanging electrons and ions. EX1003, ¶[0218]. This modification would have simply been combining a known element (Nakamura's recess dimensions) with a known device (Sato-Takemura-Kodama's battery)—to increase the battery's storage capacity. *KSR*, 550 U.S. at 417; EX1003, ¶[0218].

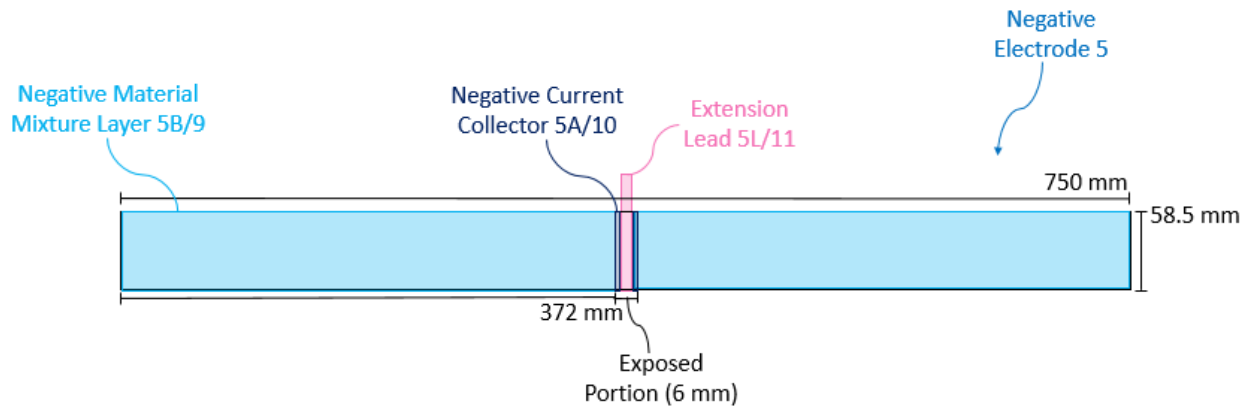
B. Claims 4/14

1. Sato

Sato's first recess (positive electrode 4's exposed portion 13) has a width (8 mm) 1-10 mm larger than a width (6 mm) of the positive lead (4L/11). EX1005, ¶¶[0094], [0111]-[0113]; EX1003, ¶[0219]. Sato's second recess (negative electrode 5's exposed portion 13) has a width (6 mm) 1-10 mm larger than a width (4 mm) of the negative lead (5L/11). EX1005, ¶¶[0094], [0137]; EX1003, ¶¶[0219]-[0221].



Sato's Positive Electrode, EX1003, ¶[0181].



Sato's Negative Electrode, EX1003, ¶[0181].

Sato is silent about “the first recess ha[ving] a length of 1-100 mm less than a length of the positive lead” and “the second recess ha[ving] a length of 1-1.00 mm⁴

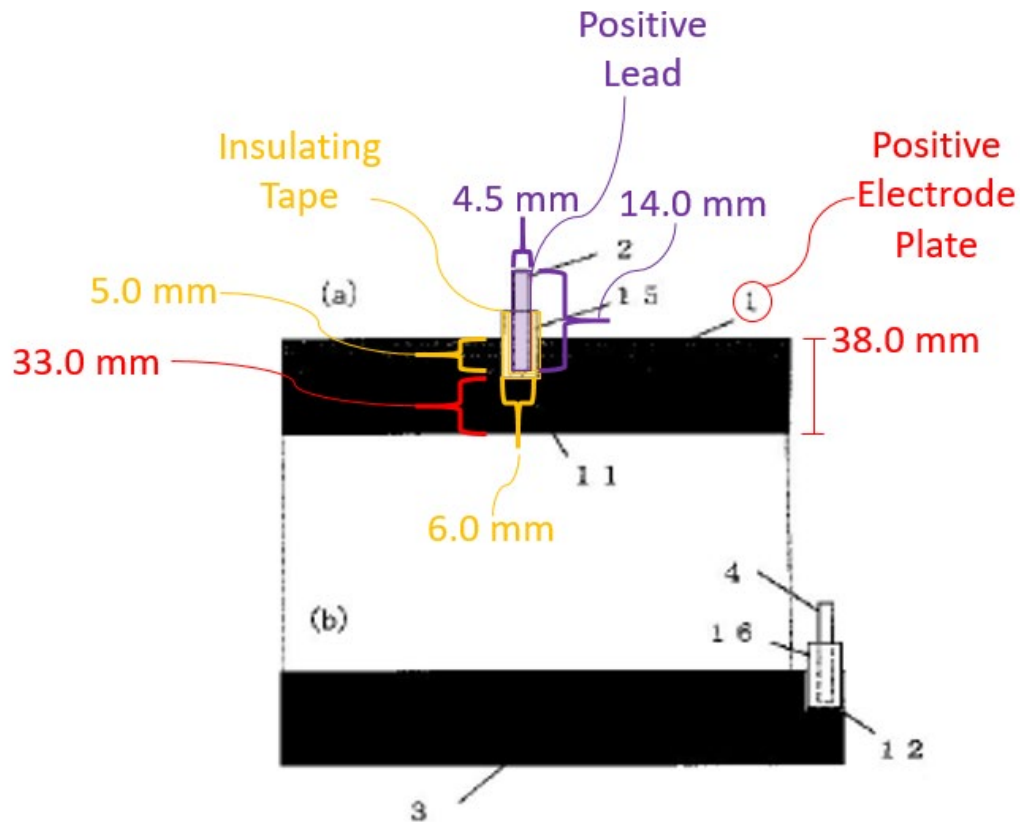
⁴ The recitation “1-1.00 mm” in claim 14 is a typographical error and should read “1-100 mm.” This is consistent with the corresponding limitation recited in

less than a length of the negative lead.” However, these recess lengths were known, as Nakamura disclosed. EX1003, ¶[0221].

2. Nakamura

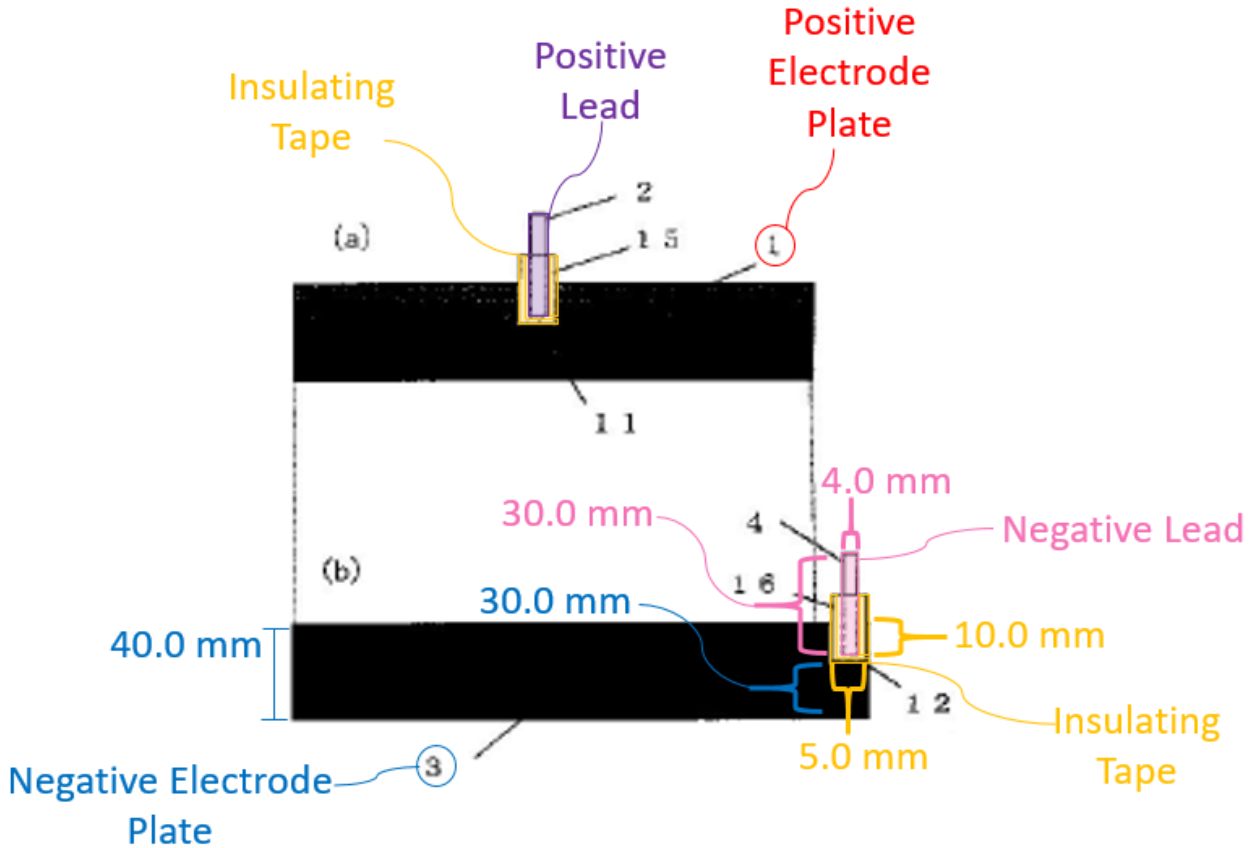
Nakamura’s positive active material-free portion 11 (first recess) has a 5.0 mm length (measured along electrode’s width) and a 6.0 mm width (measured along electrode’s length), and Nakamura’s positive lead 2 has a 14.0 mm length and a 4.5 mm width. EX1012, ¶[0052]. Thus, Nakamura’s first recess 11 has a length 9 mm less than a length of positive lead 2 and a width 1.5 mm larger than a width of positive lead 2. EX1003, ¶¶[0222]-[0223].

claim 4 (EX1001, 11:19-22) and the specification (EX1001, 3:46-49), both of which recite a range of “1-100 mm less than a length of the negative lead.”



EX1012, FIG. 1 (annotated).

Similarly, Nakamura's negative active material-free portion 12 (second recess) has a 10.0 mm length (measured along the electrode's width) and a 5.0 mm width (measured along the electrode's length), and Nakamura's negative lead 4 has a 30.0 mm length and a 4.0 mm width. EX1012, ¶¶[0049], [0043]; EX1003, ¶[0224]. Thus, Nakamura's second recess 12 has a length 20.0 mm less than a length of negative electrode lead 4 and a width 1.0 mm larger than a width of negative lead 4. EX1003, ¶[0224].



EX1012, FIG. 1 (annotated).

Furthermore, Nakamura renders obvious the recited recess dimension ranges. *Powers-Kennedy*, 282 U.S. at 185; EX1003, ¶[0225]. A POSA would have been motivated to form the second recess with a length that falls within Nakamura's preferred range 5-15 mm (¶[0034]) to reduce manufacturing costs. EX1003, ¶[0225]. This would have resulted in Nakamura's second recess having a length 15 mm to 25 mm less than its negative lead length. *Id.*

3. Sato-Takemura-Kodama-Nakamura Combination

For the reasons discussed in Section X.A, it would have been obvious to form the length of Sato's first and second recesses 1-100 mm less than a length of the

positive and negative leads. EX1003, ¶[0226]; EX1005, ¶¶[0008], [0069]-[0073].

This modification would have simply been combining a known element (Nakamura's recess dimensions) with a known device (Sato-Takemura-Kodama's battery) to increase the battery's capacity. EX1003, ¶¶[0226]-[0227].

C. Claims 5/15

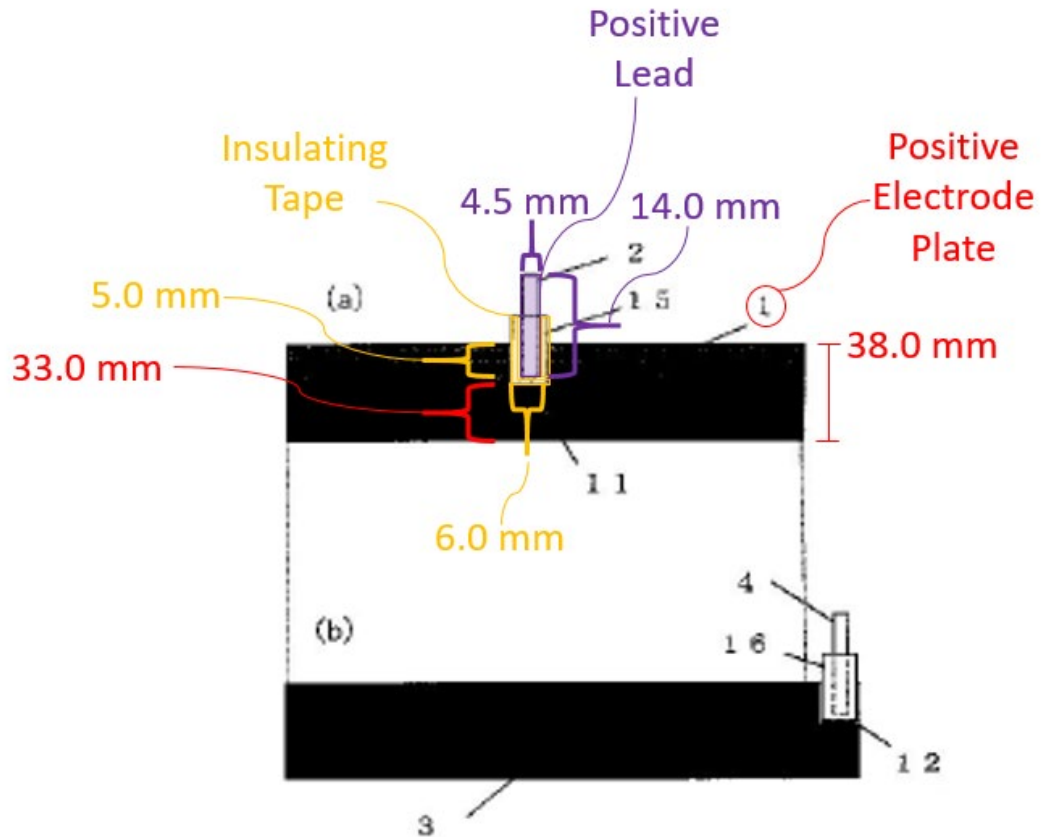
1. Sato

In Sato's example Battery 1, positive active material has a width of 57 mm, and negative active material has a width of 58.5 mm. EX1005, ¶¶[0094], [0104], [0107]; EX1003, ¶¶[0228]-[0229].

Sato is silent about "the first recess ha[ving] a length of 1-100 mm less than a width of the positive electrode active material layer" and "the second recess ha[ving] a length of 1-100 mm less than a width of the negative electrode active material layer." However, this recess length was known, as Nakamura disclosed. EX1003, ¶[0230].

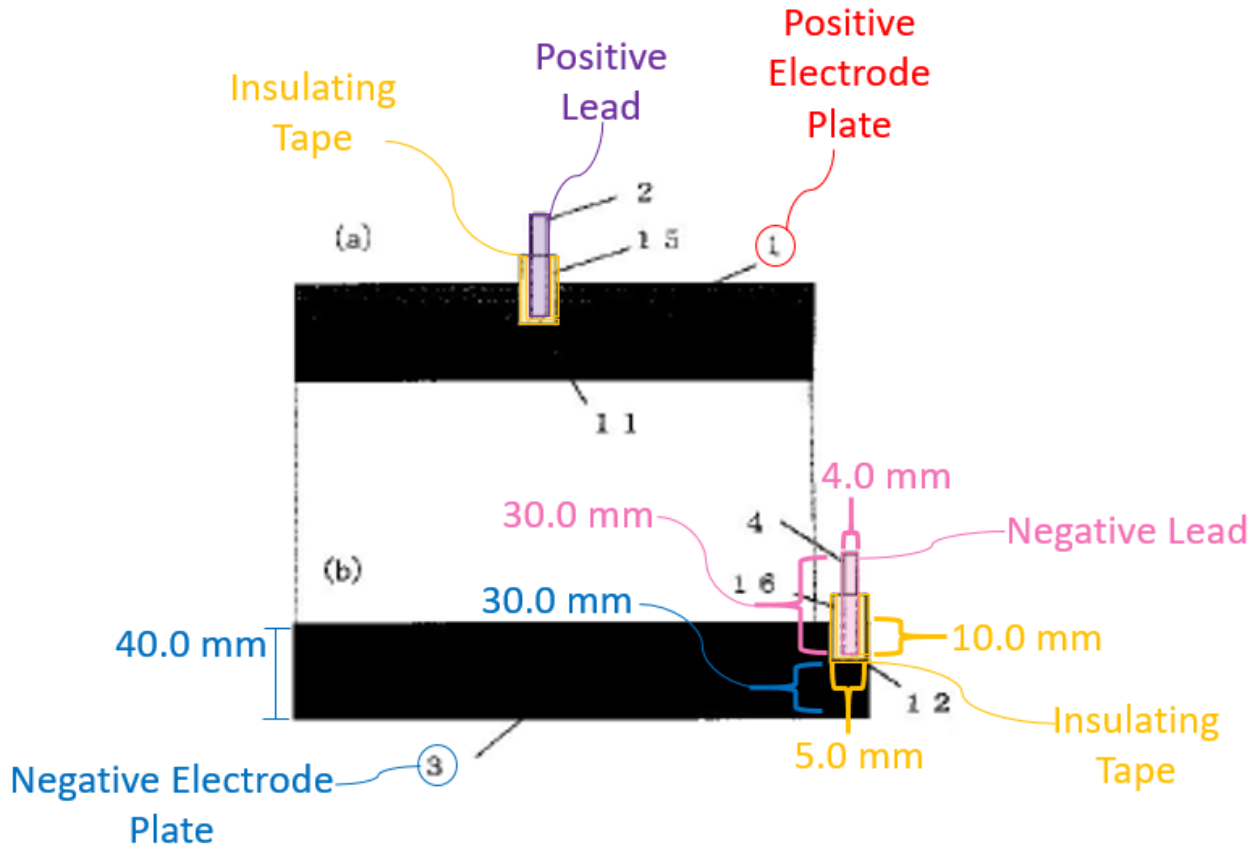
2. Nakamura

Nakamura's positive active material has "a width dimension of 38 mm," and Nakamura's first recess 11 has a 5.0 mm length (measured along the electrode plate's width). EX1012, ¶[0052]; EX1003, ¶¶[0231]-[0232]. The length of Nakamura's first recess 11 is 33 mm less than a width of the positive active-material (38 mm– 5 mm). EX1003, ¶[0232].



EX1012, FIG. 1 (annotated).

Nakamura's negative active material has "a width dimension of 40 mm," and Nakamura's second recess 12 has a 10.0 mm length (measured along the electrode's width). EX1012, ¶¶[0049], [0053]. The length of Nakamura's second recess 12 is 30.0 mm less than a width of the negative active-material. EX1003, ¶[0233].



EX1012, FIG. 1 (annotated).

Furthermore, Nakamura renders obvious the recited recess dimension ranges. *Powers-Kennedy*, 282 U.S. at 185; EX1003, ¶[0234]. A POSA would have been motivated to form the second recess with a length that falls within Nakamura's preferred 5-15 mm range (¶[0034]) to reduce manufacturing costs. EX1003, ¶[0234]. This would have resulted in Nakamura's second recess having a length of 25 mm to 35 mm less than its negative active-material width. *Id.*

3. Sato-Takemura-Kodama-Nakamura Combination

For the reasons discussed in Section X.A, it would have been obvious to form the length of Sato's first and second recesses to be 1-100 mm less than a width of

the positive and negative active material mixture layers. EX1003, ¶[0235]; EX1012, ¶[0008], [0069]-[0073]. This modification would have simply been combining a known element (Nakamura's recess dimensions) with a known device (Sato-Takemura-Kodama's battery) to increase the battery's capacity. EX1003, ¶[0235]-[0236].

D. Claims 7/17

1. Sato

In example Battery 1, the positive active material has a width of 57.0 mm, and the recess has a width of 8.0 mm. EX1005, ¶[0094], [0104], [0111]; EX1003, ¶[0237]-[0238]. Sato's positive electrode lead has "a width of 6 mm." EX1005, ¶[0112].

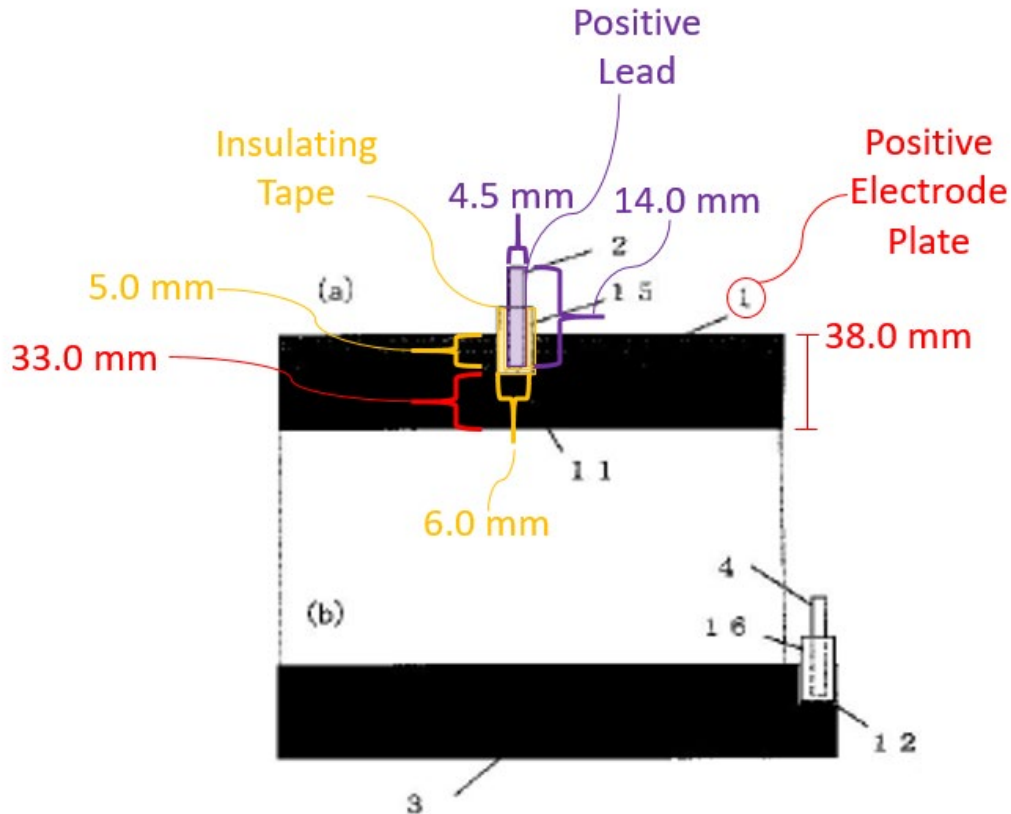
Sato is silent about "a length of a portion of the positive lead in the first recess [being] less than a width of a remaining portion of the positive electrode active material layer from an edge of the first insulating glue layer covering [a first film] the [first film] positive electrode active material layer to an edge of the [first film] positive electrode active material layer opposite to the first recess," as recited in claims 7 and 17. However, these lead and recess dimensions were known, as Nakamura disclosed. EX1003, ¶[0239]-[0240].

2. Nakamura

Nakamura discloses electrode recess and lead connection dimensions that overlap the dimension ranges of claims 7 and 17. EX1003, ¶[0241]. Nakamura's

first recess 11 has a 5.0 mm length. EX1012, ¶[0052]. The length of the portion of Nakamura's positive electrode lead 2 located in material-free portion 11 (measured along the width of electrode plate 1) is less than the length of first recess 11. EX1003, ¶[0242]. Thus, the length of the portion of Nakamura's positive electrode lead 2 located in first recess 11 is less than 5.0 mm. *Id.*

The width of the remaining portion of Nakamura's active material mixture layer from an edge of the insulating tape 15 covering the positive active material to an edge of the positive active material opposite to the material-free portion 11 is 33.0 mm. EX1012, ¶[0052] (plate 1 has "width of 38 mm.") Accordingly, the length (less than 5.0 mm) of the portion of Nakamura's positive lead 2 in material-free portion 11 is less than a width (33.0 mm) of the remaining portion of Nakamura's positive active material. EX1003, ¶[0243]. Alternatively, if the insulating tape 15 (11 mm long) aligned with the top edge of the positive active material (not specifically shown), the length of Nakamura's lead in material-free portion 11 is 11 mm. Then, the remaining width of Nakamura's positive active material would be 27 mm (38 mm - 11 mm), the length (less than 5.0 mm) of the portion of Nakamura's positive lead 2 in material-free portion 11 is less than a width (27.0 mm) of the remaining portion of Nakamura's positive active material, also satisfying the claimed requirement. EX1003, ¶¶[0243]-[0244].



EX1012, FIG. 1 (annotated).

3. Sato-Takemura-Kodama-Nakamura Combination

For the reasons discussed in Section X.A, it would have been obvious to make the length of a portion of Sato's positive lead 4L/11 in exposed portion 13 (first recess) less than a width of a remaining portion of Sato's positive active material layer 4B/9 defined from the edge of Sato's adhesive tape covering the positive lead 4L/11 to an edge of Sato's positive active material layer 4B/9 opposite to exposed portion 13. EX1003, ¶[0245]; EX1012, ¶¶[0008], [0069]-[0073]. This modification would have simply been applying a known technique (modifying the recess dimensions) to a known device (Sato-Takemura-Kodama's battery) to increase the

battery's capacity. EX1003, ¶¶[0245]-[0246].

XI. GROUND 3: CLAIMS 9, 19, AND 20 WOULD HAVE BEEN OBVIOUS IN VIEW OF SATO, TAKEMURA, KODAMA, AND KOBAYASHI.

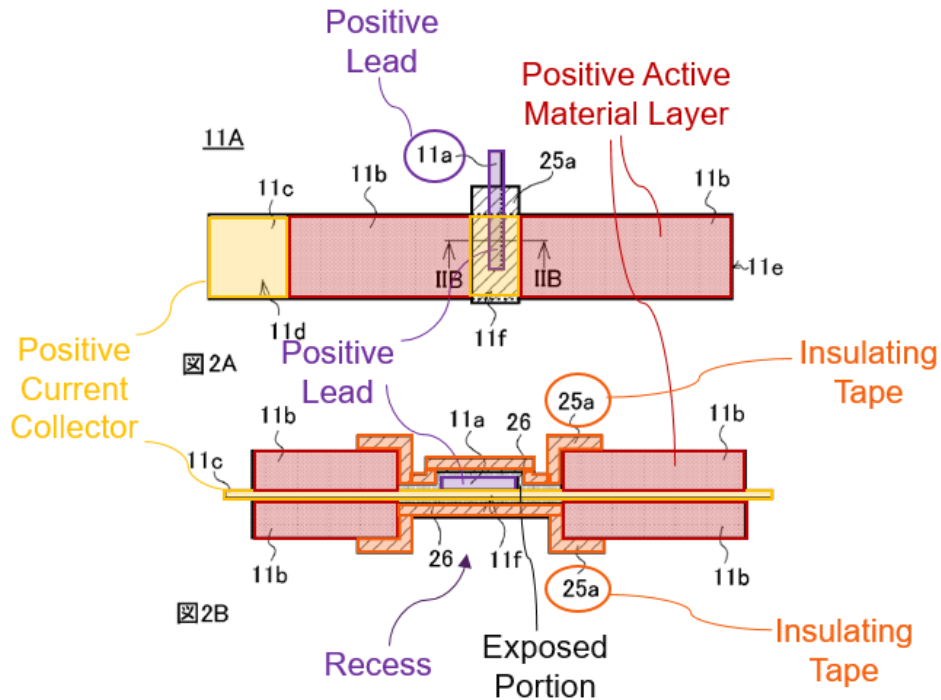
A. Motivation to Combine Kobayashi with Sato-Takemura-Kodama

Sato, Takemura, Kodama, Kobayashi, and the '330 patent are from the same field of endeavor—lithium-ion batteries. EX1005, ¶[0001]; EX1006, ¶[0001]; EX1008, ¶¶[0014]-[0016]; EX1003, ¶¶[0254]. As discussed in Section IX.A, a POSA would have been motivated to combine Takemura with Sato such that Sato's second insulating tape is located on the positive active material opposite to the negative lead connection. EX1003, ¶[0260]; EX1006, ¶¶[0003], [0008], [0022]; EX1009, ¶[0008]; EX1010, ¶[0029]; EX1011, ¶[0018].

As discussed in Section IX.H.1, Sato discloses covering the top surface of positive current collector 4A/10 connected to positive lead 4L/11 with a first insulating tape. Sato does not explicitly disclose covering the opposite, bottom exposed surface of positive current collector 4A/10 with another first insulating tape. EX1003, ¶¶[0255]-[0257]. But covering both the top and bottom surfaces with insulating tapes was known, as Kobayashi disclosed. *Id.*, ¶[0257].

As shown in Figures 2A-2B, Kobayashi discloses tapes 25a on the top and bottom surfaces of the exposed portion 11f of the positive electrode plate 11A. EX1008, ¶¶[0034]-[0035]. A first tape 25a on the top surface covers the positive current collecting tab 11a and edges of the positive active material 11b adjacent the

positive current collecting tab 11a. EX1008, ¶¶[0034]-[0035]. Similarly, a second tape 25a on the bottom surface covers exposed metal foil opposite the positive current collecting tab 11a and edges of the positive active material 11b on the bottom surface. EX1008, ¶¶[0034]-[0035]; EX1003, ¶[0258].



EX1008, FIGs. 2A-2B (annotated).

Kobayashi's tapes 25a cover the positive current collecting tab 11a and exposed metal foil within exposed portion 11f, to prevent short-circuiting caused by burrs produced on the positive active material edges at exposed portion 11f during manufacturing. EX1008, ¶¶[0005], [0010], [0014]; EX1003, ¶[0259].

A POSA would have been motivated to cover the exposed portion 13 on the bottom side of Sato's positive current collector 4A/10 with a third insulating tape, as

Kobayashi teaches, to protect the exposed surface from inadvertent contact with another conductor, preventing short-circuiting. EX1008, ¶¶[0005], [0010], [0014]; EX1003, ¶[0260]. Indeed, Kobayashi describes localized pressure gradients and burrs can occur at stepped surfaces of the electrodes, leading to short-circuiting. EX1008, ¶¶[0005], [0010]. A POSA would have understood that the exposed portion 13 on the bottom side of Sato's positive current collector 4A/10 is likely to experience these pressure gradients, making it susceptible to short-circuiting. EX1003, ¶[0260]. Accordingly, a POSA would have been motivated to cover this exposed portion on the bottom side of Sato's positive current collector with an insulating layer, as Kobayashi teaches, to prevent short-circuiting, prolonging the battery's operability. *Id.*

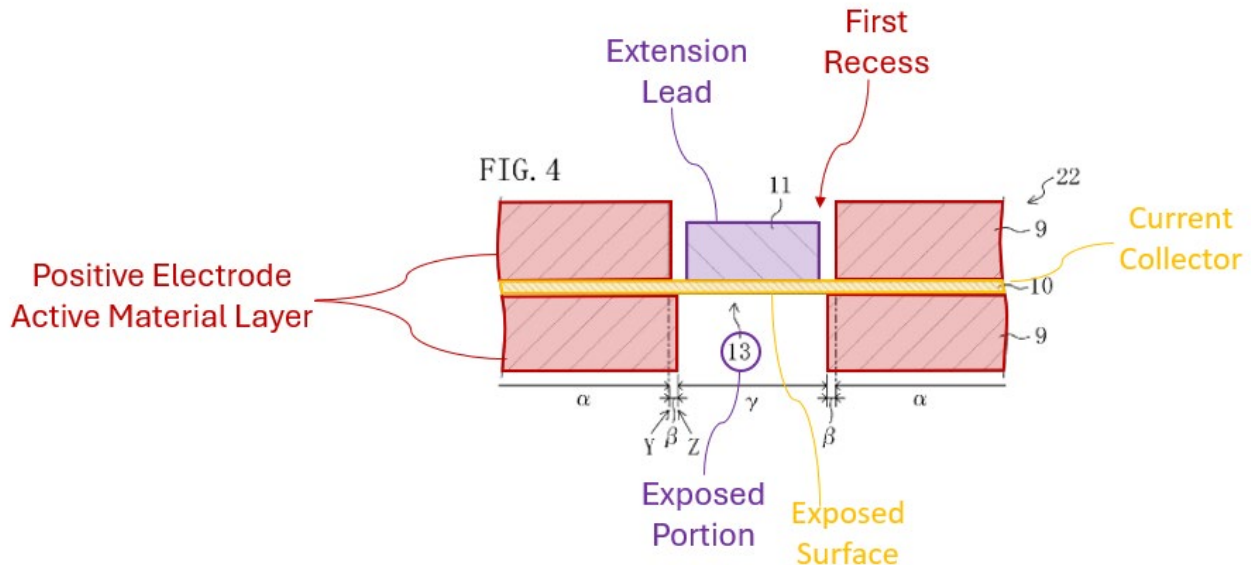
A POSA would also have had a reasonable expectation of success in combining Kobayashi's additional insulating tape—a common solution—with Sato-Takemura-Kodama to prevent short-circuiting. EX1003, ¶[0261]. A POSA would have expected Kobayashi's insulating tape, incorporated into the Sato-Takemura-Kodama battery, to insulate exposed metal and the positive active material edges. EX1003, ¶[0261]. Combining Kobayashi's insulating tape with the Sato-Takemura-Kodama battery would have simply been applying a known technique (placing Kobayashi's tape at a known position) to a known device (the Sato-Takemura-

Kodama battery) to prevent short-circuiting. *KSR*, 550 U.S. at 417; EX1003, ¶[0261].

B. Claim 9

1. Sato

Sato discloses an exposed bottom surface (12/14) of positive current collector 4A/10 that is opposite the surface of the positive current collector connected to positive lead 4L/11. EX1003, ¶[0262].



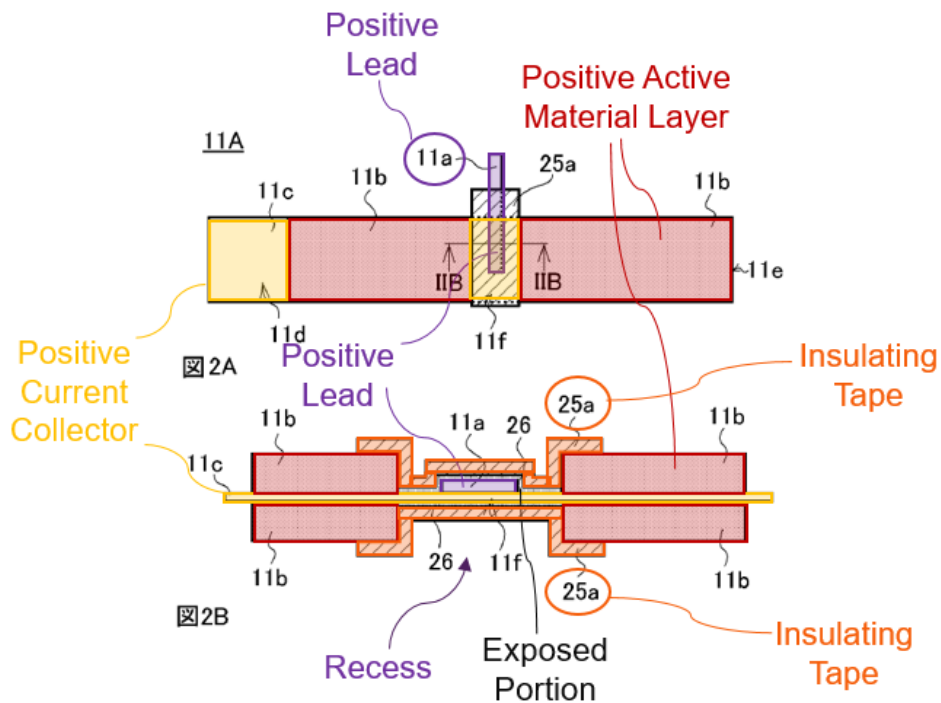
EX1005, FIG. 4 (annotated).

While Sato describes covering the top surface of positive current collector connected to the positive lead with a first insulating tape, Sato does not explicitly disclose covering the opposite, bottom exposed surface of positive current collector with another insulating tape. EX1003, ¶[0263]. But this would have been obvious in view of Kobayashi. *Id.*

2. Kobayashi

As discussed in Section XI.A, Kobayashi discloses covering a third location 11f of a surface of the positive current collector 11c opposite the surface of the positive current collector 11c connected to the positive lead 11a—a surface of the positive current collector corresponding to the positive lead—with another insulating glue layer—Kobayashi’s insulating tape 25a—as recited in claim 9.

EX1008, ¶¶[0034]-[0035]; EX1003, ¶[0264].



EX1008, FIGs. 2A, 2B (annotated).

3. Sato-Takemura-Kodama-Kobayashi Combination

As discussed in Section XI.A, it would have been obvious to apply Kobayashi's second piece of tape 25a on the bottom of Sato's positive current collector 4A/10 to cover exposed metal opposite Sato's positive lead 11 and Sato's

positive active material edges. EX1003, ¶[0265]; EX1008, ¶¶[0005], [0010], [0014].

This modification would have simply been combining a known element (another insulating tape) with a known device (Sato-Takemura-Kodama battery), to prevent short-circuiting. EX1003, ¶[0265].

C. Claim 19

1. [19.A] wherein a first location of a top surface of the positive lead is provided with a first insulating glue layer

Element [19.A] is identical to Element [10.A], except that [19.A] further recites the language “a first location of.” *Compare* Element [10.A] “wherein a top surface of the positive lead is provided with a first insulating glue layer” *with* Element [19.A] “wherein a first location of a top surface of the positive lead is provided with a first insulating glue layer.” A POSA would have understood that the recited language “a first location of” does not patentably distinguish Element [19.A] from [10.A] because it merely identifies that the insulating glue layer is applied to some portion of the top surface of the positive lead, which is already encompassed by Element [10.A]. EX1003, ¶[0266]. Thus, Element [19.A] does not impose any additional structural or functional limitation beyond providing the insulating glue layer on the top surface itself. *Id.* Accordingly, Sato discloses [19.A] for the same reasons as discussed with respect to [10.A]. Section IX.H.1.

2. **[19.B] a second location of a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer,**

Element [19.B] is identical to Element [10.B], except that [19.B] further recites the language “a second location of.” *Compare* Element [10.B] “a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer” *with* Element [19.B] “a second location of a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer.” A POSA would have understood that the recited language “a second location of” does not patentably distinguish Element [19.B] from [10.B] because it merely identifies that the insulating glue layer is applied to some portion of the top surface of the positive electrode active material layer, which is already encompassed by Element [10.B]. EX1003, ¶[0267]. Thus, Element [19.B] does not impose any additional structural or functional limitation beyond providing the insulating glue layer on the top surface itself. *Id.* Accordingly, Sato-Takemura-Kodama discloses [19.B] for the same reasons as discussed with respect to [10.B]. Section IX.H.2.

3. **[19.C] a third location of a surface of the positive current collector corresponding to the positive lead is covered with a third insulating glue layer,**

Element [19.C] is identical to claim 9, except that [19.C] further recites the language “a third location of.” *Compare* claim 9 “wherein a surface of the positive current collector corresponding to the positive lead is covered with a third insulating

glue layer” *with* Element [19.C] “a third location of a surface of the positive current collector corresponding to the positive lead is covered with a third insulating glue layer.” A POSA would have understood that the recited language “a third location of” does not patentably distinguish Element [19.C] from claim 9 because it merely identifies that the insulating glue layer is applied to some portion of the top surface of the positive current collector corresponding to the positive lead, which is already encompassed by claim 9. EX1003, ¶[0268]. Thus, Element [19.C] does not impose any additional structural or functional limitation beyond providing the insulating glue layer on the top surface itself. *Id.* Sato-Takemura-Kodama-Kobayashi discloses [19.C] for the same reasons as discussed with respect to claim 9. Section XI.B.

D. Claim 20

Claim 20 is identical to Element [10.C]. EX1003, ¶[0269]. *Compare* Element [10.C] “the second insulating glue layer has a width larger than a width of the second recess, and the second insulating glue layer has a length larger than a length of the second recess” *with* Claim 20 “wherein the second insulating glue layer has a width larger than a width of the second recess, and the second insulating glue layer has a length larger than a length of the second recess.” Accordingly, Sato-Takemura-Kodama discloses claim 20 for the same reasons as discussed with respect to [10.C]. Section IX.H.3.

XII. NO SECONDARY CONSIDERATIONS

Petitioner is not aware of any evidence of alleged secondary considerations of non-obviousness having nexus to the challenged claims, but reserves the right to address any evidence Patent Owner presents. EX1003, ¶¶[0270]-[0271].

XIII. MANDATORY NOTICES (37 C.F.R. § 42.8(A)(1))

Real Party-in-Interest (37 C.F.R. § 42.8(b)(1)): The real parties-in-interest are Zhuhai CosMX Battery Co., Ltd.; Chongqing CosMX Battery Co., Ltd.; Zhuhai CosMX Power Jinwan Subsidiary Co., Ltd.; Zhuhai CosMX Power Battery Co., Ltd.; Zhuhai CosMX Power Supply Co., Ltd.; Zejiang CosMX Battery Co., Ltd.; Zejiang CosMX Power Supply Co., Ltd.; and Chongqing CosMX Battery Co., Ltd.

Related Matters (37 C.F.R. § 42.8(b)(2)):

The '330 patent was asserted in the litigation *Ningde Amperex Technology Limited v. Zhuhai CosMX Battery Co., Ltd.*, Case No. 2:26-cv-00139 (E.D. Tex.), filed February 18, 2026, dismissed June 16, 2026.

Petitioner has previously filed petitions for *inter partes* review of Patent Owner's U.S. Patent Nos. 12,374,686 (IPR2026-00399; filed July 21, 2026), 10,916,769 (IPR2026-00398; filed July 21, 2026), and 12,294,082 (IPR2026-00401; filed July 22, 2026).

Petitioner is concurrently filing a petition for *inter partes* review of Patent Owner's U.S. Patent No. 11,699,808 (IPR2026-00408).

Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3)):

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Service Information (37 C.F.R. § 42.8(b)(4)): Please direct all correspondence regarding this Petition to counsel at the above addresses and to PTAB@sternekessler.com and COSMXPTAB@leehayes.com. Petitioner consents to service by email at the addresses above.

XIV. PROCEDURAL STATEMENTS

This Petition is filed in accordance with 37 C.F.R. § 42.106(a). Concurrently filed herewith are a Power of Attorney and Exhibit List under 37 C.F.R. §§ 42.10(b) and 42.63(e), respectively. The required fee is paid through Deposit Acct. No. 19-0036 (Customer ID No. 45324). The Office is authorized to charge any fee deficiency, or credit any overpayment, to Deposit Acct. No. 19-0036 (Customer ID No. 45324).

XV. CONCLUSION

The Board should institute review of claims 1-20 and find them unpatentable.

Respectfully submitted,

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XVI. APPENDIX A: CHALLENGED CLAIMS

A. Comparison of Independent Claims

Claim Element	Independent Claim 1		Independent Claim 11
[1.P]	A lithium-ion battery, comprising:	[11.P]	A lithium ion battery, comprising:
[1.A]	a positive electrode comprising a positive current collector and a positive electrode active material layer containing lithium cobalt oxide, wherein the positive electrode active material layer is formed on the positive current collector, and	[11.A]	a positive electrode, comprising a positive current collector and a positive electrode active material layer being formed on the positive current collector,
[1.B]	the positive electrode active material layer is provided with a first recess accommodating a positive lead being coupled with the positive current collector;	[11.B]	wherein the positive electrode active material layer is provided with a first recess accommodating a positive lead being coupled with the positive current collector;
[1.C]	a negative electrode comprising a negative current collector and a negative electrode active material layer containing graphite or silicon, wherein the negative electrode active material layer is formed on the negative current collector,	[11.C]	a negative electrode, comprising a negative current collector and a negative electrode active material layer being formed on the negative current collector,
[1.D]	the negative electrode active material layer being provided with a second recess accommodating a negative lead being coupled with the negative current collector; and	[11.D]	wherein the negative electrode active material layer is provided with a second recess accommodating a negative lead being coupled with the negative current collector; and

Claim Element	Independent Claim 1		Independent Claim 11
[1.E]	the negative lead is disposed on a surface of the negative current collector facing away from the center of the battery; and	[11.E]	the negative lead is disposed on a surface of the negative current collector facing away from the center of the battery; and
[1.F]	a portion of the negative current collector where the negative lead is disposed extends towards the center of the battery;	[11.F]	a portion of the negative current collector where the negative lead is disposed extends towards the center of the battery;
[1.G]	a separator disposed between the positive electrode and the negative electrode; and	[11.G]	a separator disposed between the positive electrode and the negative electrode; and
[1.H]	an electrolyte.	[11.H]	an electrolyte.

B. Listing of All Challenged Claims

1. [1.P] A lithium-ion battery, comprising:

[1.A] a positive electrode comprising a positive current collector and a positive electrode active material layer containing lithium cobalt oxide, wherein the positive electrode active material layer is formed on the positive current collector, and

[1.B] the positive electrode active material layer is provided with a first recess accommodating a positive lead being coupled with the positive current collector;

[1.C] a negative electrode comprising a negative current collector and a negative electrode active material layer containing

graphite or silicon, wherein the negative electrode active material layer is formed on the negative current collector,

[1.D] the negative electrode active material layer being provided with a second recess accommodating a negative lead being coupled with the negative current collector; and

[1.E] the negative lead is disposed on a surface of the negative current collector facing away from the center of the battery; and

[1.F] a portion of the negative current collector where the negative lead is disposed extends towards the center of the battery;

[1.G] a separator disposed between the positive electrode and the negative electrode; and

[1.H] an electrolyte.

2. The lithium ion battery of claim 1, wherein a distance between a center of the first recess and one end of the positive electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the positive electrode active material layer; and a distance between a center of the second recess and one end of the negative electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the negative electrode active material layer.

3. The lithium ion battery of claim 1,

[3.A] wherein, the positive lead is disposed on a surface of the positive current collector facing a center of the battery; and

[3.B] a portion of the positive current collector where the positive lead is disposed extends away from the center of the battery.

4. The lithium ion battery of claim 2, wherein the first recess has a length of 1-100 mm less than a length of the positive lead, the first recess has a width of 1-10 mm larger than a width of the positive lead, the second recess has a length of 1-100 mm less than a length of the negative lead, and the second recess has a width of 1-10 mm larger than a width of the negative lead.

5. The lithium ion battery of claim 1, wherein the first recess has a length of 1-100 mm less than a width of the positive electrode active material layer, and the second recess has a length of 1-100 mm less than a width of the negative electrode active material layer.

6. The lithium ion battery of claim 1, wherein the first recess has a depth of 0.005-0.1 mm larger than a thickness of the positive lead, and

the second recess has a depth of 0.005-0.1 mm larger than a thickness of the negative lead.

7. The lithium ion battery of claim 1, wherein a length of a portion of the positive lead in the first recess is less than a width of a remaining portion of the positive electrode active material layer from an edge of a first insulating glue layer covering the positive electrode active material layer to an edge of the positive electrode active material layer opposite to the first recess.

8. The lithium ion battery of claim 1, wherein a width of a portion of the positive lead in the first recess is greater than a width of a remaining portion of the first recess not occupied by the positive lead located on one side of the positive lead.

9. The lithium ion battery of claim 1, wherein a surface of the positive current collector corresponding to the positive lead is covered with a third insulating glue layer.

10. The lithium ion battery of claim 1,

[10.A] wherein a top surface of the positive lead is provided with a first insulating glue layer,

[10.B] a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer,

[10.C] the second insulating glue layer has a width larger than a width of the second recess, and the second insulating glue layer has a length larger than a length of the second recess.

11. [11.P] A lithium ion battery, comprising:

[11.A] a positive electrode, comprising a positive current collector and a positive electrode active material layer being formed on the positive current collector,

[11.B] wherein the positive electrode active material layer is provided with a first recess accommodating a positive lead being coupled with the positive current collector;

[11.C] a negative electrode, comprising a negative current collector and a negative electrode active material layer being formed on the negative current collector,

[11.D] wherein the negative electrode active material layer is provided with a second recess accommodating a negative lead being coupled with the negative current collector; and

[11.E] the negative lead is disposed on a surface of the negative current collector facing away from the center of the battery; and

[11.F] a portion of the negative current collector where the negative lead is disposed extends towards the center of the battery;

[11.G] a separator disposed between the positive electrode and the negative electrode; and

[11.H] an electrolyte.

12. The lithium ion battery of claim 11, wherein a distance between a center of the first recess and one end of the positive electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the positive electrode active material layer, and a distance between a center of the second recess and one end of the negative electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the negative electrode active material layer.

13. The lithium ion battery of claim 11,

[13.A] wherein the positive lead is disposed on a surface of the positive current collector facing a center of the battery; and

[13.B] a portion of the positive current collector where the positive lead is disposed extends away from the center of the battery.

14. The lithium ion battery of claim 11, wherein the first recess has a length of 1-100 mm less than a length of the positive lead, the first recess has a width of 1-10 mm larger than a width of the positive lead, the second recess has a length of 1-1.00 mm less than a length of the negative lead, and the second recess has a width of 1-10 mm larger than a width of the negative lead.

15. The lithium ion battery of claim 11, wherein the first recess has a length of 1-100 mm less than a width of the positive electrode active material layer, and the second recess has a length of 1-100 mm less than a width of the negative electrode active material layer.

16. The lithium ion battery of claim 11, wherein the first recess has a depth of 0.005-0.1 mm larger than a thickness of the positive lead, and

the second recess has a depth of 0.005-0.1 mm larger than a thickness of the negative lead.

17. The lithium ion battery of claim 11, wherein a length of a portion of the positive lead in the first recess is less than a width of a remaining portion of the positive electrode active material layer from an edge of a first insulating glue layer covering the positive electrode active material layer to an edge of the positive electrode active material layer opposite to the first recess.

18. The lithium ion battery of claim 11, wherein a width of a portion of the positive lead in the first recess is greater than a width of a remaining portion of the first recess not occupied by the positive lead located on one side of the positive lead.

19. The lithium ion battery of claim 11,

[19.A] wherein a first location of a top surface of the positive lead is provided with a first insulating glue layer;

[19.B] a second location of a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer; and

[19.C] a third location of a surface of the positive current collector corresponding to the positive lead is covered with a third insulating glue layer.

20. The lithium ion battery of claim 19, wherein the second insulating glue layer has a width larger than a width of the second recess, and the second insulating glue layer has a length larger than a length of the second recess.

C. Comparison of Dependent Claims

Claim Element	Independent Claim 1 Set		Independent Claim 11 Set
[2]	The lithium ion battery of claim 1, wherein a distance between a center of the first recess and one end of the positive electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the positive electrode active material layer; and a distance between a center of the second recess and one end of the negative electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the negative electrode active material layer.	[12]	The lithium ion battery of claim 11, wherein a distance between a center of the first recess and one end of the positive electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the positive electrode active material layer, and a distance between a center of the second recess and one end of the negative electrode active material layer is $\frac{1}{4}$ - $\frac{3}{4}$ of a length of the negative electrode active material layer.
[3.A]	The lithium ion battery of claim 1, wherein, the positive lead is disposed on a surface of the positive current collector facing a center of the battery; and	[13.A]	The lithium ion battery of claim 11, wherein the positive lead is disposed on a surface of the positive current collector facing a center of the battery; and
[3.B]	a portion of the positive current collector where the positive lead is disposed extends away from the center of the battery.	[13.B]	a portion of the positive current collector where the positive lead is disposed extends away from the center of the battery.

Claim Element	Independent Claim 1 Set		Independent Claim 11 Set
[4]	The lithium ion battery of claim 2, wherein the first recess has a length of 1-100 mm less than a length of the positive lead, the first recess has a width of 1-10 mm larger than a width of the positive lead, the second recess has a length of 1-100 mm less than a length of the negative lead, and the second recess has a width of 1-10 mm larger than a width of the negative lead.	[14]	The lithium ion battery of claim 11, wherein the first recess has a length of 1-100 mm less than a length of the positive lead, the first recess has a width of 1-10 mm larger than a width of the positive lead, the second recess has a length of 1-[100] mm less than a length of the negative lead, and the second recess has a width of 1-10 mm larger than a width of the negative lead.
[5]	The lithium ion battery of claim 1, wherein the first recess has a length of 1-100 mm less than a width of the positive electrode active material layer, and the second recess has a length of 1-100 mm less than a width of the negative electrode active material layer.	[15]	The lithium ion battery of claim 11, wherein the first recess has a length of 1-100 mm less than a width of the positive electrode active material layer, and the second recess has a length of 1-100 mm less than a width of the negative electrode active material layer.
[6]	The lithium ion battery of claim 1, wherein the first recess has a depth of 0.005-0.1 mm larger than a thickness of the positive lead, and the second recess has a depth of 0.005-0.1 mm larger than a thickness of the negative lead.	[16]	The lithium ion battery of claim 11, wherein the first recess has a depth of 0.005-0.1 mm larger than a thickness of the positive lead, and the second recess has a depth of 0.005-0.1 mm larger than a thickness of the negative lead.

Claim Element	Independent Claim 1 Set		Independent Claim 11 Set
[7]	The lithium ion battery of claim 1, wherein a length of a portion of the positive lead in the first recess is less than a width of a remaining portion of the positive electrode active material layer from an edge of a first insulating glue layer covering the positive electrode active material layer to an edge of the positive electrode active material layer opposite to the first recess.	[17]	The lithium ion battery of claim 11, wherein a length of a portion of the positive lead in the first recess is less than a width of a remaining portion of the positive electrode active material layer from an edge of a first insulating glue layer covering the positive electrode active material layer to an edge of the positive electrode active material layer opposite to the first recess.
[8]	The lithium ion battery of claim 1, wherein a width of a portion of the positive lead in the first recess is greater than a width of a remaining portion of the first recess not occupied by the positive lead located on one side of the positive lead.	[18]	The lithium ion battery of claim 11, wherein a width of a portion of the positive lead in the first recess is greater than a width of a remaining portion of the first recess not occupied by the positive lead located on one side of the positive lead.
[9]	The lithium ion battery of claim 1, wherein a surface of the positive current collector corresponding to the positive lead is covered with a third insulating glue layer.	[19.C]	a third location of a surface of the positive current collector corresponding to the positive lead is covered with a third insulating glue layer.

Claim Element	Independent Claim 1 Set		Independent Claim 11 Set
[10.A]	The lithium ion battery of claim 1, wherein a top surface of the positive lead is provided with a first insulating glue layer,	[19.A]	The lithium ion battery of claim 11, wherein a first location of a top surface of the positive lead is provided with a first insulating glue layer;
[10.B]	a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer,	[19.B]	a second location of a surface of the positive electrode active material layer corresponding to the second recess is pasted with a second insulating glue layer;
[10.C]	the second insulating glue layer has a width larger than a width of the second recess, and the second insulating glue layer has a length larger than a length of the second recess.	[20]	the second insulating glue layer has a width larger than a width of the second recess, and the second insulating glue layer has a length larger than a length of the second recess.

**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION,
TYPEFACE REQUIREMENTS, AND TYPE STYLE REQUIREMENTS**

1. This Petition complies with the type-volume limitation of 14,000 words, comprising 12,675 words, excluding the parts exempted by 37 C.F.R. § 42.24(a).

2. This Petition complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word in 14-point Times New Roman.

Respectfully submitted,

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CERTIFICATION OF SERVICE (37 C.F.R. §§ 42.6(e), 42.105(a))

The undersigned hereby certifies that on July 28, 2026, true and correct copies of the foregoing **PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 12,278,330** and all associated exhibits were served in their entireties on the following party via FedEx Express®:

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