

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 IPR2025-00431
U.S. Patent No. 11,799,131 B2

**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE TO
PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,799,131**

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EXHIBIT LIST

<u>Exhibit No.</u>	<u>Description</u>
1001	U.S. Patent No. 11,799,131 (“the ’131 Patent”)
1002	Prosecution history of U.S. Patent No. 11,799,131 (“the ’131 Patent file history”)
1003	Declaration of Dr. Brett Lucht, Ph.D.
1004	<i>Curriculum Vitae</i> of Dr. Brett Lucht, Ph.D.
1005	China Patent Application Publication No. CN 106099187A to Zeng et al. (“Zeng”)
1006	Certified English Translation of China Patent Application Publication No. CN 106099187A to Zeng et al. (“Zeng”)
1007	U.S. Patent Application Publication No. 2013/0224535 A1 to Matsuoka et al. (“Matsuoka”)
1008	U.S. Patent Application Publication No. 2017/0288268 A1 to Kim et al. (“Kim”)
1009	Japan Patent Application Publication No. 2009-252349 to Sunose et al. (“Sunose”)
1010	Certified English Translation of Japan Patent Application Publication No. 2009-252349 to Sunose et al. (“Sunose”)
1011	China Patent No. 108023117 to Su et al. (“Su”)
1012	Certified English Translation of China Patent No. 108023117 to Su et al. (“Su”)
1013	China Patent Application Publication No. CN 105552439 A to Zhou et al. (“Zhou”)
1014	Certified English Translation of China Patent Application Publication No. CN 105552439 A to Zhou et al. (“Zhou”)
1015	Chinese Patent No. 106848381 (“Hong”) and Certified Translation of Hong
1016	Petition (Paper 1) in <i>Zhuhai CosMX Battery Co. v. Ningde Ampere Tech. Ltd.</i> , IPR2023-00586 (PTAB Feb. 23, 2023)

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1017	Decision Denying Institution (Paper 14) in <i>Zhuhai CosMX Battery Co. v. Ningde Amperex Tech. Ltd.</i> , IPR2023-00586 (PTAB Aug. 18, 2023)
1018	National Library of Medicine PubChem Pages
1019	Millipore Sigma data sheets for ethylene carbonate (EC), propylene carbonate (PC), ethyl propionate (EP), propyl propionate (PP), diethyl carbonate, and fluorobenzene
1020	TCI America page for 1,3,6-Hexanetricarbonitrile
1021	Complaint, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , No. 2:24-cv-00728-JRG (E.D. Tex. Sept. 6, 2024), ECF 1.
1022	Reserved
1023	U.S. Patent Application Publication No. 2017/0324116 A1 to Youichi Ohashi (“Ohashi”)
1024	U.S. Patent Application Publication No. 2016/0294007 A1 to Wang Kefei (“Kefei”)
1025	U.S. Patent Application Publication No. 2017/0069934 A1 to Yun-Hee Kim et al. (“Kim ’934”)
1026	Prosecution history of U.S. Patent No. 11,769,910 (“the ’910 Patent file history”)
1027	Alleged Infringement Claim Chart for ’131 Patent
1028	Second Amended Complaint for Patent Infringement, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , No. 2:24-cv-00728-JRG (E.D. Tex. Jan. 28, 2025), ECF 23.
1029	Partial Stay Order, <i>STA Grp. LLC v. Motorola Sols., Inc.</i> , No. 2:23-cv-00030-JRG-RSP (E.D. Tex. Aug. 27, 2024), ECF 402.
1030	Order, <i>Stellar, LLC v. Motorola Sols., Inc.</i> , No. 4:23-cv-00750-SDJ (E.D. Tex. Apr. 21, 2025), ECF 170
1031	Order, <i>Cellspin Soft, Inc. v. ByteDance Ltd.</i> , No. 2:23-cv-00496-JRG-RSP (E.D. Tex. Jan. 27, 2025), ECF 106
1032	Order, <i>Intercurrency Software LLC v. Binance Holdings Ltd.</i> , No. 2:23-cv-00370-JRG (E.D. Tex. Aug. 29, 2024), ECF 86

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1033	Order, <i>Netlist, Inc. v. Micron Tech., Inc.</i> , No. 2:22-cv-00203-JRG (E.D. Tex. Feb. 10, 2024), ECF 493
1034	Order, <i>BoxCast Inc. v. Resi Media LLC</i> , No. 2:21-cv-00217-JRG (E.D. Tex. May 25, 2022), ECF 163
1035	Order, <i>Datatreasury Corp. v. Fiserv, Inc.</i> , No. 2:13-cv-00431-JRG-RSP (E.D. Tex. Aug. 14, 2014), ECF 616
1036	Docket Navigator Time to Trial for Eastern District of Texas District Judge Rodney Gilstrap
1037	“Nearly two lithium battery fires per week on airplanes in the US alone,” CTIF (Dec. 19, 2024), available at https://ctif.org/news/nearly-two-lithium-battery-fires-week-airplanes-us-alone
1038	Declaration of John C. Evans in Support of Petitioner’s Response to Patent Owner’s Discretionary Denial Brief
1039	Report on District Judge Rodney Gilstrap from Lex Machina
1040	Verdict Form, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , No. 2:22-cv-00232-JRG (E.D. Tex. Feb. 9, 2024), ECF 345.
1041	Amended Final Judgment, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , No. 2:22-cv-00232-JRG (E.D. Tex. Sept. 3, 2024), ECF 427.
1042	Reserved
1043	Wheeler Group Research Webpage https://www.et.byu.edu/~wheeler/research.html
1044	Supplemental Declaration of Brett Lucht, Ph.D., dated February 18, 2026
1045	Deposition Transcript of Dean R Wheeler, Ph.D., dated January 28, 2026
1046	U.S. Patent Application Publication No. 2013/0323556 to Jeong et al.

<u>Exhibit No.</u>	<u>Description</u>
1047	International Patent Application Publication No. WO2018/088743 A1 to Choi et al. (“Choi”) and Certified English Translation of Choi
1048	U.S. Patent No. 11,769,910 to Kefei Wang et al. (“the ’910 Patent”)
1049	Claim Construction Order, <i>Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co.</i> , No. 2:24-cv-00728-JRG (E.D. Tex. Feb. 17, 2026), ECF 171.

I. INTRODUCTION

Patent Owner's ("PO") Response (Paper 28, "POR") reprises arguments the Board rejected in its Institution Decision (Paper 15, "Decision") finding Petitioner likely to prevail on all Grounds and Challenged Claims. The Board should confirm its preliminary findings, finding all Challenged Claims unpatentable.

II. GROUND 1: ZENG AND SUNOSE

A. Y/Z Ratio

Zeng discloses electrolytes containing both Y (trinitrile) and Z (PP). Pet., 20–26. In Embodiments 4 and 6, Z constitutes 17.7 wt% of the total electrolyte before adding LiPF_6 , placing the Y/Z ratio within the claimed range ($Y=1$ wt%). *Id.*, 21–25. The Y/Z ratio could not fall outside the claimed range without diluting PP with so much LiPF_6 that the resulting solution would approach nearly 5 molar LiPF_6 —five times the typical 1.0 molar concentration specified by Zeng. *Id.*, 23–26, 38–39; EX1003, ¶¶128–133. The claimed Y/Z range is obvious. The Board agreed. Decision, 32.

1. LiPF_6 added as a solid

PO contends one cannot determine Zeng's Z because of a single phrase: LiPF_6 "of a concentration of 1.0 mol/L is slowly added to the mixed [solvent] solution." POR, 8 (quoting EX1006, ¶[0037]). Reading that phrase in isolation—divorced from context and common sense—PO contends a POSITA would understand Zeng to

require drastically altering the specified EC/PC/DEC/FB/EP/PP solvent recipe with an undisclosed volume of an undisclosed solvent in which LiPF_6 has already been dissolved to 1.0M. POR, 8-9. That interpretation is unworkable and contrary to Zeng's disclosure. EX1044, ¶12. The Board should reject this argument again. Decision, 24-29.

Zeng specifies a mass ratio for the EC/PC/DEC/FB/EP/PP base solvent mixture in which LiPF_6 is dissolved. Pet., 21. In this situation, a POSITA would add solid LiPF_6 to the specified solvent mixture. *Id.*, 21-22, n.4. Indeed, Zeng's focus on specific electrolyte compositions alone refutes PO's argument. EX1006, 1; EX1044, ¶13. Moreover, every reference of record teaching an LiPF_6 electrolyte concentration—including the other Zeng patent PO relies on—supports that a POSITA would have added solid LiPF_6 to reach a 1.0M concentration in Zeng's specified solvent. EX1044, ¶14; EX1023, ¶¶[0237], [0245], [0255]; EX1024, ¶[0048], EX1025, ¶[0090]; Decision, 26-27 (finding EX2022 supports Petitioner's position). Dr. Wheeler's testimony is consistent: he has never prepared an electrolyte by pouring an unknown volume of premixed 1.0M LiPF_6 solvent solution into an already-specified solvent recipe. EX1045, 55:4-8.

The Board recognized that PO manufactures uncertainty by interpreting Zeng as failing to disclose (1) what other solvent the LiPF_6 is dissolved in; and (2) how much of that solution is added to what amount of Zeng's already-specified solvent.

Decision, 25-26 (“Adding 1.0 liter of the [1.0M] LiPF_6 solution...to 1.0 liter of the electrolyte solvent would result in a composition [0.5 mol/L] vastly different from that [0.01 mol/L] created by adding 1.0 liter of 1.0M LiPF_6 solution to 99.0 liters of electrolyte solvent.”); EX1044, ¶¶15-16. In contrast, “Dr. Lucht’s interpretation of Zeng’s disclosure leads to information that a POSITA could have employed with confidence to produce Zeng’s Embodiments.” Decision, 28.

PO’s interpretation contradicts its position that “chemical interactions and effects of combinations of various compounds in electrolyte solutions are complex and unpredictable.” POR, 54. Throughout this proceeding, PO has maintained lithium-ion battery chemistry is too complex and unpredictable to permit a POSITA even minimal deviation from a prescribed formulation. POPR, 29, 54-56; POR, 12, 54-56. Yet PO departs from that position here, reading Zeng as authorizing the addition of any volume of any solvent containing LiPF_6 to its precisely specified electrolytes. Dr. Wheeler conceded this would cause unpredictable interactions. EX1045, 50:11-51:16. PO’s argument fails on its own terms. EX1044, ¶17.

The logical and obvious interpretation is a POSITA would have added solid LiPF_6 to the specified EC/PC/DEC/FB/EP/PP solvent mixture until reaching a concentration of 1.0M—conventional practice. EX1044, ¶18; EX1023, ¶¶[0237], [0245], [0255]; EX1024, ¶[0048], EX1025, ¶[0090]; EX1008, ¶[0091]; EX1015, ¶¶[0034]-[0036]; EX1047, ¶¶[171], [176]; EX2022, ¶¶[0030], [0057].

While Zeng's *translated* language may—if read in isolation without any knowledge in the art—suggest adding a superfluous LiPF_6 solution, a POSITA would not have done so given their knowledge and Zeng's context. EX1044, ¶18. A POSITA is not an automaton who blindly follows inexact wording of prior art when it makes no practical sense in context and the intent is clear. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007); *Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013); *LG Elecs. Inc. v. Immervision, Inc.*, 39 F.4th 1364, 1372 (Fed. Cir. 2022) (A POSITA “would mentally disregard the [obviously] errant information as a misprint or mentally substitute it for the correct information.”)

PO agrees a POSITA had an advanced degree and years of experience. POR, 5; Pet., 16. Possessing lithium-ion battery knowledge and willingness to understand Zeng, this POSITA would mix solid LiPF_6 into the specified solvent mixture to a concentration of 1.0M. It was common knowledge lithium-ion battery electrolytes typically contain around 1.0M LiPF_6 . EX1044, ¶19; EX1023, ¶¶[0237], [0245], [0255]; EX1024, ¶[0048], EX1025, ¶[0090]; EX1008, ¶[0091]; EX1015, ¶¶[0034]-[0036]; EX1047, ¶¶[171], [176]; EX2022, ¶¶[0030], [0057]. Dr. Wheeler admitted that 0.8M-1.2M is typical (EX1045, 38:11-22), and his own battery modeling research used electrolytes with “1 molar LiPF_6 .” EX1043, 1. The Board correctly found PO's Zeng interpretation would not yield a standard molarity, confirming PO is wrong. Decision, 25-26.

Finally, PO argues the existence of commercially-available 1.0M LiPF₆ solutions supports its interpretation. POR, 10. Off-the-shelf LiPF₆ solutions serve a different purpose: providing a convenient base for researchers who want to add additives without crafting a particular base electrolyte mixture. EX1044, ¶20. Zeng does the opposite—teaching a specific base solvent recipe to achieve desired performance characteristics. A POSITA would not ignore that context and introduce an unknown volume of unknown solvent. *Id.*

PO's interpretation elevates form over substance, introducing multiple unknown variables into an otherwise precisely specified formulation—certainly not Zeng's intent. EX1044, ¶21. A POSITA would agree with the Board: Petitioner's straightforward reading of Zeng is sufficient to “produce a resulting electrolyte solution that had a LiPF₆ concentration of 1.0 mol/L.” Decision, 28.

2. Criticality of Y/Z

PO's criticality argument fails for two reasons: (1) “critical” range doctrine does not apply, and (2) the '131 Patent fails to demonstrate criticality of the Y/Z range. POR, 13-14.

a. Zeng's Y/Z values fall inside the claimed Y/Z range

Criticality doctrine applies when prior art teaches a range *overlapping* or *encompassing* the claimed range. *E.I. DuPont de Nemours & Co. v. Synvina C.V.*,

904 F.3d 996, 1006 (Fed. Cir. 2018); *In re Geisler*, 116 F.3d 1465, 1469-70 (Fed. Cir. 1997). But Zeng’s Y/Z ratio falls entirely within the claimed range. Pet., 39 (citing EX1003, ¶¶133-134). Dr. Wheeler does not dispute Dr. Lucht’s opinion on Zeng’s Y/Z ratio if LiPF_6 is added as a solid. EX1045, 59:14-60:5. Because Zeng does not merely disclose overlapping/encompassing Y/Z ranges—“criticality” is irrelevant. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782–83 (Fed. Cir. 1985); EX1044, ¶23.

b. ’131 Patent does not establish criticality

PO bears the “burden of proving criticality” of the Y/Z range. *DuPont*, 904 F.3d at 1006. This requires factual evidence beyond “[m]ere argument or conclusory statements in the specification.” *Geisler*, 116 F.3d at 1470 (quoting *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1994)). PO cites a ’131 Patent statement that having Y/Z inside the claimed range provides “better” inhibition of DC internal resistance rise. POR, 13-14 (citing EX1001, 28:56-64).¹ Nothing supports that statement besides PO’s say so. EX1001, 28:59-64. PO cites the Table 2 test results as showing “better” performance when Y/Z is inside the claimed range, but this does not satisfy PO’s burden. POR, 14.

¹ PO cites other statements in the specification, but none addresses the Y/Z ratio. EX1001, 1:43-62, 22:24-34.

First, “better” performance inside the Y/Z range is insufficient. Rather, the Y/Z range must “produce[] a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.” *DuPont*, 904 F.3d at 1006 (quoting *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)). Discovery of a merely improved/better range by routine experimentation is “not inventive.” *Geisler*, 116 F.3d at 1470 (quoting *Aller*, 220 F.2d at 456). “Better” inhibition of DC internal resistance rise is a result differing “merely in *degree*,” not “in *kind*.” PO’s cited comparisons show improvements of 16% and 11%. POR, 14 (citing EX1001, Table 2); EX1044, ¶25. But the Federal Circuit has held even a 26% improvement in wear resistance—substantially greater than the 11–16% difference PO cites—failed to demonstrate “unexpected results.” *Geisler*, 116 F.3d at 1470. By contrast, the Court has found a 20-fold improvement in potency—ten-times greater than expected—sufficient to show “unexpected results.” *Amgen Inc. v. Sandoz Inc.*, 66 F.4th 952, 963–64 (Fed. Cir. 2023). PO’s cited improvement falls far short of *Geisler* insufficient improvement, much less *Amgen*’s.

Second, Table 2 does not even show what PO contends—the claimed Y/Z range is “better” for internal resistance. EX1044, ¶26. Below-range example D2-4 has a better resistance than in-range examples S2-2, S2-3, S2-5, S-26, and D2-1 when fresh. EX1044, ¶27. At 200 cycles, example D2-4 performed better than in-range examples D2-2, D2-1, and S2-6. *Id.* At 400 cycles, example D2-4 topped in-

range examples D2-1 and D2-2. *Id.* Above-range example D2-3 also performed better than multiple in-range examples. *Id.*, ¶28. And in-range examples were inconsistent. *Id.*, ¶29. These results contradict the Y/Z range being critical. *In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) (unexpected results must be commensurate with entire claimed range).

Moreover, the Table 2 tests do not hold other formulation variables constant, so any observed performance improvements cannot be definitively attributed to Y/Z. EX1044, ¶30; EX1001, 1:43-3:26, 21:10-46, 27:21-51 (performance depends on combinations of X, Y, Z, X+Y, X/Y, Y/Z, D1, D2, and D1/D2).

Accordingly, the evidence aligns with claimed Y/Z range being expressly approximate—“*about* 0.01” to “*about* 0.3”—which permits +/- 10% variation and “should be understood flexibly.” EX1001, 4:17-31. Indeed, the related ’910 Patent recites a Y/Z range with a low-end numerical limit 2x greater than the ’131 Patent—“*about* 0.02” to “*about* 0.3.” EX1048, 34:29. This permitted variation in the Y/Z range contradicts PO’s claim that the strict numerical limits are critical. EX1044, ¶31.

B. D1, D2, and D1/D2

Petitioner relies on Sunose Examples 2-4, which disclose the claimed D1, D2, and D1/D2 range. Pet., 33. PO’s collateral attacks lack merit and should not move the Board from its preliminary finding. Decision, 35-36.

1. Sunose Examples 2-4 Report Plausible Compaction Density Values

PO reprises the same unpersuasive argument from its POPR: certain compaction-density values reported in Sunose are “physically impossible,” so Sunose’s entire disclosure should be discarded. POR 15–17. The Board rejected this because PO does not dispute that Sunose’s Examples 2–4—the examples Petitioner cites—report compaction densities below the purported crystalline density of lithium cobalt oxide (LCO). Decision, 35–36. The Board’s reasoning remains correct. EX1044, ¶¶32-33.

Sunose’s Examples 2-4 report compaction densities below the value PO cites as crystalline density of LCO—5.1 g/cm³. Pet., 33. Dr. Wheeler confirmed this. EX1045, 72:16-73:6. Accordingly, none of the relevant Sunose Examples rely on purportedly impossible densities. EX1044, ¶34.

Sunose Examples 3 and 4 report compaction densities below Dr. Wheeler’s calculated maximum for Sunose’s composite active material. *Id.*, ¶35. Dr. Wheeler confirmed this. EX1045, 77:6-10. Thus, even accepting Dr. Wheeler’s calculation, Sunose Examples 3 and 4 report plausible compaction densities. EX2050, 99:17-18,

114:16-115:1, 117:4-8, 119:10-14, 127:1-5, 127:9-13 (Dr. Lucht testifying the compaction densities for cited Sunose Examples appeared reasonable).²

Regardless, Sunose remains prior art for “whatever is disclosed therein.” *Geo. M. Martin Co. v. All. Mach. Sys. Int’l LLC*, 618 F.3d 1294, 1302-03 (Fed. Cir. 2010) (quoting *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1357 (Fed. Cir. 2003)). PO’s peripheral attacks do not change what Sunose discloses: compaction densities D1 and D2 for single- and double-sided electrode portions, and a desired D2/D1 ratio.

PO argues Sunose's packing/active material density must refer to something other than compaction density but never explains what. POR, 18. Yet Dr. Wheeler conceded Sunose "thought they meant [compaction density]." EX1045, 78:18-79:2. His conclusory opinion is he "just knows that it's wrong" because of purportedly impossible density values. *Id.*, 77:22-78:15. Sunose is clear: packing/active material density means the density of active material after "performing a fixed-size press using a rolling machine." EX1010, ¶¶[0016], [0028], [0031]; Pet., 34. Dr. Wheeler

² Dr. Wheeler had to research and calculate the purported LCO density and Sunose’s maximum composite density—he did not know offhand whether Sunose’s reported densities were supposedly impossible. EX1045, 71:20-75:18; 140:11-143:12.

agrees Sunose's rolling process would compact the electrode active material. EX1045, 79:14-83:10. Sunose's actual disclosure is undisputed. EX1044, ¶¶36-37.

PO argues Sunose's compaction densities "quantitatively" differ from those of the '131 Patent. POR, 17. But density is always mass divided by volume. EX1044, ¶38; EX1045, 83:15-85:1 (Dr. Wheeler agreeing density is just mass/volume). Compaction density in the '131 Patent and Sunose refer to the same quantity—active material mass divided by volume of the active material after compaction. Pet., 34.

PO argues compaction density can *only* be determined by disassembling a finished product and directly measuring the active material's weight and thickness. POR, 16. Incorrect. First, the claims recite no method for determining compaction density. Second, as PO acknowledged, Sunose's reported compaction-density values (and density ratio) have "some physical origin." Decision, 35–36. That origin is Sunose's disclosed manufacturing technique: compacting a known mass of electrode active material (coat weight) into a known volume/thickness using a fixed-gap roll press. From this, compaction density can be calculated (mass/volume) without direct measurement of the finished electrode. EX1044, ¶¶39-40.

Sunose explains that the "prescribed active material density ratio" is obtained "by varying the thickness...of the active material and performing a fixed-size press." EX1010, ¶[0016]. Dr. Wheeler admitted the required information is known or readily knowable: the mass of material coated on the electrode plate, the electrode

plate area, and the fixed roll press gap height. EX1045, 85:3-86:20; EX1010, ¶¶[0029]-[0030] (providing coat weights for single- and double-sided coatings). With those inputs, a POSITA could readily calculate compaction density. EX1044, ¶40.

Sunose's technique explains why some reported compaction-density values appear high: in some examples, attempting to compact too much active material through the fixed roll-press gap. EX1044, ¶41. A known mass of coating material and known compaction volume yield a determinate compaction density—even if the electrode plate could not physically be rolled. *Id.* For example, Comparative Example 3 broke because Sunose tried compacting more active material than the fixed compaction volume could physically accommodate. EX1010, ¶[0041] (Table 1); EX1044, ¶42; EX1045, 9:20-93:22 (Dr. Wheeler agreeing Sunose teaches Comparative Example 3 broke during rolling).

Regardless, PO's focus on certain example compaction density values is misplaced. Sunose recognized a problem in electrode manufacturing where the rolling process applies uneven pressure to single- and double-sided coated portions because of the thickness difference between them. Either too much pressure is applied to the double-sided portion or too little to the single-sided portion, both scenarios causing issues. EX1010, ¶¶[0007]-[0010]. Sunose's solution is controlling the ratio of compaction densities between the single-sided (M) and double-sided (N)

active material layers so “the ratio of the density of active material [is] $0.7 < N/M < 1.0$.” EX1010, ¶¶[0012]-[0014]; Pet., 33. This is the reciprocal of the claimed D1/D2 ratio, so Sunose’s desired ratio is about $1.0 < D1/D2 < \text{about } 1.43$. Pet., 33, n.7; EX1044, ¶44. This overlaps the claimed range, rendering it obvious.³

Finally, PO argues that Sunose is not enabled. POR, 19-23. But Sunose need not be enabled for obviousness. *Amgen*, 314 F.3d at 1357. A POSITA need only have been able to make the claimed invention based on the combined teachings of Zeng and Sunose. *Martin*, 618 F.3d at 1303; *Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989). PO complains that Sunose does not disclose the active material coat weight for all examples, and that it is “beyond the skill of the POSITA” to determine this without undue experimentation. POR, 19-20. PO underestimates a POSITA’s capabilities. EX1044, ¶45.

As discussed, Sunose obtains the “prescribed active material density” by “varying the thickness” of the active material and “performing a fixed-size press.” EX1010, ¶[0016]. Sunose controls the packing/compaction densities by adjusting

³ The claimed range is “*about* $0.8 \leq D1/D2 \leq \text{about } 1.2$ ”. EX1001, Claims 1, 14. The specification defines “about” to include “less than or equal to $\pm 10\%$ of the stated value[.]” *Id.*, 4:12-31. Therefore, the upper limit of the range is at least 1.32.

coating amounts of active material (“varying the thickness”) on the single- and double-sided portions of the electrode plate while compacting both portions to the same fixed/known volume (roller gap x electrode plate surface area). *Id.*, ¶¶[0016], [0029]-[0034]; EX1044, ¶47. A POSITA needs only algebra: coating amount=(target compaction density)×(fixed volume). EX1044, ¶48; EX1045, 85:3-14 (Dr. Wheeler admitting it is “fairly simple” to calculate compaction density). At most, a POSITA would need routine fine-tuning—not undue experimentation—to determine a desired coating amount or density. *Cephalon, Inc. v. Watson Pharms., Inc.*, 707 F.3d 1330, 1336 (Fed. Cir. 2013). Thus, Sunose provides sufficient guidance to determine the coating amount/density without undue experimentation. *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1565 (Fed. Cir. 1996); EX1044, ¶¶48-49.

2. D1/D2 Range is Not Critical

It is irrelevant whether the D1/D2 range is “critical” because the cited Sunose Examples fall completely inside the claimed range. *Supra* Section II.A; Pet., 33. Regardless, the ’131 Patent does not demonstrate criticality. At the low end, decreasing D1/D2 from 0.8 (inside) to 0.7 (outside) reduced capacity retention by only 3.5% and 7.4% after 200 and 400 cycles, respectively. EX1001, Table 7; EX1044, ¶54. At the high end, increasing D1/D2 from 1.2 (inside) to 1.3 (outside) reduced capacity retention by only 2.7% and 5.9% after 200 and 400 cycles,

respectively. *Id.* These are minor improvements in degree, not kind. *Geisler*, 116 F.3d at 1470; *compare with Amgen*, 66 F.4th at 963–64; *see also* EX1044, ¶53 (’131 Patent does not meaningfully test outside the range).

Finally, the Board rejected PO’s synergy argument, correctly observing that “another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the difference would otherwise be obvious.” Decision, 36-37 (quoting *Ex parte Obiaya*, 227 USPQ 58, 60 (BPAI 1985)). PO misunderstands the law and the Board’s decision. The Board did not determine the “synergy” was obvious—which is irrelevant—but that the combination would necessarily enjoy that synergy. This renders the claimed range obvious, even if Sunose did not appreciate the same benefits of its solution that the ’131 Patent observed. *Obiaya*, 227 USPQ at 60.

C. Combining Sunose with Zeng

The Board correctly determined that Petitioner provided adequate motivation to combine Zeng and Sunose. Decision, 32-33. PO ignores those motivations and levies unpersuasive collateral attacks.

PO cites Dr. Lucht’s statement that there is a “need to use some rolled electrode configuration in Zeng’s batteries.” POR, 25 (emphasis omitted). PO misinterprets his testimony. The “need” stems from the real-world necessity to use standard commercial electrode structures, which have two principal varieties:

spiral/wound/jelly roll (like Sunose) and stacked/laminated/prismatic. EX2050, 149:11–18; EX1044, ¶56; EX1046, ¶[0004] (explaining that electrode assemblies are classified as jelly roll, stacked, or a combination of the two).

Because Zeng is neutral on electrode structure, a POSITA wanting a spiral/wound electrode cell (e.g., for any application using a cylindrical form factor) would have paired Zeng’s electrolyte with a spiral/wound electrode configuration like Sunose’s. EX1044, ¶57. This aligns with Dr. Lucht’s prior testimony: “Zeng does not specify a particular physical embodiment for its batteries,” and therefore “a POSITA would have needed to choose a battery/electrode embodiment to implement Zeng’s electrolyte solutions.” IPR2025-00722, EX1003, ¶112.⁴

PO claims Sunose’s solution is unique to the particular compaction equipment used by Sunose. POR, 26. Conclusory. Dr. Wheeler does not identify other equipment that would avoid the problem addressed by Sunose. EX1044, ¶58; EX1010, ¶[0007] (problem applies to fixed-gap and fixed-pressure presses). Moreover, “any need or problem known in the field of endeavor at the time of

⁴ If a POSITA wished to make a laminated/stacked battery, the POSITA would have combined Zeng with a laminated/stacked reference. But that is irrelevant here.

invention...can provide a reason for combining the elements in the manner claimed.”
Decision, 33-34 (quoting *KSR*).

Regardless, PO ignores the other motivations Petitioner identified for combining Zeng and Sunose. Pet., 36-38. These would have motivated a POSITA separately from the problem addressed by Sunose. EX1044, ¶59.

PO argues “extensive testing” would be required to ensure compatibility between Zeng’s electrolyte and Sunose’s electrode configuration—pure attorney argument resting on a conclusory statement from Dr. Wheeler. POR, 25–26. Dr. Wheeler admitted Zeng is electrode-structure-neutral, Sunose is electrolyte-composition-neutral, and neither reference teaches away from the combination. EX1045, 119:11-121:10. Consistently, Dr. Lucht testified that an electrolyte that “works well in one” configuration generally “works well in the other ones.” EX2050, 148:1–12; EX1044, ¶60 (Dr. Lucht explaining performance generally depends on active-material energy density, effective area, and electrode–electrolyte interface—not whether electrodes are spiral-wound or stacked).

Even if *some* testing were needed, no evidence shows it would be “extensive” or “undue.” PO identifies no specific test(s), no reason a single test would not suffice, and no basis to conclude the testing would not be routine and likely to succeed. One test would suffice: “injecting Zeng’s electrolyte(s) into Sunose’s battery to confirm the battery works.” EX1044, ¶61. PO’s position would bar combining any electrolyte

reference with any electrode reference to demonstrate obviousness. The law supports no such rule.

III. GROUND 2: MATSUOKA

PO mischaracterizes Ground 2 by assuming Petitioner relies on Matsuoka to select PP as a component of Zeng's electrolytes. POR, 27-31. As the Board recognized, "Petitioner relies on Zeng's disclosure to include PP in the solvent, not Matsuoka, and alternatively relies on Matsuoka in addition to Zeng for an appropriate amount of PP." Decision, 44.⁵ Petitioner cites Matsuoka solely for an express disclosure of an appropriate *weight* for PP—a compound Zeng's electrolytes already have—in the total electrolyte. Pet., 50-52.

Petitioner included Ground 2 as further evidence of obviousness, anticipating PO would argue Zeng does not expressly disclose the PP weight percentage in the total electrolyte. But PO now admits "Zeng already provides the POSITA with the necessary amount of PP to include in a relative mass ratio of the base solvent

⁵ Though not required, Petitioner identified motivation to select PP from Matsuoka. Pet., 51-55.

mixture.” POR, 31-32.⁶ (emphasis omitted). Petitioner agrees. And Matsuoka further renders it obvious.

PO’s arguments against Matsuoka are distractions, attacking a ground Petitioner did not propose: critiques of Matsuoka’s purportedly different “additive” terminology, use of mononitriles, discussion of low-temperature performance, and inclusion of organic lithium salt are all irrelevant. POR, 31-32. None of these bears on whether a POSITA would consult Matsuoka for disclosure of an example weight percentage of PP in an electrolyte *already containing PP*. EX1044, ¶63.

That other Matsuoka teachings might support other, unasserted modifications to Zeng is irrelevant. Obviousness does not require “bodily incorporation” of every feature of a secondary reference into the primary reference. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). It is also irrelevant whether Matsuoka might suggest some “better” combination than the one proposed because “[i]t’s not necessary to show that a combination is “the *best* option, only that it be a *suitable* option.”” *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021) (quoting *Par Pharm., Inc. v. TWi Pharms., Inc.*, 773 F.3d 1186, 1197–98 (Fed. Cir. 2014)). PO cannot have it

⁶ PO argues this admission is not contradictory because the addition of an undisclosed volume of an undisclosed LiPF₆ solution renders the ultimate weight percentage unknown. POR, 32-33. As explained in Section II.A, this is incorrect.

both ways: having insisted that lithium-ion electrolytes are too complex and unpredictable to allow changes, PO cannot simultaneously contend that a POSITA would drastically modify Zeng's formulations. POPR, 29, 54-56; POR, 12, 54-56.

Petitioner proposes a minimal combination—citing Matsuoka only for a PP weight percentage of a compound already present in Zeng's electrolytes, and Matsuoka's preferred PP range encompasses the PP amount already in Zeng's electrolytes. Pet., 50-54; EX1044, ¶64. Under PO's view, a POSITA would favor this incremental (if any) adjustment over the reformulations PO suggests.

Dr. Wheeler testified PP is a "pure component" with well-known and predictable properties. EX1045, 134:21-135:20; EX1019, 27-30 (data sheet for pure PP showing its properties). Dr. Wheeler also testified that his research focuses on computer simulation of electrolyte/battery systems, that simulation tools have been commercially available for decades, and that he could have simulated a system with an electrolyte including PP if he were interested. EX1045, 20:10-21:12, 29:2-36:19, 42:4-43:4; EX1043. Thus, even under PO's framework, the combination would have been predictable and expected to succeed—if it modifies Zeng's compositions at all. EX1044, ¶65.

PO cites a German court applying foreign law to a foreign patent—irrelevant. POR, 28. More relevant, a U.S. court found claim 1 of the related '363 Patent anticipated by Zeng. EX1040, 5; EX1041, 2.

IV. GROUNDS 3, 4, 10: KIM

Petitioner cites Kim to show including both trinitrile (Y) and PP (Z)—and adjusting their relative amounts Y/Z—was known to improve electrolyte performance, further motivating a POSITA to focus on and optimize Y/Z. Pet., 56; EX1044, ¶66. Kim’s Examples 1 and 2 have the same electrolyte composition except for trinitrile and PP in different proportions, and showed better capacity retention and thickness stability than electrolytes lacking one or both of those components. Pet., 57-59. This would have further motivated a POSITA to fine-tune Y/Z in Zeng’s electrolytes, to adopt Matsuoka’s preferred PP amounts (if at all) when implementing Zeng, and to substitute the EA for PP in Zhou’s Example 8. Pet., 57-60. The Board found the Petition identified sufficient motivation for combining Kim with the other references. Decision, 56-57, 59-60, 75-76.

Evading the Grounds’ main point, PO raises irrelevant collateral attacks on Kim’s testing methodology and results. POR, 40-44. The Board correctly dismissed PO’s nitpicking because prior art must be read in context, accounting for a POSITA’s knowledge and the inferences and creative steps a POSITA would employ. Decision, 55; EX1044, ¶67. A reference is prior art “for whatever is disclosed therein.” *Martin*, 618 F.3d at 1302-03 (quoting *Amgen*, 314 F.3d at 1357). PO concedes Kim reports improved performance when both trinitrile and PP are

present, and their relative proportions varied but asks the Board to disregard Kim as a reference by nitpicking its experimental details. That is not the law.

V. GROUNDS 5-8

PO concedes Su teaches anode D2 values within the claimed range. POR, 47-48. PO only contends Sunose's compaction density ratio applies to cathodes, not anodes as required by claims 3 and 16. But Dr. Wheeler admitted Sunose's N/M ratio disclosure—and the problem Sunose addresses—applies to electrode plates generally, both anodes and cathodes. EX1045, 110:2-14, 113:18-114:21. Dr. Wheeler is correct; EX1044, ¶¶68-69.

Although Sunose's examples are cathodes, Sunose's invention is not cathode-specific. EX1044, ¶¶70-71 (problem is geometric/structural, not chemical). Sunose repeatedly describes and claims controlling the compaction density ratio for electrode plates generally—positive or negative—before describing examples. EX1010, Abstract, ¶¶[0001], [0004], [0011]-[0018], [0021], claims 1–3.

Petitioner's combinations incorporate Sunose's entire electrode structure, not just a cathode. Pet., 36-38. Indeed, Zeng and Zhou describe electrolytes, not electrode structures, and a battery needs both positive (cathode) and negative (anode) electrodes to function. The electrodes come from Sunose. *Id.*; EX1044, ¶72.

VI. GROUND 9: ZHOU AND SUNOSE

PO does not dispute Zhou’s disclosure but presents meritless arguments regarding the selection of Zhou.

A. Selecting Zhou

PO argues Zhou is “fundamentally different” and not analogous art to the ’131 Patent because Zhou pertains to 4.35V batteries while the ’131 Patent relates to 4.45V batteries. POR, 48-49. PO cites no evidence other than Dr. Wheeler’s conclusory statement (EX2015, ¶¶241-247), which carries no weight. 37 C.F.R. §42.65.

Even if a 0.10V difference were “substantial,” it is irrelevant. The ’131 Patent’s claims impose no voltage limitations. EX1001, claims 1–17. As the Board held, Zhou need not address the same problem, purpose, or motivation as the ’131 Patent for a POSITA to consider its teachings. Decision, 68-69. Regardless, Zhou *does* address problems identified by the ’131 Patent, including preventing battery capacity decreases over cycles. *Compare* EX1014, ¶¶[0006], [0061]-[0062] with EX1001, 1:32-39; EX1044, ¶¶74-76.

B. Zhou’s Example 8

PO makes several arguments boiling down to: Example 8 is not the best Zhou example. POR, 49-53. Irrelevant. *Par Pharm.*, 773 F.3d at 1197–98. Nor does alternative examples outperforming Example 8 in certain metrics “teach away” from

Example 8. *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) (“A reference that merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the claimed invention does not teach away.” (internal quotations omitted)); *Dystar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1364 (Fed. Cir. 2006).

Example 8 is one of the better Zhou examples. EX1044, ¶77. Dr. Wheeler agreed Example 8 outperformed Comparative Examples and Examples 4 and 6 in Figure 4’s AC impedance test. EX1045, 125:22-126:10; EX1044, ¶77. Dr. Wheeler also agreed with Dr. Lucht that Example 8 outperformed Comparative Example and Examples 3-6 in Zhou’s Figure 1 discharge capacity test. EX1045, 123:1-124:6; EX1003, ¶208. Coupled with the other motivation identified in the Petition, a POSITA would have had ample reason to select Example 8—if motivation were required.

PO observes Zhou’s solvent mass ratio for Example 8 sums to 90 (not 100), arguing this “error” would dissuade a POSITA from relying on it. POR, 53. But, as Dr. Wheeler testified, that mass ratio need not total 100 because mass ratios need not add to 100. EX1045, 127:2-9; EX1044, ¶78. For example, specifying a 3:1 mass ratio of A:B (75% A and 25% B by mass) is correct—even though it sums to 4. EX1044, ¶78. Dr. Lucht’s inadvertent use of percentage symbols is immaterial, as

he treated Zhou's disclosed mass ratio correctly in his calculations. EX2050, 179:10–19; EX1003, ¶¶206–207. PO does not dispute this.

C. Substituting PP for EA

Zhou's Example 8 includes the ester EA and expressly identifies eight esters—including EA and PP—that may be substituted for one another. Pet., 60-61; EX1014, ¶[0011]; EX1044, ¶79. PO argues a POSITA would not have made that substitution for several reasons, but those arguments contradict legal precedent that a reference is prior art for what it teaches. *Martin*, 618 F.3d at 1302. Zhou teaches substituting any of the eight esters for one another—including substituting EA with PP in Example 8. Pet., 62; EX1014, ¶[0011]. Dr. Wheeler agrees, admitting Zhou teaches any of the eight esters may optionally be used in Zhou's electrolytes. EX1045, 129:14-130:2.

It is irrelevant Zhou does not use PP in its examples because Zhou expressly teaches substituting EA (in Example 8) for PP. EX1044, ¶80. It is likewise irrelevant PP may increase Example 8's boiling/melting points. As the Petition explains, PP still has sufficiently low melting and boiling points to serve Zhou's purpose of providing high ion conductivity. Further, increasing an electrolyte's melting/boiling points would improve battery safety at elevated temperatures. Pet., 60-66, 69; EX1003, ¶225.

PO again contends lithium-ion batteries are too unpredictable to allow any modifications. POR, 55-57. But Zhou explicitly teaches substituting EA for PP, giving a POSITA a reasonable expectation of success regardless of PO's conclusory assertion. Pet., 68-70. Worse, Dr. Wheeler admitted he predicted the result of substituting EA for PP: raising boiling/melting points of Zhou's Example 8 electrolyte. EX1045, 136:2-137:20; EX2015, ¶273. He explained this was possible because EA and PP are "pure components" with well understood properties. EX1045, 135:3-16. By Dr. Wheeler's standard, Petitioner's proposed modification of Zhou is therefore predictable—it would slightly raise the melting/boiling points of the electrolyte. EX1044, ¶81.⁷

Again, PO effectively argues battery patents should be exempt from the non-obviousness requirement—without any legal support. Chemistry is science, not magic, and PO adopted Petitioner's proposed (high) level of skill in the art. POR, 5; Pet., 16. A POSITA would expect substituting one ester for another—especially because Zhou expressly teaches doing so—would provide a suitable channel for ion

⁷ Under Dr. Wheeler's rationale, all Petitioner's proposed electrolyte modifications would have been predictable because the solvents in Zeng and Zhou are "pure" components with well-understood properties. EX1018-EX1020 (data sheets specifying the properties for pure versions of solvent components at issue).

conductivity as Zhou teaches. Pet., 68-70; EX1014, ¶[0011].⁸ Even if the substitution caused small changes, this would not have dissuaded a POSITA from trying a combination that Zeng teaches. EX1044, ¶82.

VII. GROUND 9

Petitioner incorporates by reference its arguments in Section II.C.

VIII. GROUND 10

Petitioner incorporates by reference its arguments in Sections IV, VI.

IX. GROUNDS 11-12

Petitioner incorporates by reference its arguments in Section V.

X. GROUNDS 1-12

The Board instituted under the view claims 1 and 14 correspond to '131 Patent Figure 4. PO cannot cite an interpretation from a different petition—discretionarily denied in favor of this Petition—to overcome Petitioner's Grounds here. PO takes no claim-construction position and raises no distinct arguments for claims 14–17, effectively conceding they stand or fall with claims 1–3 and 5. POR, 6; EX1049 (no differing proposed constructions for claims 1 and 14 in district court).

⁸ PO cites Kim as showing substituting EP with PP would decrease recovery capacity. POR, 58. But the cited Kim examples differ in other ways than just swapping EP with PP. EX1044, ¶82, n.5.

Respectfully submitted,

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Date: February 18, 2026

CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))

This Petitioner's Reply to Patent Owner's Response to Petition for *Inter Partes* Review of U.S. Patent No. 11,799,131 complies with the type-volume limitation of 5,600 words, comprising 5,599 words, excluding the parts exempted by 37 C.F.R. § 42.24(a)(1).

This Petitioner's Reply to Patent Owner's Response to Petition for *Inter Partes* Review of U.S. Patent No. 11,799,131 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 font.

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

Pursuant to 37 C.F.R. §42.6(e), the undersigned hereby certifies that a true and correct copy of the above-captioned **PETITIONER’S REPLY TO PATENT OWNER’S RESPONSE TO PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 11,799,131 and EXHIBITS EX1043—EX1049** was served in its entirety on February 18, 2026, via filing through the Patent Trial and Appeal Case Tracking System (P-TACTS) and electronic mail on the following counsel of record for Patent Owner:

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