

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.

IPR2025-00431
Patent 11,799,131 B2

Record of Oral Hearing
Held: May 19, 2026

Before: DONNA M. PRAISS, JOHN G. NEW, and
DEBRA L. DENNETT, *Administrative Patent Judges*.

APPEARANCES:

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P R O C E E D I N G S

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JUDGE PRAISS: All right. Good afternoon, everyone. I'm Judge Donna Praiss, and with me on the panel today are Judge John G. New, and Judge Debra L. Dennett. This is the hearing for Inter Partes Review, proceeding number IPR2025-00431, caption Zhuhai CosMX Battery Co., Ltd., the Petitioner, versus Ningde Amperex Technology Limited, Patent Owner. So let us start by having counsel make appearances. Who do we have for Petitioner?

MR. STEIN: Good afternoon, Your Honors. May it please the Board. My name is James Stein. I'm counsel for Petitioner Zhuhai CosMX Battery Company. And with me today at the counsel's table is Steve Philbin.

JUDGE PRAISS: And for Patent Owner?

MR. COX: Your Honor, Brady Cox, for Patent Owner Ningde Amperex Technology Limited, which you can also call Amperex or ATL. I'm joined by my partner, Christopher Douglas. We're ready to proceed.

JUDGE PRAISS: Before we begin with the arguments, just a couple administrative matters. First, we noted at the outset that the parties have filed objections to the evidence, and those objections will be held in abeyance. Second, we have your demonstratives. Thank you for submitting them before the hearing. For clarity of the record and so that we can follow your argument, we ask you to identify what page of your demonstratives or exhibits you're talking about as you argue. Also, please state your name before speaking for clarity of the record and to help the court reporter.

And then third, timing, our order of April 9th gave each party their

1 requested 60 minutes to present argument. And we'll begin with Petitioner's
2 arguments. And the Patent Owner may respond. And we'll be keeping track
3 of time, and we'll indicate if you're running short on time. But please try to
4 keep track of time yourselves. You will be able to see it up here on this
5 clock.

6 Petitioner, you can reserve some of your time for rebuttal. How
7 much time would you like to reserve?

8 MR. STEIN: Fifteen minutes.

9 JUDGE PRAISS: Fifteen. Okay. And Patent Owner, I won't ask
10 you about how much time you'd like to reserve until you have heard the
11 opening argument here.

12 So Petitioner, you may begin when you're ready.

13 MR. STEIN: Okay. Thank you, Your Honor. As you mentioned,
14 we're here today to talk about IPR2025-00431, which is challenging claims
15 of US Patent Number 11,799,131. And the challenged claims here are
16 Claims 1 through 7, 12, and 14 through 17. And I'll refer to that as the '131
17 Patent.

18 And so at a high level, the claims are directed to lithium-ion
19 battery, which is called electrochemical device in the claims, that has a
20 known electrolyte composition and a known electrode configuration. And
21 so the claims essentially combine a known -- or sorry, the petition has
22 demonstrated that the challenged claims would have been obvious.

23 In the Board's institution decision, the panel found that Petitioner
24 was reasonably likely to prevail on all grounds and claims. And today I'm
25 going to explain why Petitioner believes the Board was correct in its

1 preliminary findings and should now hold the challenged claims
2 unpatentable as having been obvious.

3 So next slide, Slide 2. So I'll just briefly go over the summary of
4 the status of the proceeding. This petition was filed in January of 2025.
5 This was before the wave of changes in 2025 to the discretionary denial
6 practice. But this petition was subject to the new bifurcated procedure
7 where discretionary denial is addressed before and separately from the
8 merits.

9 The petition was referred to the merits panel, over Patent Owner's
10 request, for a discretionary denial. And then it was instituted by the merits
11 panel. Patent Owner did not file a request for director review in this case.
12 And so following institution, the case followed an ordinary path with the
13 Patent Owner's response, Petitioner's reply, Patent Owner's sur-reply, and
14 there's no pending motions. The case is fully briefed and ready for decision
15 on the merits.

16 Next slide. So I'll just briefly go over the grounds of invalidity.
17 There's essentially two prior art tracks here, based on two different primary
18 references. The first track is based on the Zeng reference, in view of the
19 Sunose reference. And the second track is based on Zhou reference, in view
20 of the Sunose reference. The Zeng and Zhou are used for the electrolyte side
21 of the claims. And Sunose is used for the electrode side of the claims, which
22 I'll get into a little bit later.

23 And then additionally, there are grounds for the dependent claims
24 in which the Su reference is used for teaching of a specific value of a anode
25 compaction density. Then there's a few supplemental grounds with the

1 Matsuoka and Kim references that these were presented as further evidence
2 that the claims would have been obvious. But these are supplemental
3 grounds and they're not necessary to find that the claims are unpatentable,
4 although they additionally show that the claims are unpatentable.

5 And so the merits disputes have essentially boiled down to a few
6 issues now. So the issues here are whether the Zeng and Zhou reference
7 render obvious the electrolyte formulation that's recited in the claims, and
8 then whether the Sunose reference discloses the electrode configuration
9 limitations. And finally the other -- the remaining high-level issue that I
10 want to discuss today is whether a POSITA would have combined Zeng and
11 Zhou references with Sunose.

12 We'll go to the -- we'll jump to Slide 7 here. So Slide 7 shows the
13 language of independent Claim 1 of the '131 Patent, which is representative
14 for today's purposes of discussion. It recites an electrochemical device,
15 which in this case it's a lithium-ion battery. It has two primary components:
16 an electrode and an electrolyte. So the electrode is the part that stores and
17 discharges electrochemical potential. And the positive -- it includes a
18 positive electrode, which is called a cathode; and a negative electrode, which
19 is called an anode. Although here, the claim only requires a single, generic
20 electrode.

21 And so the claim also recites that the electrode has a single-sided
22 coating portion and a double-sided coating portion and that they have
23 compaction densities. And a ratio between those compaction densities is
24 around 1. It's between 80 percent, or 0.8, and 120 percent, 1.2. And then
25 the other part of the claim is an electrolyte. So that's the other part of the

1 battery that's necessary to function. And it transports lithium-ion battery,
2 lithium ions that are necessary for the chemical reactions in the electrode for
3 charging and discharging.

4 And here, the electrolyte at issue calls for a dinitrile compound,
5 which is a compound that has a cyano -- one -- or two cyano groups, a
6 trinitrile compound, which has three cyano groups, and propyl propionate.
7 And they each have weight percentages in the electrolyte, which are
8 expressed as X, Y, and Z. And the claim says how much of X plus Y there
9 is in this electrolyte, how much of X divided by Y there is in this electrolyte,
10 and then how much of Y over Z the electrolyte contains.

11 And so according to the '131 Patent, also recognized by prior art,
12 electrolytes having this formulation can be beneficial because they improve
13 the transport of the lithium ions by also helping protect the electrode
14 interfaces and improve stability of the electrolyte. The Zeng and Zhou
15 references, which are the two primary references, they teach the electrolyte
16 formulation, but they don't get into details about the electrode structure.
17 And then Sunose on the other hand teaches the electrode construction but
18 leaves out details on the electrolyte.

19 But you need both to have a functional battery. And so the
20 combinations in this -- presented in this case are essentially combining the
21 electrolyte from Zeng or Zhou and using the electrode structure, the battery
22 structure from Sunose. And so when you have those two parts together, you
23 have a working battery. And the scope of the claims covers that battery.
24 And so the claims are it would have been obvious.

25 So we'll go to the next slide here, Slide 9. So starting with the

1 Zeng reference, as I mentioned, Zeng is the reference we rely on for the
2 claimed electrolyte. And Sunose is the electrode configuration reference.
3 The petition explained how Zeng and Sunose rendered obvious to
4 challenged claims. And the disputes on this combination have narrowed
5 down quite a bit now. The first issue is whether Zeng teaches the Y over Z
6 ratio, which is the ratio of the trinitrile mass percentage to the appropriate
7 weight percentage.

8 And the second is whether Sunose teaches the ratio of compaction
9 densities in the claim, which is D1 divided by D2. And then the third for
10 this set of grounds is whether a person of ordinary skill in the art would have
11 combined Sunose with this reference. And as the record shows, the answer
12 is yes to these questions.

13 So going to Slide 9 and 10, they show -- Slide 9 shows
14 embodiment -- electrolyte Embodiment 4 of Zeng. And Slide 10 shows
15 electrolyte Embodiment 6 of Zeng. And they're very similar, except for
16 slightly different additive, one of the additive components. So Petitioner in
17 the petition relies on these two embodiments separately as rendering obvious
18 the challenged claims. And so here, Zeng specifies the additives, which are
19 on the right side of the figure, as weight percentages of the total electrolyte.

20 And then Zeng also on the left side of the figure, Zeng specifies the
21 solvent component. And that's the part that the additives are dissolved into
22 to form the complete electrolyte for the lithium-ion battery. And so Zeng
23 specifies -- it teaches a composition for the solvent. And it's a mass ratio of
24 five different -- or sorry, I'm sorry, six different electrolyte components:
25 ethyl carbonate, propylene carbonate, diethyl carbonate, fluorobenzene,

1 ethyl propionate, and propyl propionate. And they have specific mass ratios.

2 And then within that, with LiPF₆, which is the lithium salt that's in
3 this electrolyte, is dissolved to a concentration of 1 mol/L.

4 JUDGE NEW: This is the central bone of contention --

5 MR. STEIN: Right.

6 JUDGE NEW: -- with respect to saying -- it's the language of
7 paragraph 37. And just to quote it briefly for the record, paragraph 37 says,
8 relevantly that -- let me just find the place here. Yes, then lithium
9 hexafluorophosphate of a concentration of 1.0 mol/L is slowly added to the
10 mixed solution.

11 It seems to me, reading this, that the plain language of this English
12 translation of Zeng is that what's being added to the electrolyte solution is
13 hexafluorophosphate at a concentration of 1 molar, which seems to me to
14 first indicate -- the language of that, first off, sort of demands that because
15 the use of "of hexafluorophosphate of a concentration about 1.0 mol/L."
16 The concentration of the molar solution is going to modify the
17 hexafluorophosphate. And because it's mols per liter, it's not a solid being
18 dissolved into the electrolyte, rather it seems to be a solution that's added to
19 it. Because a molar solution is by definition a liquid.

20 So it leaves us the problem here that you are thereby changing the
21 volume of the electrolyte solution by adding 1 molar -- and I'm just going to
22 call it the lithium solution for the convenience of us all, especially the court
23 reporter. And you're adding 1 molar lithium solution to electrolyte, thereby
24 changing its volumes, then thereby you're changing the weight percents of
25 the other constituents' electrolyte. And I don't see how this can't be a

1 confounding influence on the analysis.

2 MR. STEIN: Judge New, we don't dispute what the literal
3 translated language says. We agree that it says LiPF₆ of a concentration of 1
4 mol/L is dissolved. But that doesn't make sense in the context of lithium-ion
5 battery electrolytes. If you go to -- essentially, lithium-ion batteries typically
6 have a concentration of 1 mol/L.

7 And so as the Board recognized in its institution decision, that
8 interpretation which is the one that Patent Owner has adopted, it doesn't
9 really make sense in the context of Zeng. Because you wouldn't know how
10 much you end up with, the relative amounts of the electrolyte composition
11 and the lithium salt. And so you can't say that the concentration will be
12 anywhere near 1 mol/L. It could be a near zero amount of liquid is -- or of
13 solution is added to the solvent or a near infinite amount. It just doesn't
14 really make sense.

15 JUDGE NEW: You just don't know. And that's the problem
16 because you're asking us to put a construction on this language that the
17 language itself doesn't support. And maybe it's a translation issue, but this is
18 the translation that we have. And furthermore, Exhibit 1005, which is the
19 Chinese version of this, if you look at paragraph 37, it says 1 mol/L there as
20 well. The plain language of this to me speaks to the fact that lithium
21 solution is added at 1 molar concentration to the mixed solution in a volume
22 -- we don't know what that is. And that renders the rest of the weight
23 percentages confounded.

24 And so I don't see how you can say that Zeng teaches the claimed
25 weight percentages of the other electrolyte constituents. The fact that Zeng

1 is deeply -- it's not ambiguous. It actually says what it says. But it doesn't
2 allow us to calculate those weight percentages.

3 MR. STEIN: Yeah. And this is in the context of obviousness and
4 what a person of ordinary skill in the art would understand from reading this
5 reference. And I agree that that's what the literal language says. But our
6 position is that that doesn't really make sense in the context of lithium-ion
7 batteries to have an unknown solution that you are dumping into another
8 solvent composition that Zeng carefully -- has carefully specified.

9 JUDGE NEW: But even by that standard, why wouldn't a person
10 of ordinary skill in the art say, well, this doesn't make any sense, so I'm just
11 going to ignore this reference altogether because I can't figure out what it
12 means? It's not the very first indication of unclear, vague, or contradictory
13 or ambiguous language in a specification of a patent. So you're asking us to
14 put a construction on here that is entirely contradictory to what the plain
15 language of the paragraph says.

16 MR. STEIN: I think the prior art is not read in a vacuum. A
17 person of ordinary skill reading this reference with the background
18 knowledge in the art and Patent Owner agrees that a person of ordinary skill
19 in the art has a high level of skill. It's an advanced degree and at least two
20 years of experience, I believe. And so they've agreed with us that a POSITA
21 would have a high level of skill. Although the literal language says that, it
22 just doesn't make sense in the context of the battery -- of a lithium-ion
23 battery where they typically have a 1 molar solution.

24 And Zeng is already specifying the composition. So you wouldn't
25 just -- you're essentially just throwing out all of Zeng's disclosure because of

1 a preposition, a change of a preposition.

2 JUDGE NEW: It's not a change of a preposition, though. It's also
3 the 1.0 mol/L, which a person of ordinary skill in the art would understand
4 has to be a solution. It cannot be a solid compound if it's talking about
5 molarity. And if that's the case, the person of ordinary skill in the art is
6 going to look at this and say, well, they added a liquid amount to the
7 electrolyte of a 1.0 ml/L solution of the lithium solution, we don't know how
8 much volume is added to it, and that confounds the rest of it. So essentially,
9 this reference doesn't tell me very much of anything.

10 MR. STEIN: Like I said, I don't dispute what the literal language
11 says. A person of ordinary skill in the art reading this reference would
12 understand how to make this electrolyte. And it is essentially a difference of
13 a preposition. Because if you say lithium hexafluorophosphate adding it to a
14 concentration of 1 mol/L, it makes a lot more sense. And it aligns with all
15 the other prior art and references of record in this proceeding.

16 JUDGE NEW: Well, as a former lab rat, I would have said add a
17 concentration of 1.0 mol/L.

18 MR. STEIN: Yeah.

19 JUDGE NEW: That wouldn't change much of anything here. And
20 even to that solution it's still problematic because of the molarity of the
21 solution. You're adding a solution to a solution and not a solid to a solution.
22 Anyway, that's my questions. We can move on here.

23 JUDGE PRAISS: Let's phrase the question a different way. When
24 we instituted this proceeding, we recognized this as possibly an issue of the
25 fact that we should have more evidence on. Can you point us to anything we

1 have in this record to support your position, how a person of ordinary skill in
2 the art would have --

3 MR. STEIN: I believe in our Petitioner's reply we submitted
4 another reference that talks about -- I think it's called the Choi reference. I
5 don't have the reference -- the exhibit number in front of me. But it teaches
6 a similar type of electrolyte composition where the solvents are already
7 specified. And then it's adding lithium hexafluorophosphate to a
8 concentration of 1 mol/L.

9 And also, Dr. Wheeler, who's Patent Owner's expert, in his
10 deposition he admitted that 1 mol/L, LiPF₆, is typical. And in his own
11 research, see on Slide 13 here, he's used -- he uses 1 molar LiPF₆, to
12 simulate electrolytes, so 1 molar LiPF₆ is a standard. And so our position is
13 that reading this reference -- so a POSITA doesn't read in a vacuum and put
14 blinders on. A POSITA reads it with ordinary skill, ordinary creativity, with
15 a mind willing to understand the reference. And when you do that, it's pretty
16 clear that this should be 1 mol/L -- or lithium hexafluorophosphate dissolved
17 to a concentration of 1 mol/L.

18 JUDGE PRAISS: Thank you, Counsel. Please proceed.

19 MR. STEIN: Okay. Let's find out where I was. And I'll just add
20 to this that Patent Owner hasn't been able to provide any evidence of making
21 an electrolyte the way that they're attributing to Zeng. There's no reference
22 of record that teaches doing it that way. And Dr. Wheeler, in his deposition,
23 admitted that he's never -- he can't recall ever doing -- making an electrolyte
24 that way or having seen it done. And so it appears to be essentially a
25 typographical error in the reference. And a POSITA would understand what

1 Zeng is trying to convey here.

2 And I'll just add one more thing there about it, if you read it the
3 way that Patent Owner is reading that statement, it creates all these
4 unknowns, which Judge New was just discussing. Whereas if you read it the
5 way we're reading it, Zeng has all the information you need to make the
6 electrolyte. So it's the most straightforward way to read it in a way that -- to
7 have the reference make sense.

8 Let's see how much ground we've just covered. So we could go to
9 Slide 15 now, I believe. And so here, Patent Owner has also argued that the
10 Y over Z range that's recited in the claims is critical and that's a reason that
11 the claims would not have been obvious. And while it's true that a Patent
12 Owner can rebut a presumption that a claim range is obvious by showing
13 that the claim range -- the variable in the claim range produces unexpected
14 results, Patent Owner hasn't done so here.

15 And also, showing that -- the unexpected results doctrine, it only
16 applies when you have an overlapping range here. And if you read Zeng in
17 a way that makes sense, it provides a Y value and a Y over Z value that falls
18 directly inside the claim range. There are data points inside the claim range.
19 And so the doctrine of criticality doesn't really apply. There's not an
20 overlapping range, there's just values inside the range in the two Zeng
21 embodiments that we're relying on. So Patent Owner can't avoid
22 obviousness by invoking the criticality doctrine.

23 And also, even if criticality mattered here, if it did apply, the
24 Patent Owner has not demonstrated the Y over Z range is critical. It's the
25 Patent Owner's burden to do that. And they cite to table 2 in the '131 Patent

1 as demonstrating that when the Y over Z value is inside the claim range, the
2 battery exhibits better inhibition of the rise of internal DC resistance. But
3 better is not enough to show unexpected results. The examples that Patent
4 Owner identifies show about 11 percent or 16 percent improvement in the
5 inhibition of the rise of DC resistance than the out-of-range example.

6 But better is not enough. Criticality requires more than just a mere
7 improvement in degree. It requires a new and unexpected result, which is
8 different in kind. And they haven't shown that. And then further, the table 2
9 examples, they don't even really show what Patent Owner's claiming that
10 there's a better performance when the Y over Z is inside the claim range.
11 Because the out of claim -- the out-of-the range examples with D2-4 and D2-
12 3 outperformed several of the in-range examples in the cycling, in some of
13 the cycling tests. And so you can't really conclude from this table that the
14 claimed range is critical.

15 And then on top of that, there's other patents in this family that
16 have the same disclosure and recite different Y over Z ranges. So for
17 example the '910 Patent, which is related to this patent and as we discussed
18 in our reply, that claim has a Y over Z range where the low end is about
19 twice what the low end of the Y over Z range is in this patent. So it's .02 in
20 the '910 Patent, whereas here it's .01. And it also uses the term "about" to
21 kind of cushion that range. And so if there's flexibility in the claim range,
22 you don't see how Patent Owner can say that it's critical.

23 So turning to Slide 16, we're going to move to Sunose. And so as I
24 discussed earlier, the claims require an electrode that has a current collector
25 and a first part that has a single-sided coating and a second part that has a

1 double-sided coating of active material. And as you can see in the Figure 2
2 here that's in the slide, which is from Sunose -- and it's annotated, it came
3 from our petition. Sunose does disclose that structure.

4 And so Sunose teaches a spiral wound lithium-ion battery
5 electrode having single side and double side active coating material portions.
6 And that's a common construction of electrodes, but it creates a
7 manufacturing issue that Sunose addresses. So when you're compacting this
8 electrode plate that has a double-sided coating and a single-sided coating,
9 either the single-sided portion receives insufficient pressure during rolling
10 compared to the double-sided portion, and that causes poor adhesion to the
11 electrode plate.

12 Or the single-sided portion receives adequate pressure, while the
13 double-sided portion receives too much pressure because it's thicker. And
14 that can lead to the electrode breaking or poor adhesion or peeling. And so
15 Sunose addresses this by making the single-sided coating portion thicker
16 than the double-sided portion before rolling. So that way when they're
17 rolled, you control the compaction density between the two sides. And so
18 both sides are adequately compacted without causing damage.

19 And Sunose calls the compaction densities of the two sides M and
20 N. M is the compaction density of the single-sided coating, and N is the
21 double-sided coating compaction density. And Figure 2 here in this slide
22 shows the electrode after it has been compacted.

23 So turning to the next slide, Slide 17, Patent Owner contends that
24 Sunose's densities -- Sunose calls them packing or active material densities.
25 Patent Owner argues that these values are not the claimed compaction

1 densities D1 and D2. Because in some examples, Sunose reports densities
2 that are greater than the crystalline density of the active material, a lithium
3 cobalt oxide, that Sunose uses.

4 That argument is unpersuasive for a few reasons. And first, as the
5 panel recognized in the institution decision, Petitioner is not relying on any
6 examples that have weirdly impossible compaction densities. We're relying
7 on examples 2, 3, 4, and none of these examples report M or N values that
8 are greater than the value that PTO claim -- or that Patent Owner claims is
9 the crystalline density of LCO.

10 And then examples 2 and 3 of that set report densities that are
11 below what Dr. Wheeler, Patent Owner's expert, claims is the maximum
12 density of the composite material, the overall material of Sunose's active
13 material. And so as Dr. Lucht stated in his deposition, these examples seem
14 reasonable upon his review of Sunose.

15 JUDGE NEW: But Mr. Stein, we look at the reference as a whole.
16 We don't just look at the particular ones that are relevant to the claims in
17 question here. And if Sunose is teaching compaction value -- compaction
18 density values that are theoretically impossible because they exceed the
19 crystalline structure of the completely compressed molecule, we have to take
20 into account or into possibility the fact that perhaps Sunose is measuring
21 compaction density by some other measure than what you're claiming here.

22 And if that's the case, that again renders all those compaction
23 densities ambiguous as to what it is. And the fact that there are some that
24 listed that are completely impossible argues fairly strongly for that.

25 MR. STEIN: Right. And I think the mechanism that Sunose uses

1 to compact the electrodes explains that. So the way that Sunose prescribes
2 these densities that it's aiming for is by compacting a known amount of
3 material, known mass material, into a known volume. Sunose uses a fixed
4 roll press. So the gap is fixed, the volume under the roll press is known.
5 And Sunose changes the coat weights on both of those sides, the single-sided
6 coating and the double-sided coating, to arrive at these compaction densities.

7 So if you're compressing a known amount of material into a known
8 volume, you have a corresponding density. And so that could explain why
9 some of the examples have impossibly high densities. It's because Sunose
10 tried to roll too much material through the roll press, and it didn't fit. If you
11 try to compact an impossibly high amount of material into that volume, it's
12 not going to fit. And actually, Sunose teaches that comparative example 3
13 broke. That's one of the examples that Patent Owner cites as having a high
14 possible compaction density. That one broke when they tried to roll it. And
15 so it couldn't be wound into a spiral.

16 JUDGE NEW: Right. But it doesn't necessarily follow, at least as
17 far as I'm understanding this, that if you pack or attempt to pack too much
18 material into a given volume, that material when it can no longer be
19 compressed will overflow. But you will still reach a maximum compression
20 volume inside what remains, right? If you press it to some area, some of it's
21 going to get ejected off the side or removed.

22 What you're measuring in the compaction density is the
23 compaction density of what remains. And if that's exceeding the crystalline
24 compaction density of the structure itself, that just doesn't seem possible.
25 I'm still kind of baffled by the fact that we've got seemingly impossible

1 figures here that exceed the max that could be compressed into the volume
2 we're talking about and trust these numbers as being measured by the same
3 way of measuring compaction density that your claims do.

4 Because it seems that we're looking at different sets of numbers
5 here, and therefore it makes it very difficult to compare compaction densities
6 in Sunose to your claim compaction densities. In fact, almost impossible.

7 MR. STEIN: Like I said, I believe that the technique that Sunose
8 is using, we have a known amount of material that they're compacting into
9 this known volume that yields a known density. And so that's how Sunose is
10 doing the -- calculating the densities. It doesn't describe the details about the
11 roll press, except that the gap is fixed. So we know the volume that is --

12 JUDGE NEW: So you're suggesting that they are basically
13 calculating a compaction density that actually exceeds the possible
14 compaction density because they're trying to pack too much material into a
15 given volume, and therefore some of it spilled over the side or is not --

16 MR. STEIN: Or just broke when they tried to roll.

17 JUDGE NEW: Or it just broke.

18 MR. STEIN: Yeah

19 JUDGE NEW: But they're still calculating the compaction density
20 here. And I'm still wondering how they can get a number that's higher than
21 the theoretical maximum.

22 MR. STEIN: Well, like with comparative example 3, they couldn't
23 -- they knew how much material they put on, and they know the volume
24 they're compacting it to. So that yields the density. But they could not roll
25 it. It broke when they tried to roll it. And so you can compute the density,

1 you could report the density, even if the electroplate cannot be rolled. But if
2 it could be successfully rolled, that calculation yields the compaction
3 density.

4 So the examples that we're relying on, 2, 3, and 4, were rolled
5 successfully, according to Sunose, and they didn't break. And they have
6 densities that are possible. And so it's our position as a Petitioner that the
7 technique that Sunose uses yields that known density, even if it is impossible
8 and could not be rolled.

9 JUDGE NEW: Thank you.

10 JUDGE PRAISS: Counsel, if I could ask you on that Embodiment
11 1, though, it doesn't indicate breakage. You're referring to 2, 3, and 4 --

12 MR. STEIN: Yeah.

13 JUDGE PRAISS: -- that why we should understand those values
14 are correct because incorrect values result in breakage, as I understand your
15 position that you just described. And I'm just noticing it doesn't hold true for
16 Embodiment 1, in table 1 of Sunose, which is Exhibit 1010.

17 MR. STEIN: I agree that for that embodiment, for the M
18 compaction density, it reports 5.7 which is above the value that Patent
19 Owner claims is the crystalline density of LCO. So I don't dispute that. And
20 the table does not say that it broke nor that it cracked.

21 I will also say that in his deposition, Dr. Wheeler agreed that all
22 the information that is needed -- all the information that's needed to compute
23 the density, the known density in Sunose, is either known from Sunose or
24 you could determine it. Density is just mass divided by volume. We know
25 the mass that is going into the known volume, and so that yields a density.

1 And also, just setting aside this issue of specific density values,
2 Sunose is more about the ratio of the compaction densities between the two
3 sides, the two portions. And so the claim requires -- or recites a ratio. And
4 so a person of ordinary skill in the art could still implement those
5 -- implement that ratio with other density values. It's just really the ratio is
6 what is key in Sunose. And that ratio of N over M is .7 to 1.2. So with that
7 information, a person of ordinary skill in the art could implement Sunose.

8 JUDGE PRAISS: Counsel, can I ask you, that position you just
9 expressed now about the ratio of M over N, is that an argument made in the
10 petition?

11 MR. STEIN: We pointed to the ratio there, but this is also a
12 rebuttal argument for Patent Owner saying that Sunose is not enabled. So
13 we're showing that you could read the entire reference and understand the
14 concept that Sunose is trying to convey, which is that this ratio is important,
15 not any specific density values themselves. And so it's a rebuttal to Patent
16 Owner's position that Sunose is not enabled.

17 And getting back to the density values in Sunose, what Sunose is
18 describing in the text is clearly compaction density. And Dr. Wheeler, in his
19 deposition, agreed that the passages that Sunose has described of compacting
20 the active material is describing a compaction density, a process to compact
21 the active material. So the language in Sunose is clear that this is a
22 compaction density. And prior art discloses what it discloses. It conveys to
23 a person of ordinary skill in the art what it conveys from its teachings.

24 JUDGE NEW: Mr. Stein, just one last, quick question on this -- at
25 least I hope it's quick. How does one go about measuring compaction

1 density? Are there various ways to do it?

2 MR. STEIN: Yeah. There could be multiple ways. The way
3 Sunose is expressing, where we know how much mass we're putting into a
4 volume yields a density. Or you could physically measure it a certain way,
5 you could take apart the take apart the electrode, and you could measure the
6 volume of it and the mass and then do the math that way. These are
7 apparatus claims, there's no method recited for a particular method of
8 measuring compaction density. The claim just says compaction density.
9 And so there's no technique that's recited. But there's multiple ways, at least
10 those two, that come to mind.

11 JUDGE NEW: All right. Thank you.

12 MR. STEIN: Okay. I'm running out of time.

13 JUDGE NEW: I have one more quick question, while you're
14 recalibrating there. If we find that with respect to the lithium solution, going
15 back to Zeng, if Zeng is hopelessly ambiguous and we can't get there, how
16 does Matsuoka save that?

17 MR. STEIN: Matsuoka is a reference that provides a teaching of
18 an amount of propyl propionate that's appropriate for a lithium-ion battery
19 electrolyte. And it's expressed as a weight percentage in the total electrolyte.
20 And so that value, the amount of propyl propionate, which Patent Owner
21 says is rendered uncertain by that language in Zeng, could be supplied by
22 Matsuoka. Matsuoka is essentially a supplemental obviousness position for
23 that value of the amount of propyl propionate in Zeng's electrolytes.

24 JUDGE NEW: Would it have been obvious to a person of
25 ordinary skill to pick the lithium hexafluorophosphate from the very large

1 list of constituents that's provided by Matsuoka in that case?

2 MR. STEIN: Sorry, did you say lithium hexafluorophosphate or --

3 JUDGE NEW: Yeah.

4 MR. STEIN: Well, that's not what the petition is contending. The
5 petition is contending that a POSITA would have looked to Matsuoka for the
6 amount of propyl propionate. And propyl propionate is already in the
7 compositions that are in Zeng.

8 JUDGE NEW: Thank you.

9 MR. STEIN: And in the petition, we also did provide motivation
10 for looking to propyl propionate specifically, even though that's not required.
11 Because propyl propionate is already in the compositions of Zeng.

12 Okay. So I'm running short on time. I'm going to jump to the
13 Zhou reference here. So the Zhou grounds are similar to the Zeng grounds
14 in that they rely on Zhou for the electrolyte and Sunose again for the
15 electrode construction. And the issues that are presented here are whether a
16 POSITA would have chosen Zhou Example 8, which is the example that the
17 petition cites and relies upon, and also whether propyl propionate would
18 have been substituted for ethyl acetate which is the other -- which is the ester
19 that is in Example 8 of Zhou.

20 Going to the next slide, which is 26, I believe, it states a similar
21 construction to the Zeng electrolyte. Except here, we know that essentially,
22 again, it has additives as a weight percentage of the total electrolyte. And
23 they include the dinitrile and the trinitrile in the amounts that are claimed. It
24 also specifies a mass ratio of the solvents. And really the only difference
25 between Example 8 in Zhou and the electrolyte that's recited in the claim is

1 that it has a different ester. It has ethyl acetate instead of propyl propionate.

2 But if that substitution is made, which Zhou teaches a POSITA to
3 do because it provides a list of a handful of esters that can be substituted,
4 then you result in the electrolyte that's recited in the claims. And so Zhou
5 teaches a person of ordinary skill in the art to make the substitution that
6 results in the electrolyte that's recited in the claims.

7 Now getting to Patent Owner's argument that a POSITA would not
8 have selected Zhou Example 8, the Petitioner does not need to provide
9 motivation to select Example 8 because it's a self-contained embodiment. It
10 is a reference. It is a self-contained embodiment that teaches the electrolyte
11 of the claim. Petitioner is not mixing and matching between different
12 examples of Zhou. We're just relying on Zhou.

13 And the only change we're making to Example 8 is substituting
14 propyl propionate for the ethyl acetate, which Zhou teaches the POSITA to
15 do in another passage in the reference. There's no need to provide
16 motivation to select Example 8. The petition provided that in an abundance
17 of caution. And the motivation that the petition provided is also sufficient.
18 Petitioner's argument that a POSITA would not have -- Patent Owner's
19 argument that a POSITA would not have chosen Zhou Example 8 essentially
20 boils down to Example 8 is not the best example. But that's not required for
21 obviousness.

22 If you look on Slide 27, it shows Figures 1 and 4 of Zhou show the
23 test results for various examples. And Example 8 performed very well. In
24 his deposition, Dr. Wheeler agreed Example 8 was the second best example
25 in discharge capacity test, which is shown in Figure 1. And it's the third best

1 example in the impedance test. So there's plenty of reason to use Example 8.
2 It doesn't have to be the very best example in the reference.

3 JUDGE PRAISS: Your time has ended. The time --

4 MR. STEIN: Yes. Oh, I went over. Okay. It's coming up now.
5 Okay.

6 JUDGE PRAISS: Do you want to add this time to your -- or are
7 you ready to end and reserve?

8 MR. STEIN: I'll just do one more point, and then I can reserve the
9 rest of my time for rebuttal. So --

10 JUDGE PRAISS: Keeping track of the time on rebuttal.

11 MR. STEIN: So Patent Owner also argues that a person of
12 ordinary skill in the art would not have substituted propyl propionate for
13 ethyl acetate in Example 8 of Zhou. But Zhou teaches a POSITA to do it
14 and gives a POSITA a reasonable expectation of success in doing it by just
15 identifying this list of eight or so esters that can optionally be used in its
16 electrolyte formulations. And Dr. Wheeler, in his deposition, agreed that
17 Zhou teaches that any of these esters can optionally be used in its electrolyte.
18 There's no hindsight being used, it's just following the literal teachings of
19 Zhou to modify Example 8 with the option that Zhou provides.

20 Patent Owner also says that this substitution would have
21 unpredictable results. But reading Zhou's text, it just directly refutes that by
22 teaching this substitution and only identifying a handful of these esters,
23 which are low-boiling point materials that provide a good channel for ion
24 conductivity. So Zhou is teaching a POSITA these materials are appropriate
25 for this purpose. And so a POSITA would have a reasonable expectation of

1 success in making that substitution.

2 And then in his declaration and also in his deposition, Dr. Wheeler
3 stated that he predicted what the substitution that Petitioner's proposing
4 would do. He says it would raise the melting or boiling points of Example 8
5 of the electrolyte. So it is predictable. But that doesn't defeat the purpose of
6 Zhou, because Zhou teaches that ethyl acetate is appropriate for its
7 electrolytes. And there's no one best electrolyte for -- overall. It depends on
8 the application that you're looking at.

9 For example, as Dr. Lucht explains in his second declaration, I
10 believe maybe in his original declaration as well, that electrolytes that have
11 higher boiling points can be safer because they're less likely to boil over and
12 explode and things like that. So you don't necessarily want an electrolyte
13 that has the lowest possible boiling point. And so it's okay that the
14 substitution would raise the boiling point of the Example 8 electrolyte.

15 So I will pause there, reserve the rest of my time.

16 JUDGE PRAISS: That will be for your rebuttal.

17 MR. COX: I'd like 10 minutes for surrebuttal, Your Honor.

18 JUDGE PRAISS: Fifty minutes on the board here. You can begin
19 whenever you're ready.

20 MR. COX: Thank you. And Judge Dennett, can you see my slides
21 as well?

22 JUDGE DENNETT: I can.

23 MR. COX: Thank you, Your Honors. This is Brady Cox, for
24 Patent Owner Ningde Amperex Technology Limited, Amperex or ATL. We
25 respectfully request that the Board find the challenged claims not

1 unpatentable. And I'll go through today and explain how the Petitioner
2 CosMX has failed to meet its burden by proving unpatentability on any of its
3 12 grounds.

4 Every ground suffers from three or more independent fatal defects.
5 The "or mores" are just in our briefing. In the interest of time, I'm just going
6 to try to address the three today. The first is that -- as we've been over
7 already today is that Petitioner cannot establish the claimed Y, Z ratio from
8 the prior art, at least because Zeng's disclosure is expressed in what it
9 discloses, in that it's adding a liquid solution, making the total ratio
10 indeterminate.

11 Or at best, for Petitioner, the disclosure is ambiguous, which
12 cannot serve to invalidate the claims. And Petitioner's calculations rest on
13 unsupported assumptions, including an open-ended range that includes not a
14 floor but a floor of the floor. And we'll get to that when we get to criticality.

15 With respect to Zhou, Petitioner's arguments rest on a fundamental
16 and now admitted misinterpretation of Zhou's Nyquist plot. In the petition,
17 they made an argument based on a misunderstanding of that Nyquist plot
18 that Dr. Lucht later admitted was -- he was wrong about. Plus, they make a
19 mass-for-mass substitution of propyl propionate for ethyl acetate, for which
20 there's no motivation to do that.

21 The second reason that every ground fails is Petitioner cannot
22 establish the claimed electrode compaction density ratio D1 over D2
23 because, as we've discussed today, Sunose's purported density values are
24 physically impossible as electrode compaction values. Your Honors asked if
25 there were different ways to measure compaction density. The '131 Patent is

1 clear, and Dr. Wheeler addresses this in his declaration, Exhibit 2015, at
2 paragraph 51. He explains how the compaction density is calculated in the
3 '131 Patent. And that's at column 20, line 54 and onward of the '131 Patent.
4 And that explains how compaction density is to be measured.

5 So to be clear, it's not inferred, it's not estimated, it is supposed to
6 be measured by taking what is in effect the total (INDISCERNIBLE) weight
7 of the added coating on top of the current collector. So you take the
8 thickness of the entire electrode, and you subtract the thickness of the
9 current collector. And you divide that by the area as well as the thickness of
10 the layer, subtracting out again the thickness of the current collector. And so
11 that formula is in column 20, line 54 of the '131 Patent. I just wanted to be
12 clear that there's no question there that there's one way to measure this.

13 And the third reason is because Dr. Lucht admitted he does not
14 know what porosity values would be typical or acceptable to a POSITA and
15 did not test and has no reasonable expectation of success as to whether the
16 Zeng or Zhou electrolytes and their attendant viscosities, including their
17 viscosities as might be modified by any proposed substitution, would
18 actually work at the densities and porosities that would be implied even if
19 Sunose's numbers were correct. And so I'll get to all of those, but I wanted
20 to kind of headline from the start that that's kind of where I intend to go. Of
21 course, welcome to ask any questions Your Honors would like.

22 Before we get into the merits themselves, I have a couple of -- I'll
23 call them housekeeping matters. One, as we raised in our sur-reply, the '131
24 Patent is no longer asserted in the underlying District Court proceeding and
25 has not been asserted since March 17th. And so we believe that under the

1 director's Coretronic Corp versus Maxell Limited decision in IPR2025-941,
2 Paper 10, that this Board has the authority to and should de-institute this
3 proceeding for efficiency reasons.

4 The second issue that is a little more -- a little less housekeeping
5 and a little more merits, Petitioner asserts in this proceeding that its
6 interpretation of Claims 14 through 17 that it applied when analyzing Sunose
7 and Su is wrong. And it said that in Paper number 8. It said Claim 14, if
8 correctly interpreted, requires two electrodes, a plurality of electrodes. But
9 for purposes of this petition, we are going to assume that they own -- that
10 this claim reads on just one electrode that meets all those limitations. And
11 we think that is wrong, but we are asserting it anyway.

12 Under the Hologic case that we cited in our briefing, Petitioner is
13 not satisfied with Rule 42.104(b)(3) because it expressly disagrees with its
14 proffered constructions in this petition. So with respect to Claims 14
15 through 17, we believe because they applied only one electrode of Sunose or
16 Su to these claims and because those claims require a plurality of electrodes
17 that each meet the different limitations, that Petitioner failed to meet their
18 burden to Zeng.

19 Unless you had a question --

20 JUDGE PRAISS: Patent Owner, can I just ask what is Patent
21 Owner's position on the correct construction of Claim 14?

22 MR. COX: We believe that what Petitioner said was the correct
23 construction but did not apply is the correct construction. Stated differently,
24 Petitioner is correct that it is wrong in this petition.

25 JUDGE PRAISS: Thank you, Counsel. Please proceed.

1 MR. COX: Thank you, Your Honor. So as we've discussed at
2 some length, Zeng's disclosure expressly states on its terms, as translated in
3 Petitioner's own certified translation, that lithium hexafluorophosphate of a
4 concentration of 1 mol/L is then slowly added to the mixed solution. This
5 implies a liquid solution being added, as we've been over this morning. And
6 Dr. Lucht admits that if that is true, he has not done any calculations as to
7 what the correct ratio would be. And that was on Slide 7, Your Honors.

8 Importantly, and on Slide 9, this is not disputed, without additional
9 volume information regarding how much lithium salt solution Zeng added,
10 you cannot determine a mass fraction of the lithium salt in the total
11 electrolyte solution. And you cannot determine a ratio between the trinitrile
12 of Zeng's examples 4 and 6 and the propyl propionate.

13 For Dr. Lucht's calculations, he assumed that the lithium
14 hexafluorophosphate or the amount of lithium that was added weighed zero.
15 And that's obviously not true. And as a result, if you look at the table in
16 Petitioner's slides at Slide 11, they calculate a Y over Z value that is for
17 Embodiment 4 greater than .057 and for Embodiment 6 greater than .056.
18 Patent Owner submits that because of the way this was calculated, assuming
19 that the lithium salt weighed zero, this is not an actual floor, but it is a floor
20 for the floor of this open-ended range.

21 JUDGE NEW: Mr. Cox, let me just turn my earlier questions
22 around and ask you, given that the language of Claim 37 with respect to the
23 lithium solution renders the weight percentages of the other constituents'
24 electrolyte unknown and unknowable, that it is ambiguous on its facial
25 reading, and also considering the fact that this is a translation from another

1 language, why isn't it possible that the language saying lithium
2 hexafluorophosphate of a concentration shouldn't read to a concentration?

3 MR. COX: So my first response is of course that is not what it
4 says. And in Slide 12 --

5 JUDGE NEW: Well, that's correct. But let me just put on for the
6 record here that we come across typos in translations constantly. And what
7 the Board tends to do when it can is put a reasonable construction on
8 something that's obviously a typographical error. So it's not like we just say,
9 oh, well, can't possibly be a typo, and walk away from it.

10 MR. COX: Sure. No, I understand, Your Honor. And we believe
11 that this is not a typographical error at all because it does make grammatical
12 sense. And Petitioner is relying on their own correction of an alleged
13 typographical error, where the expressed disclosure doesn't say what they
14 need it to say. And there is a perfectly justifiable reason why Zeng might
15 not have included the amounts.

16 So by way of analogy, Zeng is testing what changes to these
17 different additives and different solvents -- what impacts those changes have
18 on the overall electrolyte composition. If I were to test what changes to a
19 cookie recipe did to the Ultimate Cookies by varying the amount of brown
20 sugar, white sugar, butter, salt, coconut oil, and I varied all of those things
21 but I held the amount of chocolate chips and flour constant, I wouldn't need
22 to tell you how much flour I was using or how many chocolate chips I was
23 using to be able to show that adding butter has this effect, adding salt has
24 this effect.

25 And what Zeng was testing, the variances in the other solvents and

1 additives it was testing, are what Zeng is concerned about.

2 JUDGE NEW: Well, I would suggest there's a difference, a
3 definite difference, between recipe writing and writing about chemistry
4 insofar you cannot generally in a chemical -- describing a chemical reaction
5 or a chemical composition or synthesis of a chemical composition basically
6 say season to taste. You have to be precise about what you're saying.

7 And if the authors of Zeng are scientists of ordinary skill in the art,
8 and we assume that they are, then we can assume I think, can we not, that
9 they are trying to be clear about what they're writing about and not
10 purposely introducing ambiguities into it? So why shouldn't we put on that
11 construction that makes the most sense in terms of the chemical synthesis of
12 this electrolyte?

13 MR. COX: So, Your Honor, if it were to be interpreted as a
14 typographical error and that the sentence doesn't mean what it says, if there
15 is an error, just as simply an error could have been they omitted by accident
16 the amount of this lithium solution that was added. That for their testing and
17 their purposes they used a known amount to them and didn't include it.

18 And so if there's an error, there's no reason that it has to be the
19 error that is being proposed, as opposed to they made an error and they
20 omitted the volume of lithium solution that was added. And the text is clear
21 that what is being added is a lithium solution. We considered getting
22 another translation, but the translation is right.

23 JUDGE NEW: Thank you.

24 MR. COX: And there's no dispute that 1 molar solution of lithium
25 hexafluorophosphate is commonly and was commonly commercially

1 available, was a thing you could buy off the shelf and was commonly used.
2 So Petitioner's arguments about how, oh, 1 molar is a common concentration
3 for lithium hexafluorophosphate or for lithium salts, all that tells you is it's
4 perfectly possible that that is what they were adding to their base solvent
5 was an existing off-the-shelf commercially available 1 molar solution. And
6 if they added more of it, it would approach a 1 molar.

7 But there's no guarantee that all battery electrolytes are exactly 1
8 molar. And Dr. Wheeler and Dr. Lucht agree that these molarities of lithium
9 salts can be in an entire range of values.

10 JUDGE NEW: Thank you.

11 MR. COX: Dr. Lucht admitted that terms like molarity and
12 concentration are not used to refer to solid salts. Shown in Claim 10,
13 something with molarity is a liquid solution. And Dr. Wheeler's testimony
14 -- and Dr. Wheeler's an expert in these arts -- says that Zeng's disclosure is
15 straightforward and clear. Dr. Lucht, by contrast, reads ambiguity where
16 none exists.

17 And if Zeng actually means what it says, which in Slide 12, Dr.
18 Lucht admits that "all I can tell you is that clearly from a POSITA's
19 perspective you can't do specifically what's described." That's an admission
20 that what is in Zeng is what's described. And so that contradicts. And this
21 theory that Zeng is a typographical error that needs correcting is not present
22 in the petition. It's something that Petitioner has now made up in their reply,
23 and it wasn't part of the original argument.

24 And I think that this argument that it's a typographical error that
25 ought to be corrected is, at best, ambiguous. But Patent Owner submits the

1 statements very clear and expressed. And Slide 14, it is undisputed that if
2 the lithium solution were added as a solution, Dr. Lucht did no calculations
3 to determine what the ratio ought to be.

4 With respect to criticality, the range of the ratio Y over Z was
5 unexpectedly found by the inventors to be critical to forming a highly stable
6 protective film that's not easily decomposed. This is not the case where it's
7 merely a difference in degree. It is a difference in kind. It is forming a
8 different type of film that is more stable at high temperatures. And
9 Petitioner says that, oh, there are some values that are outside of the range
10 that are still good.

11 But whenever comparing apples to apples, if you hold Z and you
12 hold X the same, comparing, for example, Embodiments S2.5 and D2.4,
13 when you see one inside the range, one outside the range, or embodiments
14 S2.2 and D2.3, one Y over Z inside the range and one outside the range, you
15 see that the ones inside the range have the greater -- the better DC internal
16 resistance. And again, you want a lower DC internal resistance after
17 multiple iterations.

18 So the inventors of the '131 Patent were focused on the long-term
19 protective effects of this film after multiple iterations. The values of a fresh
20 battery, which are something that Petitioner points to, isn't what the
21 invention is supposed to provide a benefit to. It's about the protective effect
22 over multiple cycles, including 400 cycles. And in the '131 Patent, that's the
23 value they're comparing.

24 So the ratio is critical. Now why does that matter? Because as we
25 pointed out on Slide 11 of Petitioner's demonstratives, the way that they

1 estimated Z, even if you assume that the lithium salt was added as a solid,
2 not as a solution, was to assume the lithium salt weighed zero. And of
3 course, it doesn't. They did know upper bound estimates on how much
4 lithium salt might have been added, what the mass ratio of that lithium salt
5 would be.

6 And so when they invert the Y and Z and turn that less than 17.66
7 weight percent or that less than 17.7 weight percent into a ratio, all they
8 know is the floor is something above .057 or .056, but they don't know what
9 that floor actually is. Dr. Lucht did not do that math, did not do those
10 calculations. And so there's no guarantee that it's even within the range at
11 all.

12 Unless Your Honors have other questions on Zeng, I'd like to
13 move to Sunose.

14 JUDGE PRAISS: I have a question.

15 MR. COX: Yes.

16 JUDGE PRAISS: Back when you introduced yourself and told us
17 that the '131 Patent is no longer involved in the litigation.

18 MR. COX: That's correct, Your Honor.

19 JUDGE PRAISS: It's been settled? Or how did you --

20 MR. COX: No.

21 JUDGE PRAISS: -- (INDISCERNIBLE)?

22 MR. COX: And I'm not part of the District Court litigation, Your
23 Honor. My understanding is at the exchange of expert reports, it was no
24 longer -- it was not asserted in the expert report.

25 JUDGE PRAISS: Oh, not asserted in the expert report, but it's still

1 involved in the complaint?

2 MR. COX: That's correct.

3 JUDGE PRAISS: Technically, for mandatory notices purposes, it
4 is still on litigation?

5 MR. COX: That's correct, Your Honor. There's been no filing of a
6 dismissal, as far as I'm aware.

7 JUDGE PRAISS: Okay. Thank you for that clarification.

8 MR. COX: Yes.

9 JUDGE PRAISS: Now I can focus on your next argument.

10 MR. COX: I apologize, Your Honor. So with respect to Sunose,
11 the ratio D1 over D2 that has to be between .8 and 1.2, they rely on Sunose
12 exclusively for this limitation for every ground, including those that require
13 the anode to be within that range. And we'll get to that a little bit later in
14 connection with Zhou. But undisputed by Dr. Lucht that the maximum
15 theoretical compaction density of Sunose's combination of materials is 4.5
16 grams per cubic centimeter. And undisputed that many of the reported
17 active material density Ms of Sunose are greater than that figure.

18 What does that mean? That means either Sunose made a
19 systematic error that infects all of its results, or Sunose is measuring
20 something that is not electrode compaction density but is still something
21 else. So Sunose does not tell us how it calculates or measures active
22 material density M. Petitioner has made some assumptions and Dr. Lucht
23 has made some assumptions about how that was done, but it's not stated in
24 Sunose how it's calculated. We're unable to compare whether its calculation
25 corresponds to the disclosure of electrode compaction density that's shown

1 in column 20 of the '131 Patent.

2 And what this tells us is that however Sunose was estimating or
3 calculating these active material densities M, that whatever the error is it was
4 the same method that it used to calculate all of the active material, densities
5 M and N, and it infects the entire table.

6 By another way of analogy, and I promise this will be my last one,
7 Your Honors, if I were to say I'm going to estimate the heights of players on
8 a basketball team based on their shoe size and weight and I report back, hey,
9 these five players had heights of 16 feet, 14 feet, 12 feet, 11 feet, and eight
10 feet. You would know that even though one of those heights, 8 eight feet, is
11 biologically possible, you would know that the method that I used to
12 calculate those heights was obviously incorrect and not based in reality.
13 Because if I had, I would have reported values that could correspond to
14 physical reality.

15 Similarly, because Sunose is reporting active material densities
16 like 8 and 6.5 and 5.7, there's no way that a system or an algorithm that's
17 used to report those values could possibly be reporting electrode compaction
18 density.

19 JUDGE NEW: Is it not possible, Mr. Cox, that by using a different
20 way of measuring compaction density you derive a different scale, and
21 therefore the numbers don't necessarily mean the same thing in Sunose that
22 they do in, say, your interpretation of them? In other words, it could be
23 scaled differently somehow.

24 MR. COX: They could be scaled differently, but I wouldn't submit
25 that they would necessarily be geometrically connected, if that makes sense,

1 right?

2 JUDGE NEW: Yeah.

3 MR. COX: So just because two players have the same shoe size
4 and weight, it doesn't mean they're the same height. And so similarly, the
5 method that's being used to calculate this M and N value might be incorrect
6 in multiple ways. And so it might not scale geometrically. It might not be
7 as simple as, oh, multiply all of these by .5 and you get the right answer.
8 Because now you have that, oh, they forgot that this is the single-sided, not
9 the double-sided, and they forgot to divide it by 2 or something like that.

10 Importantly, Embodiment 1 and comparative example 1, if you
11 look at Slide 19 which I have up, the Sunose specification states that the
12 same coating amount is used for the single-sided portion on both. But it
13 reports a density of 5.7 grams per cubic centimeter for Embodiment 1, and 2
14 grams per cubic centimeter for comparative example 1. That's another error
15 that seems to be not corrected, in addition to the errors that we pointed out
16 that Sunose also is off by a factor of 10,000 because it uses centimeters
17 squared instead of centimeters cubed. Dr. Wheeler submits that Sunose was
18 just sloppy and a person of skill in the art would not rely on this reference at
19 all.

20 JUDGE NEW: It seems to me that no matter how you measure it,
21 the volumes that are coming out in grams per cc or grams per ml, basically
22 you can't get around that. However you calculate feet, you can end up with
23 feet in terms of -- when talking about -- to use your height analogy. So
24 whatever method you use, you're coming to a value that is understandable as
25 being quantitative in a very specific way as grams per cc equals density.

1 MR. COX: Right.

2 JUDGE NEW: So how you get there is perhaps not really
3 important.

4 MR. COX: That's right, Your Honor. And Dr. Lucht does not
5 dispute that all the values over 4.5 are impossible. And he did not do the
6 analysis of what porosities would be implied by the values of 4.4 and 4 that
7 he relies on in Embodiments 3 and 4. And that's important because we
8 know zero porosity, Dr. Wheeler testifies in his declaration, would never be
9 achievable and would be undesirable. Because you need porosity for the
10 electrolyte to filter through and for the ions to be able to flow.

11 Similarly, this 4.4 value would imply, even if it were correct, a
12 porosity of 2 percent. And there's no analysis by Dr. Lucht of what porosity
13 values are typical or acceptable as of the date of invention of the '131 Patent
14 or which porosity levels would work with the electrolyte solutions of Zeng
15 or Zhou which have their own viscosities. And their proposed substitution
16 of propyl propionate would only increase the viscosity, which would require
17 a higher porosity in order to work.

18 Dr. Wheeler testified, Slide 24, that you would have to have a
19 value less than 4.5 by some significant amount. And a realistic upper bound
20 on density would necessarily be lower than 4.5. That 4.5 assumption that he
21 calculated is assuming zero porosity, assumes the highest possible density
22 for the binder and for the carbon black and everything else. And in the real
23 world, in a practical world, that's just not achievable using Sunose's
24 combination of elements.

25 Dr. Lucht didn't dispute that any of these output numbers were

1 higher. That's shown on Slide 25. And he admitted in the lower right-hand
2 corner that he's an electrolyte guy. Electrodes are just not his area of
3 expertise. He says, this is not my primary area of expertise when we're
4 talking about how the electrodes of Sunose are created and compressed and
5 what the effects would be.

6 Dr. Wheeler noted that Dr. Lucht failed to take into account in his
7 calculations the possibility that these active layers as they go through the
8 high-pressure rollers would deform or elastically relax after exiting the high
9 pressure roller, which could account for possibly how Sunose miscalculated
10 this. They might have calculated, oh, that would be the density if it never
11 sprung back. But Dr. Wheeler explained that these active materials tend to
12 relax after going through a high-pressure roller. Imagine, if you will, kind of
13 running any material through something at many megapascals of pressure
14 and then it returns to atmospheric pressure, it's going to spring back some
15 amount.

16 Slide 26, Dr. Lucht admits that he did not calculate what level of
17 porosity the Sunose M values he relies on would represent. And he also
18 admitted that he did not know what porosity levels a POSITA would have
19 believed would have been typical or acceptable. And I think that's a crucial
20 admission. And it shows a lack of reasonable expectation of success in
21 combining the references.

22 There's no dispute that Sunose uses the same methodology,
23 whatever it is, to determine the densities for each layer, as shown in Slide
24 27. And Dr. Lucht himself admits there's no difference for how the active
25 material density M was calculated for Embodiments 3 and 4 as composed

1 -- as opposed to any other embodiment. So because that methodology
2 returns impossible results, the entire table is suspect, which also means the
3 range of .7 to 1.0 that they rely on in reply is similarly suspect. Because that
4 .7 to 1.0 only comes from the table, on the M and N values that we cannot
5 trust.

6 Dr. Lucht admits, and this is also crucial on Slide 29, that it's
7 possible that Sunose's measurement of compaction density is wrong. He
8 says it is possible they measured it wrong. And he says they don't specify
9 how they measure the compaction densities. And then in his second
10 deposition, he said Sunose did not measure the values at all. He opined that
11 they are estimated or calculated but never actually measured.

12 Dr. Wheeler explained on Slide 30 this relaxation effect that I
13 discussed earlier and explained in Slide 31 that the error in Sunose that led
14 to those impossible values is a systematic error that infects everything.
15 Therefore, for all the reasons I've discussed, a POSITA would know that you
16 could not trust or achieve the prescribed densities of Sunose. And in any
17 event, there's no indication that those densities or their implied porosities,
18 which Dr. Lucht did not estimate, would work with Zeng or Zhou's
19 electrolytes and their specific viscosities.

20 If we look at Slide 16 of Petitioner's slides, that's Paper 43. This is
21 the figure of -- I don't have it up -- Exhibit 1003. They rely on Sunose's
22 electrodes. Its single cathode, shown here in Figure 2, as also meeting the
23 limitations of Claim 14 which require a first and second electrode. One
24 electrode has the single-sided coating, the other electrode has the double-
25 sided coating. Because they only rely on this and because they expressly

1 disagree that that interpretation of the claim is correct, I believe they've
2 failed to show Claims 14 through 17 for any ground.

3 Lastly, Sunose teaches that the range of D1 to D2 is a critical
4 range. They test it, and they found that when D1 over D2 is within the range
5 of .08 to 1.2 they achieved better cycle performance after multiple cycles,
6 possibly because the combined additives facilitate the reduction of the
7 electrode interface resistance and the reduction of the cell polarization. And
8 that's Slide 39.

9 Slide 40 explains that there's no motivation to combine Zeng or
10 Zhou with Sunose. Dr. Wheeler explained that using Sunose's electrodes
11 may deteriorate the performance of Zeng or Zhou. There's no reason to use
12 a cylindrical electrode, which is their only reason really for using Sunose is
13 they say, well, you need to use something, and so you'd use a cylindrical
14 electrode. And that's not truly a motivation to combine. Sunose's figures are
15 specific to its roller press and its calendaring method, and there's no
16 evidence that that type of calendaring was used with any of Zeng or Zhou's
17 electrolytes or their working batteries at all.

18 Slide 41, this is kind of the crucial admission that I had from Dr.
19 Lucht in the second deposition, where he said he did not know how well a
20 electrode with a compaction density of 4.4 would work with any of the
21 electrode solutions of Zeng or Zhou that he proposes to combine with
22 Sunose. If Your Honors don't have any other questions on Sunose, I'm
23 prepared to move on from there.

24 JUDGE NEW: Just one question, the fact that the expert doesn't
25 know how it would work, I'm not sure how that speaks to motivation.

1 Wouldn't a person of ordinary skill in the art be inclined to experiment to see
2 if you could get a better result by that? And isn't that enough to drive
3 motivation?

4 MR. COX: So I think this is more about reasonable expectation of
5 success, perhaps. And what he's saying is I don't know if it would work is a
6 lack of expectation of success.

7 JUDGE NEW: Well, he's not saying I don't think it would be
8 likely to work, which I think would argue --

9 MR. COX: Well, sure, yeah.

10 JUDGE NEW: -- against a reasonable expectation of success. The
11 key word here is reasonable, and we're talking about electrodes and
12 electrolytes. And wouldn't a person of ordinary skill in the art be inclined to
13 look at combining them, even if this particular expert's not sure how it would
14 work to see if it would work?

15 MR. COX: So Dr. Wheeler testified that a near zero porosity
16 would not work and would be undesirable and that it wouldn't work because
17 the electrolyte would be unable to infiltrate the active layer. And 4.4 implies
18 a porosity of 2 percent which is essentially zero.

19 JUDGE NEW: Okay.

20 MR. COX: And in the interest of time, I'm going to move to Zhou,
21 starting on Slide 62 of my presentation. So a POSITA would have no reason
22 to select or implement Zhou's Example 8 when combining with Sunose.
23 This isn't an anticipation case. This is an obviousness case where they're
24 choosing what from Zhou they are going to combine with Sunose. And
25 there's nothing about Example 8 that would commend Example 8 to be the

1 example that was combined with Sunose.

2 Again, Example 8 does not contain propyl propionate. And
3 looking at Slide 64, Figure 4 of Zhou, this was the Nyquist plot that Dr.
4 Lucht in his declaration submitted with the petition suggested that Example
5 8 was the best-performing example with respect to AC impedance. He later
6 admitted that was a misunderstanding and an incorrect understanding of how
7 this Nyquist plot should be read. They're simply numbered from
8 comparative example one to three and then examples one up to eight from
9 bottom to top. They're spread apart in this matter to make the graph easier to
10 view.

11 But Zhou explains on Slide 65, and that's paragraph 58 of Zhou,
12 that the corresponding semicircle in the AC impedance curve is what
13 characterizes the impedance behavior of the ions in the film. And the larger
14 the radius of the arc, kind of the further to the right in Slide 64 the elbow is
15 or the knee or whatever angle or body part you want to use, the further to the
16 right is a longer body part -- a longer radius, that's undesirable.

17 And so the shorter, tighter circles, like those shown in examples 1
18 and 2, are the more desirable values. And importantly, examples 1 and 2
19 contain no trinitrile at all. And so a POSITA looking at Zhou and its
20 characterization of the different AC impedance values would be led to
21 believe that trinitrile was an undesirable additive because it results in worse
22 AC impedance.

23 And on Slide 66, this is what I was just discussing, that examples 1
24 and 2 outperform Example 8 with respect to AC internal impedance, and
25 neither of those contain a trinitrile. Zhou teaches that improving the high

1 temperature performance of its battery is one of its goals. And the high
2 temperature performance is often challenged when using the solvent system
3 of the present invention. But when looking at the high temperature
4 performance in Figure 3, Example 8's performance is not indicated at all.

5 And so if a person was focused on high-temperature performance,
6 like Zhou suggests ought to be pursued, Figure 3 does nothing to commend
7 Example 8 to a person of skill in the art either and in fact suggests that
8 perhaps example 1, which is outperforming, ought to be used. And again,
9 that contains no trinitrile. We acknowledge that Zhou does have a section
10 that teaches that other esters could potentially be used. We don't dispute
11 that.

12 But Zhou teaches that carboxylic acid esters, like the ethyl acetate
13 it uses, often do not participate in the formation of the SEI film. The '131
14 Patent recognizes that propyl propionate does. We're not saying that Zhou
15 must solve the same problem the '131 Patent does. But there's no motivation
16 here, as Counsel may have suggested earlier, that forming this protective
17 film using propyl propionate was known in the art. Because Zhou in fact
18 teaches the opposite. Zhou teaches that the carboxylic acid esters used in the
19 present invention do not often -- do not participate in formation of the SEI
20 film.

21 And lastly, on Zhou, a person of skill in the art would have no
22 reason, no motivation to substitute propyl propionate for the ethyl acetate
23 that is already in Example 8. Petitioner proposes modifying this on a one-to-
24 one mass basis. And there's really no reason why you would do it on a mass
25 basis rather than a molarity basis, and there's no support in Zhou for what

1 would motivate you to make that substitution.

2 And as Dr. Wheeler explains in his supplemental declaration and
3 shown here in Slide 73, the properties of these different esters are very and
4 significantly different. Ethyl acetate has a boiling point of 77.1 and a
5 melting point of -84. Whereas propyl propionate, the respective values for
6 boiling point and melting point are 122.5 and -75.9. So that's a dramatically
7 different boiling point. It's going to have significant effects on the
8 electrolyte. And Dr. Lucht hasn't accounted for what those effects might be.

9 Dr. Wheeler does explain that due to the longer chains, the
10 viscosity is going to be negatively affected. And Zhou is focused on low
11 viscosity electrolytes. And just because two molecules share a functional
12 group, that's no indication that they are simple substitutions one for another.
13 Battery chemistry is exceedingly complicated. You can't just say, oh, I
14 could just swap these mass-for-mass and expect the underlying solution to
15 work.

16 And there's no reason why it would be a total substitution of the
17 ethyl acetate that is present in every embodiment of Zhou as opposed to a
18 further addition of propyl propionate. And those numbers aren't calculated
19 by Dr. Lucht. They don't explain why you would take out the ethyl acetate
20 and add in propyl propionate as opposed to just adding propyl propionate.

21 JUDGE PRAISS: Counsel --

22 MR. COX: Yes.

23 JUDGE PRAISS: -- does Zhou's express listing of these
24 possibilities suggest their interchangeability?

25 MR. COX: Your Honor, I don't think it suggests that they are

1 interchangeable or substitutes. I know I promised this would be my last
2 analogy earlier, but here's another one. Because I can make sandwiches out
3 of ham and cheese and peanut butter and jelly, that doesn't mean in my
4 peanut butter and jelly sandwich I can substitute the jelly for ham
5 necessarily and expect success in that combination.

6 So he lists a variety of things that could be used, but he does not
7 list which one -- which other solvents and additives and embodiments they
8 would work well with or would be well suited to work with. Just because
9 there's a list of possible ingredients doesn't mean all of those ingredients
10 work well together. And Dr. Lucht hasn't done that analysis to show that the
11 substitution of propyl propionate would result in any desirable qualities.
12 And in fact, Dr. Wheeler explained that the change to viscosity would be
13 undesirable in Zhou.

14 I apologize, Your Honor, I'm just close to running out of time. I'm
15 making sure I have everything that I need to address. Dr. Wheeler, on Slide
16 81, explained there's no expectation that an equal weight of these two
17 molecules would be a substitution that you could predict the outcome of the
18 electrolyte behavior. And even if you believe that the two materials might
19 have similar behavior, mass is not necessarily the best way to compare those
20 two different molecules. Another common way is to do it by volume or by
21 molarity. And Dr. Lucht does not address that.

22 With respect to Su as it applies to Claims 3 and 16, which require
23 the electrode to be an anode, the petition fails to argue that Su's anode meets
24 the D1 over D2 limitation,. And that's a fatal flaw with respect to Claims 3
25 and 16. So again, looking just at those dependent claims, Claim 3 requires

1 that the electrode of Claim 1 be an anode and D2 be between these two
2 values. And Claim 16 requires that the first electrode and the second
3 electrode both be an anode and D2 be within those two values.

4 For the petition's analysis, their only analysis of D1 over D2 is
5 from Sunose's cathode. And Sunose never teaches an anode that has a D1
6 over D2 ratio that meets this limitation. And in the petition, Petitioner does
7 not purport to do an analysis of Su's anode to determine if D1 and D2 fit in
8 the corresponding ratio. And that's shown in Slide 86.

9 With respect to Matsuoka, which Your Honor addressed briefly,
10 there's no reason if one is looking at Zeng which tells you how much propyl
11 propionate to use in its base solvent, its initial solution. Even under
12 Petitioner's view of the world, there would be no reason to modify the
13 already existing amount of propyl propionate that's already in the base
14 solvent. And for the other issues on Matsuoka, I believe we'll rest on the
15 papers, Your Honor, unless you have a question.

16 JUDGE PRAISS: Any questions from the panel?

17 JUDGE NEW: None for me.

18 MR. COX: Then I'll reserve the rest of my time, Your Honor.

19 JUDGE PRAISS: Whenever you're ready.

20 MR. STEIN: Okay. I just wanted to discuss a couple things that
21 counsel for Patent Owner raised. During his direct, Counsel misrepresented
22 Petitioner's petition -- position with regard to the Y over Z ratio in Zeng.
23 Mr. Brady said that the petition only says that -- it only provides an upper
24 limit for the Y over Z range. In the table on page 39, the petition does
25 provide an upper limit for the Y over Z range in each of Embodiments 4 and

1 6 of Zeng.

2 But then below the table, it goes on to explain that the Y over Z
3 value in Zeng has to be more than 0.3. Because that would require adding so
4 much lithium salt that the molarity would be nearly five times what Zeng
5 discloses. And so the Y over Z range that is contemplated by Zeng is
6 entirely within the Y over Z range that's recited in the claim. And so any
7 criticality to this range doesn't matter, because Zeng's Y over Z value is
8 inside the claim range. And Dr. Lucht discusses that. It appears on
9 paragraphs 129 through 132 of his original declaration.

10 And then regarding Claims 14 through 17 and the construction of
11 those claims, I'd just like to remind the panel that Petitioner filed a second
12 petition that challenged only Claims 14 through 17 of the '131 Patent, and it
13 was under the Petitioner's proposed construction there. And so the Board
14 denied that one -- discretionarily denied that petition in favor of this petition.
15 This petition was ranked first. And so the Board found that there's a
16 reasonable likely -- prevailing on those claims under the construction
17 presented in this petition. And Patent Owner has not presented any
18 arguments that distinguish Claims 14 from -- or Claim 14 from Claim 1.

19 Going to Zhou and the substitution of propyl propionate for ethyl
20 acetate, the modification that Petitioner proposes is the least intrusive
21 substitution that's proposed by or taught by Zeng. Substituting ethyl acetate
22 mass-for-mass -- or propyl propionate mass-for-mass with ethyl acetate
23 preserves the remaining composition, the mass ratio of the other solvents in
24 that solution. And so according to Patent Owner's own logic about how
25 changes to battery composition are unpredictable, Petitioner's proposed

1 modification is the most straightforward one, and the least intrusive one.

2 And regarding dependent Claims 13 and 16, which implicate the
3 Zhou reference, Petitioner's proposed combination incorporated the entire
4 electrode structure from Sunose. You need an entire battery for the
5 electrode -- you need an entire electrode structure, both anode and cathode,
6 for the battery to function. And so the petition proposes using Sunose's
7 electrode structure with the electrolyte of Zeng and Zhou.

8 Sunose's disclosure regarding the N over M ratio is not limited to
9 cathodes. It's directed to electrode plates generally. And Dr. Wheeler
10 admitted in his deposition that the broader disclosure of Sunose is not
11 limited to anodes. And so the proposed combination is not modifying what
12 the D1 over D2 ratio is from Sunose. It's simply importing an appropriate
13 D2 value from Sunose. And so the combination does address the anode in
14 Claims 13 -- or Claims 3 and 16. That's all I have, Your Honor.

15 JUDGE PRAISS: Any further questions from the panel?

16 JUDGE NEW: Not from me. Thank you.

17 JUDGE PRAISS: All right, Mr. Cox, whenever you're ready.

18 MR. COX: Thank you, Your Honors.

19 JUDGE PRAISS: I figured out keeping a separate clock.

20 MR. COX: I'm not sure we'll need to track it.

21 JUDGE PRAISS: All right. Whenever you're ready.

22 MR. COX: Thank you, Your Honors. My only comment in
23 response to Mr. Stein's rebuttal there is with respect to Su. There's no
24 argument in the petition that an electrode that is an anode meets the D1 over
25 D2 ratio. There's no dispute that Sunose teaches a battery that has cathodes

1 and anodes. But there's no description in the petition anywhere of an anode
2 that meets the D1/ D2 ratio. And for that reason, the petition fails with
3 respect to Claims 3 and 16 on all grounds. Nothing further, Your Honor,
4 unless the panel has questions.

5 JUDGE PRAISS: Any further questions from the panel?

6 JUDGE NEW: None for me. Thanks.

7 MR. COX: Thank you, Your Honors.

8 JUDGE PRAISS: Thank you, Counsel.

9 I'd like to thank both the parties for this opportunity to investigate
10 the record with you further and also your attentiveness to our questions. We
11 are now adjourned.

12 (Whereupon, the above-entitled matter went off the record at 2:51
13 p.m.)

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