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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

RJ TECHNOLOGY LLC,
Patent Owner.

Case IPR2023-01350
Patent 7,749,641 B2

Record of Oral Hearing
Held: December 4, 2024

Before JON B. TORNQUIST, CHRISTOPHER M. KAISER, and BRIAN D. RANGE, *Administrative Patent Judges*.

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P-R-O-C-E-E-D-I-N-G-S

1:00 p.m.

JUDGE TORNQUIST: Good afternoon. We're here today for oral hearing in IPR2023-1350, Apple Inc. versus RJ Technology, LLC. We'll address U.S. patent number 7749641. I'm Judge Tornquist, and with me are Judges Kaiser and Range.

Who do we have from petitioner?

MR. RENNER: Good afternoon, Your Honors. This is Karl Renner from Fish & Richardson on behalf of Apple, Petitioner. I'm joined in the room by Hyun Jin In and Gretchen DeVries, and on the public line, Aaron Huang of Apple.

JUDGE TORNQUIST: Okay. And Ms. DeVries will be our LEAP practitioner today?

MR. RENNER: She is. Yes, Your Honor.

JUDGE TORNQUIST: Okay. Excellent.

And who do we have from patent owner?

MR. YANG: Good afternoon, Your Honors. Mitch Yang, on behalf of patent owner RJ Technology. My colleagues George Stamatopoulos and Robert Zhou of Kobre & Kim will be presenting.

JUDGE TORNQUIST: Okay. Welcome. Per our oral hearing order, each side will have 60 minutes of argument time today, but as I just noted, both sides have LEAP practitioner, so it will be 75 minutes for each side to present today. Petitioner, bearing the burden of proof, you'll go first, and you can reserve a period of time for rebuttal. Then we'll hear from patent owner, who can also reserve a short period of time for rebuttal, and we'll have the rebuttal and sub-rebuttal arguments. We have the parties'

demonstratives, but for the clarity of the record, would you please announce clearly each slide number when you start discussing it?

Okay. With that, Petitioner, when you're ready.

MR. RENNER: Thank you, Your Honor. We'll reserve 15 minutes for our rebuttal, just for clerical purposes.

JUDGE TORNQUIST: All right.

MR. RENNER: May it please the board. Karl Renner on behalf of Petitioner, Apple. As to the argument management, we -- our demonstratives track the order of the issues in the record briefing as they were presented. But in today's oral presentation, we plan to address issues in a slightly different order.

We plan to begin by addressing the construction of charged cutoff voltage, the only claim element whose construction was disputed. And because that term was advanced by the patent owner with only respect to the two petitioned grounds, one of those grounds, the Yasunami-Koyama combination, we plan to begin with that ground. Hyun Jin In will lead that portion of our presentation. After that, we'll return, revert back, and Gretchen DeVries will discuss the Yamaki-Sakamoto combination. Finally, I'll join you again to talk about Defendant claims 11 to 14.

Now, absent questions from you or unless you want to see us presented in a different order or address other issues, I'd say just a few words about the Yasunami-Koyama combination that will be addressed in greater detail by Hyun Jin In.

As noted, the only subject, the only term subject to construction is that charged cutoff voltage. And you'll recall that this term's meaning was

debated in the final oral hearing of IPR 2023-1183 involving this same patent and petitioner Samsung just a few weeks ago.

On the record -- and while that record reflects that we embrace positions offered by Samsung counsel in that hearing -- we don't plan to spend our limited time together really reiterating those. Rather, we plan to spend our time reinforcing a different but related point as it relates to this combination. And that is that Apple doesn't need to prevail against patent owner on the meaning of charged cutoff voltage to prevail in this case on that ground or in this case generally.

To that point, even if this term is construed in the manner advanced by patent owner, the claims are rendered obvious by both combinations as Apple's position. As noted, patent owner doesn't even argue otherwise with respect to the Yamaki-Sakamoto combination, which Gretchen will address.

But the point I want to make and bring into focus is that the Yasunami-Koyama combination is also viable even under patent owner's construction of charged cutoff voltage. And this is the point that H.J. is going to spend some time with Your Honors on.

With that, I'd transition to H.J. and ask you to turn your attention to slide 29, if you would.

MR. IN: Thanks, Karl.

And good afternoon, Your Honors.

Like Karl said, if we could go to slide 29, I'd like to now discuss the Yasunami-Koyama combination, which was identified as ground 2A in our petition and also forms the basis of our ground 2B.

I'll begin with a very brief overview of the combination itself and then proceed to show how this combination satisfies the charged cutoff voltage limitation of claim 5, as well as other limitations.

If you would move with me to slide 31, we can see in the upper box in this slide that Yasunami is directed to a secondary lithium-ion battery that has a high battery voltage and also long charge-discharge cycle life.

With respect to this high battery voltage, we can see in the lower box in this slide that Yasunami has what it refers to as an end-of-charge voltage that goes all the way up to 4.7 volts. And Yasunami even mentions lower in that snippet there, higher than 4.7 volts, which of course is far higher than the 4.2 volts that is mentioned in claim 5.

And while Yasunami does not disclose a specific ratio of the positive-to-negative electrode materials, as also recited in claim 5 of the 641 Patent, it does say, for instance, in paragraphs 19 and 32 of Yasunami that there are no particular restrictions on the use ratio for the positive electrode active material and the negative electrode active material. And Yasunami further recognizes that the negative electrode active material can be preferably increased.

Now, moving to slide 32, we see here that Koyama, the second reference in this combination, is similarly directed to a lithium-ion battery that has, and I quote, "better charging characteristics." And as you can see in the blue highlighting here at the bottom of the slide, Koyama explicitly provides the claimed electrode ratio where there is more negative electrode material than the positive electrode material.

Now, slide 33 now. Our petition here had laid out the various reasons why POSITA would have been motivated to combine these two references,

Yasunami and Koyama, to arrive at a high-voltage lithium-ion battery with the required electrode material ratio.

If we could go to slide 34 now, Your Honors. So my colleague, Mr. Renner, just now alluded to arguments now being advanced by patent owner concerning how this term, charge cutoff voltage, should be construed. And we can see the positions of the parties on slide 36, with patent owner basically saying that the charge cutoff voltage refers to an intrinsic battery voltage, and petitioner's view being that it is an externally applied voltage.

But that said, at the outset, and as Mr. Renner noted, I'll simply note here that we stand by our record in these proceedings, which is that we don't believe this term should refer to some sort of an intrinsic battery voltage. Slides 37 and 38 here, which I won't go over in detail right now, show some of the rationale that we provided in these proceedings to support this view, including our review being consistent with the 641 Patent specification, and it also being consistent with what patent owner's expert, Dr. Yao, told the court in the district court case that is co-pending here.

But all that said, if we could go back to slide 35, please. I apologize for moving back and forth so much.

In slide 35, I really want to just emphasize here that we think all this sort of quarreling here at best amounts to a distinction without a difference. And I say that because the Yasunami-Koyama combination satisfies this charge cutoff voltage limitation, regardless of which party's view the board adopts regarding that charge cutoff voltage. And as Karl noted --

JUDGE TORNQUIST: This is Judge Tornquist. I want to make sure I understand your argument correctly. For you to prevail on patent owner's

construction, then do we need to find that Yasunami would use constant current, constant voltage charging scheme?

MR. IN: Yes, Your Honor. So you would have to find that Yasunami includes constant charge cutoff voltage, but you would not have to separately determine what exactly that means, whether it means applied voltage or battery voltage. Because as I will go on to explain, Yasunami satisfies under both scenarios. Does that answer your question, Judge Tornquist?

JUDGE TORNQUIST: Yes, I think I'll just wait to see how you -- I think I'd like to make sure I understand how it's going to do that if we're just using constant current, and we are adopting -- if we were to adopt patent owner's position that it's the battery voltage.

MR. IN: Okay. So I think slide 35 here will help slightly here. So on slide 35, if we look at the plot on the left side of slide 35, we can see this constant current, constant voltage charging plot that the patent owner provided. And I think this really highlights what we mean when we say that this really is a distinction without a difference.

So, again, if we look at this graph, the petitioner's position, our position, is essentially that the term charge cutoff voltage should correspond to this top green line here that you see on this slide, which represents an applied voltage on the battery.

Patent owner's view appears to be that the charge cutoff voltage should instead refer to this light blue line that you see just below the green line. This line, of course, representing what they refer to as the battery voltage.

So a couple of things to point out here. As you can see, as the charging progresses, these two lines become very, very close to each other. And regarding this point, our expert, Mr. Hruska, explained -- and you can see this on the bottom right side of the slide -- that this blue battery voltage line asymptotically approaches the green applied voltage line to basically become equal to each other after a reasonable amount of charging.

And patent owner actually agrees -- and you can see this on the top right side of the slide -- where they acknowledge that the two voltages are, and I quote, "practically equal to each other." And their expert, Dr. Yao, also said the same thing, noting that, and I quote, "There is almost no difference between these two voltages when the battery gets charged." And this is from paragraph 114 of his declaration.

So with this context, let me now skip to slide 40, where we see how this notion applies to Yasunami. On the right side of slide 40, we see patent owner's position, which is that Yasunami's disclosure of 4.3 volts somehow does not satisfy the claim's requirement of being over 4.2 volts, because this 4.3 volts is what they call an applied voltage and not a battery voltage.

But as all the parties here seem to agree, if there is no difference in a charged system between what an applied voltage is and what a battery voltage is, then Yasunami's 4.3 volts satisfies the claim's requirement of a charged cutoff voltage being over 4.2 volts, whether it's an applied voltage or a battery voltage.

JUDGE TORNQUIST: Counsel, this is Judge Tornquist. Now, I just want to make sure, this is where I think we might be diverging. My understanding, if we go back to slide 35, there's a constant current set up on the dark blue line until about a quarter of the way through, and then our

voltage reaches its peak. Then it stays at that voltage and the current drops. And then the asymptotic points that you're showing us are where the current is dropping, and the voltage is staying the same.

MR. IN: Yup.

JUDGE TORNQUIST: My understanding is that is a constant current, constant voltage charging scheme. But before, you seemed to indicate that we could just use constant current and get to that same number. And that's where I -- maybe I'm not understanding your argument.

MR. IN: Yeah, thanks for that clarification, Judge. I think I may have misheard your earlier question regarding constant charging.

So our view is that a POSITA, when charging these types of battery systems, typically use a constant current, constant voltage charging system, as you see here. And our expert, Hruska, has testified to that same concept, saying that, for instance -- give me a second here -- slide 46, for instance, our expert mentions that, you know, either Yasunami implements this type of charging, or POSITA would have found it obvious to implement this type of charging, because it is the sort of a very typically used and advantageous way of charging lithium-ion battery systems.

JUDGE TORNQUIST: Okay. So this is Judge Tornquist again. So that means we do need to find that either Yasunami does use constant current, constant voltage, or it would have been obvious to do so because it was conventional in the art.

MR. IN: I think that's fair to say, Your Honor, although we would also submit that under both parties' views, applied voltage and battery voltage really sort of approach each other as a battery is completed to its charging. And that I don't think there's been something on the record to say

that any specific type of charging is always required. But as far as the party's deviation goes, those two voltages are what the disclosed voltage in Yasunami refers to. If they are the same, then they're necessarily satisfying the 4.2 volts limitation. I think that is our view here.

JUDGE TORNQUIST: My understanding of what patent owner have been arguing is that your expert testified that it was a constant current charging scheme, and that at that point where the voltage hits 4.3, your state of charge is maybe 60 percent. I think they said maybe you could get to 80 if your charge was lower. But those numbers are not going to converge. So we do need to go beyond that constant current scheme that patent owner was talking about defined for you.

MR. IN: Yeah. So I think what our experts have said and what their expert has said is that as the charging goes to completion is where we reach this state where the two voltage lines converge and become the same.

JUDGE TORNQUIST: Okay.

MR. IN: Sorry. So in slide 41 now, I think where it was. Here, I can see where Yasunami refers to its voltages. On the left side, there is a 4.3 volts, which the patent owner refers to in their papers. But also, it also refers to 4.7 volts, as you can see on the right side. And again, 4.7 is much greater than 4.2. And all this was cited in our petition.

If we could go to slide 43 now. Here we see a testament from our expert who discussed the second declaration, which notably was not challenged through additional depositions or any countering evidence. And here he explains that even if Yasunami's disclosure of 4.7 volts is referring to an applied voltage, and even if charge cutoff voltage must refer to a battery voltage as patent owner contends, which is slightly less than this

applied voltage, Yasunami's voltage range that is disclosed would still be well within what is claimed in the patent. And that's shown through these bar graphs that you see on the right side, where we see -- to break this down a little bit, the red bar here refers to the claimed CCV range. And the green bar refers to the Yasunami's so-called applied voltage. And the blue and purple bars here show what Yasunami's battery voltages would be as understood by POSITA. And you can clearly see here that the purple, blue, and green bars all overlap with the red bar, meaning that the CCV limitation is satisfied.

So with that, let me sort of wrap things up here in this section with slide 48. Here, we see, as provided in the petition, four separate motivations to combine that were provided in our petition. That is to combine Yasunami with Koyama. And these remain unrebutted. And these reasons include improvements in charging performance, improvements to safety, improvements to cycle life characteristics. And so, these were all reasons that were testified to by our expert, Mr. Hruska. And again, were not rebutted in these proceedings.

So with that, Your Honors, unless there are any other questions, let me hand things off to my colleague, Dr. DeVries, who will discuss the Yamaki grounds.

MS. DeVRIES: All right. Thanks, H.J.

And good afternoon, Your Honors. I'm Gretchen DeVries.

Now, let's go back to slide 7 for a discussion of the Yamaki-Sakamoto ground. And you'll see in slide 7 that we've identified three key disputed issues for this ground. In the interest of time, I'd like to address just two of them. The question of whether Yamaki's disclosure is sufficient for us to

rely on it as a battery with a charge cutoff voltage in the claimed range. That's issue 1.1. And the question of a reasonable expectation of success in the combination. That's issue 1.3. We've also included slides that address the petition's advanced motivations to combine the two references. That's issue 1.2. And that's addressed on slides 18 through 23. I'm not planning to discuss this issue now, although we're certainly happy to answer questions if you have any.

Before we get into the issues themselves, though, I'd like to start with a quick overview of the combination to frame it for future discussion. So let's go to slide 9, please.

Now, just like the Yasunami-Koyama ground, Yamaki-Sakamoto starts with a primary reference, this time it's Yamaki, that has a charge cutoff voltage between 4.4 and 4.8 volts. That's highlighted in green at the bottom bit of the slide. And so that charge cutoff voltage falls within the CCV range that's recited in the claims.

And this charge cutoff voltage -- I'll talk about this a bit more later -- but it's enabled by Yamaki's choice of electrode materials. And the result is that we get a battery that can operate at high voltage and can also exhibit good cycle life.

Just as a quick aside, I'll remind you that the claim construction issue that we talked about with regard to the Yasunami ground doesn't implicate this ground. There's no dispute that these disclosed voltage values are charge cutoff voltages. The question is how much we can rely on Yamaki for the disclosure of these voltages.

So I'm going to take these slides slightly out of order here. So apologies in advance for jumping around. I'd like to skip to slide 12 for a

moment. And this slide still focuses on Yamaki. We have an excerpt from Yamaki on the bottom. And this excerpt says that Yamaki tells us that one outcome of operating a battery at a high charge cutoff voltage is that the discharge capacity of the positive electrode material is improved. Discharge capacity is basically the amount of energy that the battery can deliver.

And Yamaki also shows us that with this increase in discharge capacity, you can reduce the amount of positive electrode material that you need in your battery. That's because you need less of that material to produce an equivalent amount of energy.

And then, similarly, the amount of negative electrode material can be increased. And that conclusion is highlighted there in yellow at the bottom of the slide.

So what this means is that Yamaki, with its high charge cutoff voltage, is already contemplating increasing the amount of negative material and decreasing the amount of positive material in the battery. That's already along the lines of what the ratio that's recited in the 641 claim says. That ratio in the claim says basically that there's more capacity in the negative electrode active material than there is in the positive electrode active material.

Now, Yamami -- I'm sorry -- Yamaki gives us this idea, more negative than positive, but it just doesn't go so far as to provide actual numbers. So he's led us most of the way there, but not quite all the way to what's recited in the claims.

So now if we go back to slide 10 and we go to the disclosure of Sakamoto. Now, remember, we're starting with this point supplied by Yamaki, which says, generally, reduce positive, increase the negative

electrode material. And we can now make this natural turn to Sakamoto to find specific implementation parameters that are consistent with that general disclosure from Yamaki.

Sakamoto describes a battery that's exactly what Yamaki has already recognized as appropriate. There's more capacity on the negative electrode than the positive. That's highlighted in blue here. And this disclosed range of capacity ratios, it's 1.05 to 1.30, falls right within the range that's recited in the 641 claims.

And so this is interesting. It aligns with a general idea contemplated by Yamaki. And then it also provides a variety of other advantages, improvements in cycle life to supplement the excellent cycle life that Yamaki has already achieved, and also some safety enhancements that we can talk about.

So if we go to the next slide, slide 11, in the combination, then, we use Yamaki as a starting point. This means we're starting with a battery that has Yamaki's electrode compositions, and it operates at a charge cutoff voltage between 4.4 and 4.8 volts. And then consistent with Yamaki's recognition that we can then reduce positive electrode material and increase negative electrode material because of what happens at these high charge cutoff voltages, we implement those electrode materials according to the specific capacity ratio that's described by Sakamoto, the 1.05 to 1.30, so that we have more negative than positive electrode capacity.

And the petition provided quite a bit of discussion about how exactly these references come together and why beyond this general indication that we've already talked about that's provided by Yamaki.

Patent owner did raise some concerns about whether this combination was sufficiently motivated. And like I said before, I'm not going to talk about these concerns specifically now unless there are questions. But I'll point you to the petition at pages 11 through 13 in our experts declaration, that's APPLE 1003, paragraphs 36 to 46, which get into detail about five distinct motivations that underpin this Yamaki-Sakamoto combination.

So instead, like I said, I'd like to focus on two issues. The first one is how the petition is justified in its reliance on Yamaki's disclosure. And for that, we can go to slide 14.

So the issue that patent owner has raised with Yamaki, again, is not whether this 4.4 to 4.8 voltage disclosure falls within the claimed range. It does. But whether Yamaki's disclosure is sufficient to justify the petition's reliance on Yamaki.

So if we go to slide 15, please. The issue is this. Yamaki describes only 10 charge-discharge cycles for its test results. That means that it's tested its battery only for 10 cycles of charging. And it concludes that it -- I'm sorry -- its experimental results show excellent cycle life, over 90 percent capacity retention for these 10 charge-discharge cycles.

And patent owner, though, has taken issue with this relatively limited testing. Certainly, 10 cycles is a small number of cycles. And you can see a brief overview of their arguments at left in an excerpt from their sur-reply. And they've argued that in light of such limited testing, a POSITA would not have understood Yamaki is actually teaching that its battery is capable of operating at these high charge cutoff voltages.

So to be sure, 10 cycles is a small amount of testing, but this isn't the full extent of what Yamaki discloses. And I want to point out a couple of

other things that are important about Yamaki that a POSITA would have considered when they were evaluating Yamaki's disclosure.

First is that Yamaki provides an explanation of the physical mechanism that allows its battery to operate at high charge cutoff voltage. This is Yamaki -- I'm sorry -- paragraphs 18 to 19 of Yamaki. And basically, without getting into too much detail, the mechanism has to do with the composition of Yamaki's positive electrode active material. It's a lithium cobalt oxide, includes a small amount of another element. And Yamaki explains that the presence of this other element helps to suppress some structural changes that would otherwise cause the electrode to deteriorate as charging and discharging cycles go on.

So you can see it right on this slide that our expert has studied this explanation. And he's concluded that this physical mechanism is a credible explanation for why Yamaki's battery shouldn't have good cycle life, should be a functional operable battery.

And so his conclusion, after reviewing both Yamaki's 10-cycle test data and also the rest of Yamaki's disclosure, is that a POSITA, in fact, would have understood Yamaki to disclose a viable battery.

And the other thing I'd like to point out is that this testimony from Mr. Hruska, concluding that Yamaki's disclosure is robust, stands unrebutted. And note that this excerpt here that you see on the slide comes from Mr. Hruska's second declaration. And patent owner didn't even depose Mr. Hruska on this second declaration, nor did it really engage at all on its conclusion that Yamaki presented a credible explanation of its physical mechanism.

So although we have only 10 cycles of test data --

JUDGE TORNQUIST: Counsel, this is Judge Tornquist.

MS. DeVRIES: I'm sorry?

JUDGE TORNQUIST: One of their arguments has been, they went to Yamaki's Japanese prosecution history and said that that indicates that, you know, when you operate above 4.2, those batteries are highly unpredictable. How do you address that?

MS. DeVRIES: Yeah, certainly battery functioning is certainly unpredictable, but our expert, Mr. Hruska has discussed that oftentimes a viable way to approach battery testing and battery development is to first do a small amount of testing, a small amount of cycle-life testing, to determine whether a battery appears to be a good candidate for further testing. And then further testing is routine and well understood in the arts. There are various ways to continue testing and to predict the performance of batteries, even based on small amounts of testing.

And so we believe that given Yamaki's 10 cycles of testing, its own characterization of its cycle life is excellent and our experts' opinion on the physical mechanism that's described that we can actually rely on, Yamaki is disposing a viable battery.

JUDGE TORNQUIST: Okay. So is that the criteria you need to show that it's viable? I mean, you do have different claims here. Claim one is actually quite broad. There's no requirement for performance, you know, conversely with 11 and 14, where you do need extended periods. So just trying to figure out what you feel you need to prove here to show that you would actually start with Yamaki.

MS. DeVRIES: Yeah, that's an excellent question. And I think one of the things that we haven't discussed much is that certainly the requirement

for specific performance is in claims 11 through 14, which my colleague Karl will get to in a few minutes. But in claim 11, we just need to get over a basic hurdle, which is that essentially that Yamaki is an enabling reference. I think that that's really what patent owner seems to be suggesting without perhaps using so many words.

And prior art generally is presumed to be enabling, absent a compelling reason otherwise. And so, we believe that given the totality of Yamaki's disclosure and the skill of a POSITA in terms of evaluating battery performance, that there is sufficient disclosure in Yamaki to conclude that this is an enabling reference.

JUDGE TORNQUIST: Okay. And then the next question I have is, is there any evidence of record that increasing the negative -- or the anode material would change the operation of the battery?

MS. DeVRIES: But we have certainly evidence of record indicating that increasing the negative electrode material will have various advantageous effects on the operation of the battery.

JUDGE TORNQUIST: Is there any evidence of negative effects of increasing the anode, the level of anode material other than the fact that maybe you put so much in that you don't use it, and you increase, you know, weight and reduce energy density? But is there any physical functioning of the battery that goes down if you increase the anode material as compared to the positive cathode material?

MS. DeVRIES: Yeah. I can't think of any evidence of record offhand. I can certainly look into that and get back to you on rebuttal. But I do want to say that we've presented five motivations for why increasing the amount of negative material would be a good thing for battery life. So even

to the extent that there is some kind of disadvantage associated with having more negative material, that doesn't necessarily negate the fact that there are multiple advantages that negative material would bring along with it.

JUDGE TORNQUIST: But the lack of any negative effects actually helps your case, right?

MS. DeVRIES: It does, yes. But even if there were a negative effect, that wouldn't necessarily hurt our case to the point of making the motivation -- I'm sorry -- making the combination not motivated.

JUDGE TORNQUIST: Okay.

MS. DeVRIES: All right. I said that I was going to talk about expectation of success also, and I'd like to -- I'm just going to breeze through a few points on this because I know that we have a lot to get through on claims 11 through 14 also. So I'd like to skip to slide 25 if there are no further questions on Yamaki's disclosure.

And slide 25, this is a slide that you've already seen, and I'm just going to put it here to very briefly frame this combination again. Remember that we're starting with Yamaki, which has a high charge cutout voltage, and bringing in Sakamoto following a roadmap that's already been laid out by Yamaki to have more negative material than positive material.

And patent owner has raised some questions about whether this combination will be successful. And as a starting point, I'd like to say that already the fact that Sakamoto is merely providing implementation parameters for something that's suggested already by Yamaki is enough to give a POSITA comfort that this combination is moving in the right direction, that it will be successful. We're not changing anything about the

system so much as we are providing specific parameters to implement something that's already been contemplated by Yamaki.

So if we go to slide 26, please. So POSITA has argued that there was no reason for POSITA to expect this combination to be either safe or effective. That's shown at left in the POR.

And remember that we've already discussed that Yamaki, we believe, to be an operable, viable battery. But that's not really the question when we're looking at expectation of success. The question is the success, the likelihood of success of the combination. It's not a referendum on the operability of Yamaki's battery. And so we can consider very briefly the patent owner's concerns regarding effectiveness and safety of the combination.

First, on effectiveness, again, we're following the roadmap that's laid out by Yamaki. So, again, just based on the fact that we're implementing something that's already suggested by Yamaki, we believe that that points toward effectiveness.

There's also a significant overlap in materials between Yamaki and Sakamoto. Our discussion of the materials overlap is described quite a bit in Mr. Hruska's declaration starting at paragraph 50. And without getting into the details, I'll just mention that, remember, Yamaki tells us that the composition of the material is very important in contributing to the ability to operate a high-charge cutout voltage. And Sakamoto also describes materials that overlap with the materials that are described by Yamaki.

So we have a compatibility in materials between Yamaki's disclosure and Sakamoto's disclosure, which indicates that that ratio that's disclosed by

Sakamoto is likely to be successful also when implemented in a battery based on Yamaki.

And then regarding safety -- just skipping to slide 27 -- again, now we're starting with Yamaki's battery. And so we believe this to be a viable battery, a safe battery. And Sakamoto itself tells us that a battery having an electric capacity inside of this 1.05 to 1.30 range is itself promoting safety. That's highlighted in yellow on the right. And we also presented abundant corroborating references indicating that more negative than positive material promotes safety.

And so when the Yamaki battery is implemented with a specific ratio, we believe that a POSITA, in fact, would have a strong reason to expect not a decrease in safety, but an enhancement in safety.

So I'm going to stop here at this point. And unless there are further questions, we can move on to claims 11 through 14. Thanks very much.

MR. RENNER: Again, hello, Your Honors, and may it please the board. Claims 11 to 14 recite varying metrics, and we can see this on slide 54. Varying metrics reflecting retention achieved by a battery configured in the manner recited by claim 5, when tested, of course, at 400 charge cycles.

Apple has offered arguments and evidence to demonstrate that these retention metrics, they would have been obvious based on each of the two petitioned combinations. And I plan to address each petition combination in sequence as a consequence, starting by following up on the conversation you just had with Dr. DeVries, with the further discussion of the Yamaki-Sakamoto combination.

That said, to set out a bit of a framework for what we're talking about, because this conversation will be a bit in depth, as I address each

combination in keeping with the presentations that you heard from both Dr. In and Dr. DeVries, I'll focus initially on the integration of the references being combined, demonstrating how their disclosures that relate to retention and cycle life would have been combined to lead POSITA to find that the claim 11 to 14 retention metrics are indeed obvious. And in this discussion, I'm going to explore two different aspects of each combination.

First, I'll review the disclosures in the subject references that directly implicate cycle life and retention. Now those disclosures combine to demonstrate or at least render obvious the claim for 11 to 14 retention metrics. And then I'll review the implication of each combination also rendering obvious the claim 5 ranges that you just heard about for battery cutoff voltage and electrode material ratios.

And now this indirectly implicates the obviousness of claims 11 to 14, since these were the only physical battery attributes that the 641 Patent credited for its purported improvements of the type recited by claims 11 and 14.

And finally, I'll showcase with respect to each a record evidence affirming that routine experimentation optimization would have been reasonably expected by POSITAs during the implementation of these combinations. Now, this further reinforces the obviousness of claims 11 to 14 when considering the petitioned combinations.

So without further ado, I would turn us to Yamaki-Sakamoto and start with slide 61, if I could please. So we'll look at Yamaki. The primary reference here again is Yamaki, and it offers experimental data for only 10 cycles, as Dr. DeVries had pointed out. Patent owner wants to believe that Yamaki's disclosure ends largely here, or at least to focus your attention

exclusively on that. But the references often show test results for only a narrow range of cycles, as Yamaki did. And Yamaki offers much more to confirm that its disclosed technology achieves well beyond the 10 cycles for which tests were revealed.

This is apparent from paragraph 12 of Yamaki, which is shown at the top of the slide. It states in relevant part, and I'll quote, "It is an object of the present invention to provide a lithium-secondary battery with high energy density and, importantly, excellent cycle characteristics."

Paragraph 60 of Yamaki confirms this is not just aspirational. It reads, "The present invention is able to provide a lithium-secondary battery with high energy density and excellent cycle characteristics."

So we know that Yamaki is talking about a battery that has what it deems to be excellent cycle characteristics, not in theory, but it's in practice. This is what it tells us it's providing. And still begs the question, how would a POSITA understand what Yamaki said here, the reference it makes to excellent cycle characteristics?

We didn't want to guess, we didn't want to leave it to chance, so we asked patent owner's witness, Dr. Yao. And we show his answer here in the lower left-hand text box. It begins with a reference to, quote, "a long cycle life." And he's right. It's characterized by a long cycle life. But he follows with more helpful detail.

He says, and I'll quote again, "According to the standard testing standards, typically, more than a few hundred cycles is considered excellent cycle characteristics." A few hundred, a few hundred. 300? 400? Well, hey, actually, he says more than a few hundred. So is that more than 300? More than 400? He's talking in terms of hundreds after all. And what we do

know is it's certainly not limited to 10. This excellence is achieved well beyond 10, and arguably sufficient alone to render obvious the 400 cycles referenced in claims 11 to 14 as a base.

So before we even consider the integration of Sakamoto, we see Yamaki offer key disclosure of cycle life at more than a few hundred cycles with batteries that show promising initial results of over 95 retention, 95 percent retention. Of course, the petition grounds look beyond Yamaki to the integration of Sakamoto.

JUDGE TORNQUIST: Hello, this is Judge Tornquist. Can I ask a question?

MR. RENNER: Please.

JUDGE TORNQUIST: What level of proof do you need to show? Do you need to show it necessarily would reach the cycle numbers that we have in the claims? Is it more likely than not? Probably? What's the burden here?

MR. RENNER: We're so glad you asked that. Thank you, Your Honor. It's an excellent question. It seems the patent owner has a view on this, and they want to accept nothing other than actual disclosure of a testing at cycle level 400. And they're rejecting in their writing anything that does not actually disclose 400. We don't believe that is obvious. That's anticipation. So in order to require actual disclosure, you have to -- you're talking about anticipation.

Here, it's an obviousness ground. We think it's whatever a person of ordinary skill needs to see. It's a judgment call. We have to look into what does a person of ordinary skill see when it reads these references. And it sees a high, as you see in Yamaki, disclosed excellent cycle characteristics

that are characterized by their expert as over more than a few hundred cycles of testing with excellent characteristics. And it's what do they think that that means. And now you've got a combination.

We'll talk about it with the secondary reference, which complements that with additional teaching, which has said itself to impart improved cycle life.

In addition to that, you'll see that we have disclosure, -- and you've heard this already from Dr. DeVries -- that you have disclosure, obvious rendering disclosure in the combination of the underlying credited by the 641 Patent CC, the charge cutoff voltage, and the ratio. And you've got routine testing.

So this is our case, and to your point, we do not think it requires exact test, an exact showing. We think it's the general standard that's applicable. It's a preponderance, Your Honor.

Okay. So slide 62, if I may, we'll turn to Sakamoto, and that's to see what Sakamoto is adding to the equation. As mentioned, we already have Yamoto giving us a tremendous disclosure of this excellent cycle characteristics. But here we see paragraph seven from the Sakamoto reference, and there Sakamoto urges POSITAs to adapt configurations for purposes of limiting deterioration through repeated charging and discharging, i.e. focusing on improving cycle life.

For this purpose, Sakamoto suggests improving that performance using an electrode material ratio that promotes more negative material than positive. You've heard about this a little bit already.

In this final sentence of paragraph seven, with the highlighting applied, Sakamoto credits this electrode material ratio with improved cycle

life, and I will read it just for cleanness. "As a result, a high-performance battery can be obtained that experiences less deterioration after repeated charging and discharging."

Now, Sakamoto offers some testing of its own, and it shows that without what Yamoto brings to the table just on its own, this one feature, if you will, it's achieving a 75 percent retention after 300 cycles.

But again, we're not applying Sakamoto alone. What we're doing is we're saying it has a complementary technology to Yamaki, and when integrated, that's going to bring Yamaki's disclosed retention and testing up. So back to that combination.

JUDGE TORNQUIST: This is Judge Tornquist. Sakamoto was at 4.2 or less; right? Charge cutoff voltage?

MR. RENNER: Sakamoto, I'll have to check that. I thought it was beyond 4.2, Your Honor. But regardless, it's our view that frankly, regardless, it's teaching a specific technology and an approach. It's not itself needing to arrive at that particular voltage level.

JUDGE TORNQUIST: I understand, except there is a lot of evidence that the lower you make that charge cutoff voltage, the longer you can get these cycle lives, you know, in time. And so if they're at 4.2 and they have 300, I don't know how much we can extrapolate that to 4.5 and say that's going to come through.

MR. RENNER: Yeah, no, I understand your point. And I would submit the following. I would submit that it will improve. The level of improvement, the materiality of the improvement is going to be a judgment call. We believe that a person of ordinary skill seeing it would know that there is improvement and would see the Yamaki reference needing very

little, if any at all, from it to actually get to the claimed, or at least render obvious the claimed performance metrics.

Back to the combination, we don't rely -- and I think this is apparent at this point -- we're not relying, but there's a lot of briefing on here and I want to make sure it's clear, on the testing at 10 cycles alone that Yamaki provides.

Instead, we're relying on Yamaki's disclosure of what it says is achieved, that is excellent cycle characteristics. And the patent owner's own witness's interpretation of that, which is appropriate, which is to say those excellent characteristics are achieved at more than a few hundred cycles.

And despite the arguably comprehensive nature of that disclosure -- recall that the combination doesn't even rely on Yamaki alone for the improved cycle characteristics -- it instead advances the integration of that complementary teaching. We know that technology is complementary. It's only the degree of how much it's going to give from Sakamoto to further improve cycle life.

So specifically, through the integration, a POSITA would integrate the techniques offered by Sakamoto, and we'd know that they would improve, to some extent, the cycle-life performance of Yamaki's baseline disclosure, which already has achieved a high retention of more than a few hundred cycles.

JUDGE RANGE: Counsel, this is Judge Range. I wanted to go back to the issue of burden. I'm trying to clarify what exactly it is you have to prove for this claim, claim 11 through 14. Because the claim is directed to a characteristic of the physical battery rather than, for example, what the battery is made out of, or something like that, right?

So it seems like we have to first figure out what kind of battery would be obvious based on the combination, or, you know, some battery would have certain, you know, physical makeup. And then it seems like we would need to determine what the cycle of characteristics of that hypothetical combination would be.

And I guess you would say that that the preponderance of the evidence before us suggests that combination battery is going to meet these cycle characteristics. Does that kind of way of thinking about it sound roughly right to you?

MR. RENNER: It does, Your Honor. The only -- I think you meant this. I just wanted to clarify it, though, just to make sure we're talking the same language. I think that second inquiry in particular, the performance that it would have, it's really a determination of what performance would be obvious from it. Our view of the claim 11 to 14 is they are talking about what's achieved, almost what's the use of that battery look like. And so, once you have a battery -- and we think that we've demonstrated through our Claim 5 proofs that there is obviousness of the battery of Claim 5 -- now it's really a question of what kind of performance would be obvious as it relates to retention at the cycle measures, you know, the indicated cycle. That would be a comparison then to the indicated cycle testing level. I think you were saying that, but I just wanted to -- if I'm saying something different than you're thinking, I'd love to --

JUDGE RANGE: Yeah, I'm not sure it's quite the same. So person of ordinary skill in the art, they're taking the two references, they're building something, right? And the thing they build isn't a -- they don't build a cycle characteristic, right? They're building -- they're putting chemicals together

in a certain way, right? That's the thing they're building. And it seems like that's the thing that needs to be obvious to make. And then the only question is, after you're done making it, does it have this characteristic or not?

MR. RENNER: I believe that that's correct. I think that's what I'm probably inartfully expressing as I'm trying to clarify. Yes, I agree.

JUDGE RANGE: Fair enough. Thank you.

MR. RENNER: Of course.

And to complete the thought, our view is that we've demonstrated the obviousness of the structures in claim 5. Those structures include structures that were cited in the 641 Patent specification itself as responsible, and that's the section I guess I'm going into now, as responsible for the improvements brought from the patent 641, improvements like retention. That's what it's purporting to bring. It's purporting to bring an improved retention.

So if we look, for instance, and I'll direct your attention to slide 57, please. Slide 57 has a clip from our pages 26 and 27 of the petitioner's reply at the top of the slide and in highlighting. You'll see citing -- you'll see them cite to, in particular, a section of the patent itself. Column 3, lines 3 to 15.

This is important because, as noted in that section of our petitioner reply, the patent specification is really clear and concise in crediting just two of the claim 5 features for the performance gains that it purports to bring.

And I'll read them to you. I didn't put them on the slide. I probably should have. But I'll read that section to you, lines 7 through 11, if you wanted to look at it yourself in the patent of column 3. So "The efficacy of the electrode active material is greatly increased
by" -- so it's telling you, how is it greatly increased? Well, it's "increased by, one, increasing the charge cutoff voltage, two, properly adjusting the ratio of

positive electrode material to negative electrode material of a single lithium ion cell, period."

Now, interestingly, read in context, this doesn't surprise because the 641 Patent, it doesn't credit any other aspects of the cell battery designed as bearing on the purported inventions or improvements. On the contrary, the 641 Patent is generous in calling out other aspects as conventional.

Columns 8 and 9 tell us that positive electrode materials, separator, negative electrode materials, the electrolyte and process parameters, or other voltages; those are all conventional. The one thing that it talks about, giving you the improvements, and it actually says this is how you improve. Remember, it said that the efficacy of the electrode active materials is increased by these two things. It's the charge cutoff voltage and it's that ratio, and those are claimed in claim 5.

And, as we have talked about, we believe we've got two different combinations rendering those obvious. So if we're rendering obvious to your point, the structure, the battery, that which is responsible for giving you the performance, the retention in claims 11 to 14, we actually think that alone arguably demonstrates the obviousness of claims 11 to 14, but we don't need it to. It's additive to what is already demonstrated by the primary references as it relates to their stated retention, and the stated testing, and the stated excellent cycle characteristics they bring and are complimented in bringing. It just further enhances that story of obviousness, Your Honors.

Now, during the deposition, we asked two related questions to the expert for patent owner. We asked him -- and if you'll get slide 56 with me, please, we'll show you the excerpt that I'm pointing to.

He said, "Besides adjusting the capacity ratio and increasing the cutoff voltage" -- those are the two things talked about in that column of three lines 3 to 13 -- "does the 641 Patent mention anything else that it does to obtain improved battery performance?" Which is precisely, of course, the feature focused on claims 11 to 14.

And his answer was not only to confirm the absence of anything else, but he graciously and gratuitously emphasized that the two aspects of the cell battery are the major point of claim 5, which further corroborates that they are indeed promoted by that 641 as responsible for the battery performance of claims 11 to 14, as we know from column 3.

But to make doubly sure, we asked him more. He backed up and said, "We didn't want to make any" -- you know, "Is there any misunderstanding on this?" So we said to him, "What about that specification?" We weren't just talking about the claims. "What about specification? Are there any other factors mentioned in the spec as contributing to improved performance?" And he, of course, answered, "No." Because there aren't any.

So with this, we can see that the patent owner's witness confirming that we are reading correctly that patent at columns 3 to 13 -- sorry, column 3, lines 3 to 13 -- as indicating the same, that the charge cutoff voltage and that ratio, this is what's responsible, says the patent owner, for whatever performance they are achieving, which, of course, includes that claims 11 and 14. And this, too, is rendered obvious by our combination.

JUDGE TORNQUIST: This is Judge Tornquist. One concern I have is, yes, I saw that testimony; but in Sakamoto, it goes from, I believe, 1.05 to 1.3 as the ratio. But the patent actually goes up to 2.5, a much higher level

in the anode. So how can we say, when these numbers aren't matching up, that because the patent was able to achieve that, that your Sakamoto-Yamaki reference would also be able to?

MR. RENNER: Thank you, Your Honor. That's a great question. Our view on that is that Sakamoto, it tells us it's achieving with even what I would call a modest increase in the negative proportionality of the material involved. That's what, I guess, you know, the translation of that, right? It's giving you -- it's demanding a more modest increase.

If you increase it even more, of course, you would expect that the effect wouldn't diminish; it would enhance. So in our view, as you're talking about a combination, you're talking about the promotion through Sakamoto's integration of more -- it's really a ratio that it's teaching, hey, go higher on the negative material. The higher you go, the more the effect you would expect to see, and the greater the obviousness of the very performance metrics that are talked about in claims 11 to 14.

JUDGE TORNQUIST: Did you argue that you would go above 1.3 in Sakamoto, in your combination?

MR. RENNER: What we argued was that Sakamoto is being relied upon for the concept of integrating a higher degree, a greater ratio of negative to positive. So in that argument, we believe it was implicit that, yes, we were just talking about, you know, enhancing and increasing the amount of negative, which is not limited by Sakamoto, but enhanced by it.

JUDGE TORNQUIST: Despite the fact that Sakamoto says, "Hey, we don't want to go much higher than 1.3 because now we're wasting -- we have too much, it's not being used in the cycle life."

MR. RENNER: It's just, that's a matter of, you know, I believe that's a matter of design choice. It's a waste argument, right? It's not -- it doesn't affect what you achieve in terms of, like, claims 11 to 15 by our 14 to integrate, but yes.

JUDGE TORNQUIST: And the one thing on this combination that's -- I find problematic is, kind of, it feels like a little black magic or art. We don't know what it's going to do. And their expert has shown that in many of these, there's, like, a knee or a drop-off or -- I forget what they call it -- a catastrophic death or something at some point. And you don't necessarily know where it's going to be. So how do we know that that wouldn't happen in your combination?

MR. RENNER: Yeah, two thoughts on that. Number one is, we don't know that it wouldn't work. And we do know that their patent doesn't tell you anything about how they made it work. They just somehow come up with the magic "it works."

So they're asking you, we believe, more of the prior combination than they were asking of their own specification in this regard. It's a well-established principle of law that you shouldn't do that. You shouldn't ask more of the advanced prior grounds, and they can't be held to a higher, stricter standard than the disclosure that's actually put forward in the patent. And on this point, that's what they'd have you do. They'd be saying to you, "I know we didn't complete the puzzle. We didn't tell you why" --

(Simultaneous speaking.)

JUDGE TORNQUIST: The patent actually has experiments though. And the numbers that they're using are from experiments that they reported.

MR. RENNER: Correct.

JUDGE TORNQUIST: It's not just that they made up some number. They actually went out and tested it and found these numbers. But you didn't go and test. And that's what, I'm questioning, is there a gap there?

MR. RENNER: No. I don't think there is, Your Honor, number one is those tests don't give you any underlying structural reason other than the two characteristics we just talked about, which we know are rendered obvious by the combinations, both of them, as responsible for this.

Two, the Yamaki reference, keep in mind, excellent charge characteristics. While it didn't show you the tests that it has, it didn't demonstrate that in the actual document. It gave you what is a surrogate for it. It told you what those words were. It said, "Our device achieves this: excellent characteristics in terms of the charge retention."

And we know from even their expert, the most motivated human on earth, that this means to a person of ordinary skill that it's going to perform excellently at hundreds, more than a few hundred cycles. So we're not talking, we don't believe, about a primary reference that's, in fact, either without this or that it's not awfully close if not there, is I guess my point.

If we were starting out with only the 10 cycles, I'm not sure where we'd land here today. But that's not what we're looking at. We're looking at a primary reference that tells you that it's either got the goods or it's awfully close. It's telling you what a POSITA, in a POSITA's language, what it knows to be disclosable right here. And that is that its device is operating at range.

The second thing is not all devices, let's be really clear, they're using examples of a few knees and cutoffs. There's examples in almost any technology where things can fail, but it's not the case that it necessarily will

fail. And we want to make sure that that's apparent. And when you've got a reference in the primary that's achieving, already telling us that it's achieving what is claimed here in the excellent characteristics it describes, we don't believe that that is a probative point.

Your Honor, if I could turn this to slide 58, please. I'd complete the trilogy on this by talking about the experimentation. And the final point that I'll make here on Yamaki and Sakamoto is that the obviousness established based on their combination is still further supported by record evidence demonstrating a basis for achieving or rendering obviousness of these claims through routine experimentation optimization.

And on this slide, we highlight and call attention to a few excerpts from the petitioner's reply, as well as corroborating evidence that was offered in support. I'll look at the excerpts to the left first, which makes the point that POSITAs were inclined to motivate to improve cycle life. We know this is a design feature. This is something that POSITAs knew they should pursue. And we can see that both from express motivations that are set forth in the primary references, the Yamaki and Yasunami references, as well as evidence that cycle life improvement was a well-known objective and battery design divorced even of those teachings.

And next, I'll refer you to the excerpt on the right, which highlights that POSITAs not only wanted to improve cycle life; they know how to influence it. There are design factors that could be adjusted to influence cycle life, and they were known. And they were known to include, for instance, physical cell battery attributes, the electrolyte composition, the strength and purity process factors, charge-discharge rate.

Point is -- oh, and sorry, I should say, the patent owner's witness, Dr. Yao, confirmed this during his deposition. He endorsed the existence of many parameters known to POSITAs to affect cycle life. This is apparent from his depo transcript. And I'll cite it. It's Apple 1034. It's page 80, 19, and then to 82, 6. You could see in there that he acknowledged that cycle life was known to be impacted by, for instance, adjustments to amount to electrolytes, type of electrolytes, cathode and anode materials, package shape.

All of this to say that a POSITA seeking to implement a battery based on the combined teachings of Yamaki and Sakamoto, they'd have been motivated to conduct routine optimization and experiments using these well-established factors in service of an improved cycle life, which is a known objective. And here again, you saw patent owner's witness confirming the same.

If I go to slide 59 with you, upper left is an excerpt from page 29 of our reply. It's quoting paragraph 155 of Yao Declaration, Exhibit 2007, and that quotes Exhibit 1021, which is shown here in excerpt.

In that reply, we pointed out statements by Dr. Yao, which here again confirm that routine adjustments to parameters were known to achieve improvements to life cycle. And I quote, "To avoid sudden decay in capacity, one should make a proper choice of, in this case, carbon and electrode material generally, and electrolyte."

And here he appropriately characterizes the Broussely teachings, that's at Exhibit 2021, in a way that shows endorsement of the specific point that we're making, which is well-known factors such as electrode and electrolyte

can be selected for avoiding decay and thus increasing electrode stability in forming and contributing to cycle life.

We also see that from Dr. Hruska's declaration, Exhibit 1003, paragraph 114, where he describes that electrodes and electrolyte compositions affect life cycle. And it's with this context that we see the obviousness of claims 11 to 14, those retention metrics, would become even more apparent to a POSITA when considering the availability of the routine experimentation, and particularly when implementing the proposed combinations which each integrate secondary references and promote improved life cycles off of a primary that is, again, already saying that it achieves excellent cycle characteristics.

So just a --

JUDGE TORNQUIST: This is Judge Tornquist. So just a quick question, where does this break down? How many cycles could you keep going to and feel that you could just keep modifying these and find success?

MR. RENNER: We kind of looked at it the other way. They're claiming 400 as if it's a magic stake in the ground, but they have no indication of anything to make that critical. Nothing proves that that's critical. And so my question kind of would be as to what their position is, is, well, what about 399? I mean, surely you don't -- to an earlier question you asked -- they can't demand that you actually show a test at 400 in order to establish obviousness, that everything else is not obvious. But what about 399? What about 350? What about 300? What about a few hundred cycles? You know, the claim acts as if there's a pillar, but there's nothing critical about this element or this level of testing that has actually been demonstrated in the record.

And, Your Honors, we have the primary reference that starts out, Yamaki, of course, with an excellent characteristic. It tells you excellent cycle characteristics. Over 90 percent retention is what it does show. At 10 percent, I grant you, but it's said to operate with excellent characteristics over a few hundred cycles.

Sakamoto, it urged improvement. It offered a complementary teaching, and it increased the negative material to boost retention, which we know works. We know that works with Yamaki, and it yields performance that's pretty good on its own.

Combination, you would actually improve whatever Yamaki has, and what it has is awfully close. Then you look at what this combination actually does, to Judge Green's question, in terms of how it proves out the underlying basis the 641 promotes, the charge cutoff voltage and the ratio, also talked about as obvious based on this. And now there's routine experimentation.

Each one of these, unto themselves, they don't need to be unto themselves. They build together a story that a person of ordinary skill would really have no doubt that you don't need to move much. And if you did, you have room to move off of Yamaki to get to the claims.

JUDGE TORNQUIST: I have you -- your rebuttal time, which you're welcome to use, just wanted to let you know.

MR. RENNER: Thank you, Your Honor. I appreciate it. I'll move to the Yasunami-Koyama combination, if I might, just for a few moments.

JUDGE RANGE: Judge Range. I had one other question on this point. So you have Yamaki saying that it has excellent characteristics. You have their experts saying that that relates to how it would perform after more

than a few hundred, which arguably, maybe that would be 400 included. But how do we know whether or not excellent is above 75 percent or above 80 percent?

MR. RENNER: Thank you, Your Honor. It's an obvious inquiry. The language, unfortunately, in patent law doesn't always match up. What we see from Yamaki is it's showing you 94 and 95 percent numbers at the 10 percent. We've got excellent being the word, and we've got their expert, as I recall that testimony, he's saying that it would work after and with more than those cycles, it'd be an available battery. So we would expect a high performance. Excellent is an excellent word. And I think that would -- we think from an obviousness standpoint do the trick.

But you ask a good question, and it's a matter of language, we believe. But a person of ordinary skill, we think, looking upon that would be able to reasonably deduce.

JUDGE RANGE: Thank you.

MR. RENNER: Of course.

If we could turn to slide 64, please. The Yasunami cycle life. Again, I won't spend a lot of time because an awful lot of what I've said, it ends up applies here as well.

Yasunami expresses a goal of having, again, good or long cycle life. As for testing, it demonstrates its batteries retain approximately 60 percent capacity after 220 test cycles. And of course, this disclosure doesn't match the retention recited in claims 11 to 14. We don't contend that it does. And it's measured at 400 cycles, no less.

But it's not too far off. And it's not alone being considered. It's integrated with Koyama, which suggests modifications that would be expected to improve the life cycle, or cycle-life characteristics.

If you look at 65, slide 65, we see a little bit on that Koyama teachings. And top center, we can see an excerpt from the Koyama reference promoting use of a similar technology, an increased ratio of negative to positive. Bottom left, we show an excerpt from the petition, which cites the third-party references used by Apple to demonstrate that in fact, as we talked earlier, that would be something that would lead a person of ordinary skill, the increase in negative relative to positive, to believe that life cycle would be improved.

And this speaks a little bit, Judge Tornquist, to your question earlier. We do have third-party reference material there. It's not just found in the Sakamoto reference, for instance, or even Koyama reference. We have third-party reference material that says and recognizes, they just expect people to see an improved life cycle performance when you have a greater degree of the negative material relative to positive. We've reproduced the Exhibit 1019 here, but you can see a great number of reference materials here that are cited for that proposition.

If we go back to slide 63 now, we just go to the integration of the two. And I really want to preserve a little bit of time for rebuttal. I'll simply say that we have the Yasunami offering of batteries designed for and already demonstrates good life -- cycle life. And through Koyama, we do have that same ratio being increased on the negative to positive, improving on that objective, and therefore rendering obvious the improvement, which would be a cycle-life performance metric that's laid out.

Let me look through my notes here for a moment.

I think, given the time, absent questions, I'd be happy to entertain further. But given the time, I would rest and maybe reserve our time for rebuttal at this point. Any further questions before I do?

JUDGE TORNQUIST: Okay. I see no further questions.

MR. RENNER: Thank you, Your Honor.

JUDGE TORNQUIST: We asked you a fair amount of questions. You'll have 10 minutes of rebuttal.

MR. RENNER: I appreciate that. Thank you.

JUDGE TORNQUIST: Okay. With that, Patent Owner, when you're ready.

MR. STAMATOPOULOS: Thank you, Your Honor. And good afternoon, Your Honors. George Stamatopoulos from Kobre & Kim for patent owner.

So I was going to initially address the charge cutoff voltage limitation. I don't think I'll do that. I think we've talked about that extensively in the previous hearing that related to Samsung, Samsung's IPR. To the extent that Your Honors have any questions on that limitation, I'm happy to go over them and try to address them.

So the way we're going to --

JUDGE TORNQUIST: Before you --

(Simultaneous speaking.)

-- Counsel, just for record keeping, how much time would you like to reserve to help you?

MR. STAMATOPOULOS: Yes. I was going to get to that, Your Honor. So I think I'd like to reserve 20 minutes. And then the way that

we're going to be dividing the presentation is I will be addressing Yamaki-Sakamoto. My colleague, Mr. Zhou, will be addressing the Yasunami-Koyama ground. And then I will be addressing the dependent claim limitations, 11 through 14.

So with that, Your Honors, I'd like to start briefly by talking about Yamaki and Sakamoto. So petitioner relies upon Yamaki for the charge-cutoff limitation and Sakamoto for the capacity-ratio limitation. Our view is that a POSITA would understand that Yamaki does not disclose a secondary lithium-ion battery configured to be charged to the claim charge cutoff voltage. Remember, that's part -- that construction, Your Honors, is part of the claims, right? The battery needs to be configured to be charged to that charge cutoff voltage.

That's very important. And the reason it's important is because on an experimental basis, it's possible for a battery to display -- and we discussed this a little bit in the Samsung IPR as well -- to display certain cycle-life characteristics, to withstand certain voltages. That's what's going on here at Yamaki. Yamaki is able to withstand these higher voltages for 10 cycles.

A person of ordinary skill in the art would not understand that a 10-cycle life is evidence that the battery or is, let's say, a preponderance, constitutes a preponderance of evidence that a battery is actually configured to be charged to that higher cutoff voltage.

If you turn to slide 32 of patent owner's deck, you will see that Dr. Yao explained this very clearly, says that the inventors of Yamaki were conducting a preliminary assessment of the proposed cathode material, and this is also important. Yamaki's focus is on a new cathode material, a new cathode material that is intended to increase cycle life. It's an experimental

setup. It's an experimental material. And much more experimentation, says Dr. Yao, would be needed to confirm whether a secondary lithium-ion battery could be built using Yamaki's proposed cathode.

So the question is, what would a person of ordinary skill in the art understand from the disclosure? A person of ordinary skill in the art would look at Yamaki and would recognize immediately that this is an experimental preliminary setup that does not constitute a disclosure of a secondary lithium-ion battery that's actually configured to be charged to that higher voltage.

Now, much has been made by petitioner of this language in Yamaki about excellent cycle life, and Dr. Yao's testimony that excellent cycle life or excellent cycle characteristics means that the battery is actually -- that it has a long cycle life, one that is capable of, let's say, retaining capacity over hundreds of cycles.

It's true that this is what Dr. Yao said, that excellent cycle characteristics typically mean a long and good cycle life with good capacity retention characteristics. But if you actually look at Yamaki, that's not what it actually discloses. It uses that language, and that language should mean that there's also experiments -- or experimental data that support it, but that's just not there in Yamaki.

Yamaki does not show that the battery was either tested or that it actually was able to retain capacity over hundreds of cycles. And that would be readily apparent to a person of ordinary skill in the art. I don't think there's any dispute there. As well as the fact that the battery is -- or that the disclosure is directed to preliminary results.

In fact, I don't think that petitioner disputes that Yamaki's disclosure is limited to a battery with capacity retention of 80 percent or more when charging and discharging have been repeated 10 times. 10 times. That's the extent of Yamaki's experimentation.

Now, that's not the only issue with Yamaki. There is another issue with Yamaki, and if you turn to slide 34, you will see that in addition to having only 10 charge and discharge cycles, Yamaki actually measures capacity retention and battery performance in a highly controlled experimental setting with very low charging that is intended only for a preliminary assessment of the properties of the battery.

Dr. Yao explains this. He says -- that's in slide 34 of patent owner's deck -- that each of the batteries was charged and discharged with a current of 0.5 milliamperes. And what that means is that it is going to take about eight hours for the battery to be fully charged. Typically -- and that's in the last sentence of that -- or the penultimate sentence of that slide -- typically, much higher current would be used to assess the normal cycle life of a battery, such as 0.5C or 1C. That corresponds to one to two hours.

So what Yamaki is doing here is it's charging at, let's say, an eighth or 25 percent of the normal, let's say, charging rate that a person of ordinary skill in the art would expect to see for a battery that's actually configured to be charged at that level, as is disclosed in Yamaki. So that's additional evidence that Yamaki does not disclose the claimed secondary lithium-ion battery.

And there's additional testimony from Dr. Yao where, you know, he explains that Yamaki represents -- or that the data in Yamaki represent a very limited aspect of the performance of Yamaki's batteries and that a

person of ordinary skill in the art would not be able to reasonably ascertain whether the battery in Yamaki could be safe in normal operating conditions over its cycle life.

In order to make that determination -- and I think Your Honor has asked a question about what's the standard -- so a person of ordinary skill in the art needs to form an understanding based on what's disclosed in the prior art.

And the question here -- and this needs to be established -- that understanding needs to be established by preponderance of the evidence, right, by petitioner, in order to find the patent obvious.

So there is no way that a person of ordinary -- and there is no way because there is no evidence for a person of ordinary skill in the art to do so. There is no way that a person of ordinary skill in the art could conclude from the data reported in Yamaki that Yamaki alone or in combination with Sakamoto would actually yield the secondary lithium-ion battery that's configured to be charged to this elevated voltage level, and as I'll address later on, that that particular battery could retain the capacity levels that are claimed in claims 11 through 14.

Now, as you'll see on slide 36, Dr. Yao explained that after testing for multiple factors, such as safety, capacity retention, and tolerance to extreme conditions; the industry arrived at a charge cutoff voltage that was equal to 4.2 volts. Dr. Hruska agreed.

If you go to slide 37, you'll see that Mr. -- sorry, not Dr. Hruska -- Mr. Hruska -- agreed with Dr. Yao that the industry arrived at the 4.2 volts conventional limit because it is the point where the cell manufacturers

clearly found that the combination of characteristics -- that there was a combination of characteristics that they felt were best for their system.

That testing has simply not been performed by Yamaki. There is no disclosure of such testing. The data is preliminary, and without that testing -- this is the key point -- a person of ordinary skill in the art would not understand that this battery is configured to be charged to that voltage level based on the conditions disclosed in Yamaki and based on the number of cycles of testing performed in Yamaki.

It's not --

JUDGE TORNQUIST: This is Judge Tornquist. I'm having a little trouble with your argument because Yamaki actually says we're charging to these levels, we've got excellent characteristics, and you're basically saying no, no one would believe that. Are you really kind of coming in at an enablement question here?

MR. STAMATOPOULOS: Not at all, Your Honor. Not at all. What we're saying here is that Yamaki uses this language, okay? It uses this language of excellent cycle life. And I think if you were to set to the side a little -- or excellent cycle characteristics; not excellent cycle life. Excellent cycle characteristics.

If you were to put to the side for one second Dr. Yao's testimony about what excellent cycle characteristics may mean, you will see that the actual disclosure of Yamaki is one where the testing is limited to 10 cycles and the conditions of the testing are different from normal operating conditions.

A person of ordinary skill in the art would be potentially very excited to see excellent cycle characteristics when reading that disclosure in

Yamaki, but then when looking at the actual data, would immediately conclude that what's being reported as excellent cycle characteristics does not correspond to a finished product, does not correspond to a battery that's configured to be charged. That's an important part of the language there in the construction. That's configured to be charged to that voltage. That applies to claim 5 or that that battery is actually configured to be charged to that claimed voltage and retain those capacity levels over 400 cycles.

Now let's reintroduce -- because that's part of the record -- let's reintroduce Dr. Yao's testimony. I actually think, Your Honor, that the way that Dr. Yao's testimony is being presented contorts its true meaning. I think what Dr. Yao was trying to say is that if you were to actually try to -- if you were to actually consider excellent cycle characteristics, you would not think of what -- you would not have in mind what Yamaki is reporting here. Excellent cycle characteristics mean you need to perform hundreds of testing cycles, and that's simply not what Yamaki is doing here. I think Dr. Yao's disagreeing that Yamaki is actually disclosing what petitioner says Yamaki is disclosing. Not that he is confirming that Yamaki discloses a battery that's actually configured to be charged to 4.2 volts or that it retains the capacity levels that are claimed in claims 11 through 14.

In fact, that opinion, that you need more testing, is actually supported by Mr. Hruska. If you go to slide 39, you'll see that Mr. Hruska testified that testing at only after 10 cycles would not be enough to assess cycle life because capacity after 10 cycles, after 100, all different values, all might be affected in different ways by the charge cutoff voltage. That's just a less sophisticated way of reporting this capacity fading issue, the non-linearity of capacity retention over a long number or a high number of cycles.

So the bottom line is that this is, as petitioner has admitted, this is a highly unpredictable art. You can't just say that I have 10 cycles of testing, and I have this language here that purports to disclose an excellent cycle life. And I actually don't even think that Yamaki is purporting to disclose that. I think that's just petitioner's interpretation.

And from that, I can extrapolate that the battery would perform well over hundreds of cycles. I don't think that that's possible. And I think a person of ordinary skill in the art would know that additional experimentation is needed to draw that conclusion. Absent which experimentation, it is impossible. There is no basis from which to draw that conclusion precisely because of the unpredictability of the art that I'm sure the Board is intimately familiar with.

So to conclude, Yamaki simply does not disclose sufficient information that a person of ordinary skill in the art would need to know to confirm that the battery is configured to be charged in the claim bridge.

JUDGE TORNQUIST: Counsel, you would agree that Yamaki felt that its numbers were correct and that it was configured to charge to those levels; correct?

MR. STAMATOPOULOS: Could you repeat that last part of your question, Your Honor, because I didn't hear it. It kind of trailed off.

JUDGE TORNQUIST: Okay. You would agree that Yamaki and those inventors felt that their battery was configured to be charged to up to at least 4.5 volts; correct?

MR. STAMATOPOULOS: For 10 cycles. For 10 cycles, I would agree, Your Honor. And I would even concede that it's probably probative that this battery could withstand more than 10 cycles. But there is an order

of magnitude difference, which both experts have testified to, between 10 cycles that are disclosed on an experimental basis in Yamaki and the hundreds of cycles that you need to test a battery for in order to conclude that it's actually a secondary lithium-ion battery that's configured.

And that language is important, right? We're not just talking about a battery that immediately disintegrates once you raise its charge cutoff voltage or once you go beyond its charge cutoff voltage. What we're talking about is it needs to be configured to hundreds of cycles. And how many hundreds? That's potentially a design option. I don't think it's an issue in this case. But what we -- or in the record. I don't think it's been addressed very much in the record. But what we do have in the record is clear statements that the battery needs to perform at that level acceptably and safely for hundreds of cycles.

Yamaki simply doesn't disclose that. It talks about a new cathode material that has excellent cycle characteristics for 10 cycles in conditions that are experimental, that are non-operating conditions. And we've briefed that issue as well, that, you know, you can't actually extrapolate from one set of conditions to a different set of conditions. And you can't extrapolate from 10 cycles to the hundreds of cycles that are both required by the construction -- that's part of the independent claim -- as well as the dependent claims, which actually expressly require capacity retention levels that are very specific over hundreds of cycles, 400 to be exact. I think that's part of the claims.

So I don't think that's something we can rewrite here. I don't think we can just simply extrapolate based on an errant sentence in Yamaki that there's excellent cycle characteristics and assume that the very specific

performance requirements and structural requirements that go with those performance requirements that are claimed in the 641 Patent are actually met by Yamaki.

JUDGE RANGE: Counsel, to be clear, like, we all know that claim 11, for example, has got an explicit requirement for certain characteristics after 400 cycles. Claim 5 doesn't have anything explicit like that, but your argument seems to entail that it does have, like, even though it's not set in the claim, the claim nonetheless requires certain characteristics after a certain number of cycles.

MR. STAMATOPOULOS: Well, so Your Honor is right that, you know, it's claims 11 through 14 that recite the specific capacity retention levels after a specific number of cycles. And that imposes -- and we can talk about that a little bit later -- a structural requirement. And I think both experts have testified that not every battery that satisfies claim 5 will satisfy the dependent claims.

Now, with that said, with respect to claim 5, Your Honor is right that there's no specific performance requirement, but there is this construction which says a battery that's configured to be charged to that voltage level. That configured language has a meaning to a person of ordinary skill in the art. It's part of the construction; it's part of the claims.

What that means is, to give an example, if you had a battery that could be cycled three times at 4.3 volts and then completely and suddenly collapsed, I don't think that we would be seriously debating here whether this is a secondary lithium-ion -- or perhaps we would be. I can't, you know -- maybe we would.

But the bottom line is we would adduce evidence, and I think that's what we've done here through Dr. Yao, that a person of ordinary skill in the art would not understand a battery that's cycled at three times and then fails is a battery that's configured to be charged at that voltage level.

I think that we're making the same argument, but it's a little bit different because, you know, 10 cycles admittedly are more than three, right? We're saying that 10 cycles is simply not enough. It's orders of magnitude less. And we're not just making that argument, we're also saying that Yamaki discloses experimental conditions. It doesn't disclose conditions that correspond to a configuration of a battery to be charged at a particular level. It's on the basis of those two discrepancies between what's required in the claims: that configuration to be charged at a particular level; and what's disclosed in Yamaki that renders Yamaki insufficient, or Yamaki's disclosure insufficient to render the claimed battery obvious.

With that, I'd like to move a little bit and discuss Sakamoto and the Yamaki-Sakamoto combination. Now, petitioner contends that a person of ordinary skill in the art would combine Yamaki and Sakamoto. Now, we've already briefed Sakamoto describes a very different battery from Yamaki's. And importantly, as Dr. Yao explained, Sakamoto teaches, actually teaches against raising the charge cutoff voltage to above 4.2 volts. I'm not going to address that so much. I think that's in our papers. I want to talk a little bit about the reasonable expectation of success.

A person of ordinary skill in the art would not have a reasonable expectation of success in combining Yamaki and Sakamoto to practice the invention because, first of all, as we've discussed -- or I've discussed at length -- Yamaki only includes very limited data.

And second, Sakamoto teaches against raising the voltage. But as Dr. Yao explained, when designing a new battery, much more testing than what Yamaki and Sakamoto disclosed is required to form that reasonable expectation of success.

Mr. Hruska agreed. If you go to slide 46, patent owner slides. I asked Mr. Hruska, "How would I know" -- I'm asking about tweaking a battery, right? Taking a battery like a combination, for example, the one of Yamaki and Sakamoto, that petitioner is proposing here, "How would I know if I'm a person of ordinary skill in the art, whether my tweak has actually led to an improvement in terms of capacity retention?"

Response, "Through testing."

And then there's -- I asked him if there's another way. I think you'll see later on in the -- or elsewhere in the record, where Mr. Hruska is adamant that testing is really the only way to form an expectation of any sort.

Now, he testifies at the end of that segment, "Eventually on any system, you would test it out to full failure, and you would not stop at 100 or 10 or 200 or 400. You would test it completely. But that's after, you know, some sort of predictive testing that you do in a new system."

So it's true that Yamaki does this predictive testing. It does, you know, it tests a candidate. It tests a candidate cathode material to see if it's worth testing anymore. But it stops right there. And what petitioner is proposing -- let's put to the side whether Yamaki discloses, what cycle life Yamaki discloses -- what petitioner is now proposing is, you know, take Yamaki, combine it with an altogether new system, a system that actually teaches against Yamaki's charge cutoff voltage levels; and now infer from

that, extrapolate from that, that this system would succeed in both higher voltage levels and in an acceptable capacity cycle life, and that this result would be conferred upon this combination by raising the anode capacity.

There's no teaching about that in the record, Your Honors. There's no teaching in the record that anode capacity is in any way related to the charge cutoff voltage. In fact, as we briefed, even as late as 2015, there was evidence -- or 2014, I should say, late 2014 -- there is evidence in the record that the -- and I'll invite your attention to slides 14 and 15 of patent owner's slides -- that the capacity ratio was not a well-understood design parameter, that it was understudied, and that there was certainly no understanding of its relationship or potential relationship to the charge cutoff voltage.

And so what petitioner is inviting the board to do here is to do what? To take the limited disclosure with limited data of Yamaki and infer or extrapolate that a combination with an altogether different reference, Sakamoto, would work based on two parameters: the charge cutoff voltage and the capacity ratio, one of which was known to be dangerous. And we have, going above 4.2 volts, a host of persons with skill well above what was ordinary in the art, thought it was dangerous. And take that dangerous leap on the basis of an inconclusive and unknown relationship with another parameter, which is the capacity ratio. That's what petitioner is inviting the Board to do. A person of ordinary skill in the art would not do that. And to the extent that they even attempted it through experimentation, there's no evidence that that experimentation would be routine. And to the extent that they did so, they did attempt this routine experimentation and that the experimentation was, in fact, routine, there's no evidence, because there's

no data whatsoever, and no explanation whatsoever, and no teaching whatsoever, that this experimentation would actually be successful.

And that's what Petitioner needs to prove here: by a preponderance of the evidence, that a person of ordinary skill in the art would have a reasonable expectation of success. Let's think about that. What does reasonable mean? Reasonable means that there needs to be some sort of basis. And in chemistry and in electrochemistry, that basis is data-driven. And it's data-driven because this isn't an unpredictable art. And any person of ordinary skill in the art would know this. So there's no reasonable expectation of success, Your Honors.

JUDGE TORNQUIST: Counsel, this is Judge Tornquist. If we conclude that Yamaki does have a 4.5 volt charge cutoff voltage, why would there be any problem in increasing the anode levels as in Sakamoto?

MR. STAMATOPOULOS: Why would there be any problem, you asked?

JUDGE TORNQUIST: Yes. I haven't heard -- that's what I haven't heard. Sakamoto says, "Hey, this is good to go from 1.05 to 1.30 in that range. There's benefits here." You're saying no one would do it, there's problems, but what are the problems with increasing anode capacity? I don't think I've seen that yet. And that's what I'd like to understand.

MR. STAMATOPOULOS: Well, there are a couple of problems with anode capacity. Number one, it's uneconomical, right? And I think you addressed that when you asked Counsel your first question. And you said, forget about the fact that it's uneconomical, what other problems are there?

The other problem is that there is a reduction of energy density. When you have higher anode relative to cathode capacity, you have a

reduction of energy density. And there is a formation of SEIs, SEI films, which consume lithium and reduce discharge capacity. That's why a person of ordinary skill in the art, contrary to what Petitioner said -- and its expert said in his first declaration, but then I think revised in his second declaration -- it was not a straightforward that you would design a battery with excess anode to cathode.

There were problems with designing a battery with excess anode to cathode. And there was a trade-off. And the important point here, Your Honor, is were there reasons, were there reasons why a person of ordinary skill in the art in some instances would design a battery with excess anode? Sure. And there were also reasons why a person of ordinary skill in the art in other instances would design a battery with excess cathode. The problem is there's no guidance that designing a battery with excess anode actually solves the problem of the charge cutoff voltage.

JUDGE TORNQUIST: But they don't need to, in their combination, I prefaced this with, if we assume that they had it in Yamaki, they don't need to show that because Yamaki already has it.

(Simultaneous speaking.)

MR. STAMATOPOULOS: Yamaki is not a --

JUDGE TORNQUIST: And if Yamaki doesn't have it, then you're going to win anyway. So I'm trying to understand how this combination is going to work with your position.

MR. STAMATOPOULOS: First of all, Your Honor, I want to apologize for speaking over you. It's the connection. So let me just say that. The second thing I want to say is that you, I believe, said in articulating your

question that Yamaki already has this instruction to raise the anode. And that's not -- oh, you did not see that.

JUDGE TORNQUIST: No, I'm sorry. What I'm saying is Yamaki already, if we assume, if we think Petitioner's right, Yamaki already has a charge cutoff voltage of 4.5. And you keep arguing that no one understood that increasing the anode would help you get to that higher charge cutoff voltage. What I'm saying is in their argument, they don't need to. They just need to show some reason for doing it. And they've given us a reason with the express statements of Sakamoto.

MR. STAMATOPOULOS: They need to show a reason for doing it, given that you are in charge-cutoff-voltage elevation blend, right? When you're in charge-cutoff-voltage elevation blend, there's no teaching in the art that the way that you would approach that problem is by adjusting the capacity ratio. And if you were addressing some other problem, perhaps you would do that. But when you are in that world of raising the charge cutoff voltage, Yamaki actually is completely silent. And I would take issue with one of the statements by opposing Counsel that, you know, Yamaki says increase the anode.

Yamaki doesn't provide a starting point. It doesn't say you're starting with equal and then increase the anode. It just says, now there's more room. Maybe you want to increase the anode. Even if you take that as an instruction to increase the anode, which I don't believe that statement is that conclusive in Yamaki. But even if you were to take it generously in favor of Petitioner, you would see that there's no starting point in Yamaki. We don't know what the initial capacities are of these two electrodes such that an

increase in anode capacity would result in having excess anode capacity relative to the cathode.

So, the way that I would approach the question your -- or your question, Your Honor, is that there needs to be some type of nexus or a teaching of a nexus between these two parameters. And that's what's missing. And the only reference that actually teaches in this combination -- I mean, there's other references that have excess anode to cathode capacity -- but the relevant reference, which is Sakamoto here, actually says when you are in elevation, in charge cutoff voltage elevation line -- and forgive me for that expression -- it actually says don't go to charge cutoff voltage elevation line. It says, don't do that.

So, it's doubtful that a person of ordinary skill would even look to Sakamoto once they are focused on Yamaki. And you really -- and that's the other issue here, Your Honor, that what Petitioner has done, and its expert has done, is it has ignored a body of art that shows that, you know, persons of ordinary skill, they aren't routinely designed batteries with excess cathode capacity.

A body of art that shows or that does not show the requisite nexus between these two parameters -- in order to circumvent that limitation of a teaching of a nexus between these two parameters, Petitioner and its expert have instead invited the Board to assume that in all instances, anode capacity would exceed cathode capacity. And that's just wrong. It's not borne out by the evidence. And it's also legal error, by the way, because you need that nexus; you need that teaching.

So, with that, Your Honor, or Your Honors, I've reached the end of the first part of my presentation, which is about Yamaki and Sakamoto. I'd

like to turn it over to Mr. Zhou, and then I can go into the dependent claims, unless Your Honors have a question for me, or more than one question about Yamaki and Sakamoto.

JUDGE TORNQUIST: No. I don't see any further questions, so I think we can move on.

MR. STAMATOPOULOS: Thank you.

MR. ZHOU: Thanks, George.

And good afternoon, the Board.

Yeah, next I'm going to address the Yasunami-Koyama combination. So like the Yamaki and Sakamoto combination, the second combination, and the second combination Petitioner relies exclusively upon Yasunami for the charge cutoff voltage limitation and Koyama for the ratio limitation.

We have two separate reasons why the second combination does not render claim 5 obvious. The first reason is that Yasunami does not even disclose a charge cutoff voltage greater than 4.2 volts. So the Board does not even need to look at Koyama for further consideration.

The second is, even if the Board turns to Koyama, a POSITA would not have had the motivation to combine the two references because combining the two references is only going to be redundant and counterproductive.

So let's talk about the first issue first. I think we heard from Petitioner that they basically have two arguments about why in their mind Yasunami discloses a battery voltage not greater than 4.2 volts. The first argument they have is that when charging is complete -- it is completed, the applied voltage always converge to the battery voltage. We think that is simply not true. So Yasunami itself is the best example for that.

If we turn to slide 59 of Yasunami, paragraph 66, turn to the Patent Owner's slide 59. Paragraph 66 of Yasunami says that the resultant batteries were then subjected to a charge and discharge cycle test at a charge-end voltage of 3.9 to 4.3 volts. And there's no dispute that the 4.3 volts here is an applied voltage.

And Yasunami also said that the current density is 2 milliampere centimeter square. So a POSITA would understand that Yasunami is doing constant current charging only here. And as Dr. Yao explained in his declaration, which is shown in slide 61 of Patent Owner's demonstratives, under that kind of charging conditions, the end is not at the end of the charging, the battery voltage was only about 4 volts. That's what Your Honor was mentioning that at the end of the charging, the battery capacity may be only like 80 percent or 60 percent. And that corresponds to a lower battery voltage.

And if we look at what Mr. Hruska said in his deposition, that is perfectly consistent with Dr. Yao's testimony and that is contradictory to what Petitioner's Counsel just said in the hearing. So here Counsel was asking Mr. Hruska, if there's a measurable current going through the battery, then there ought to be a measurable difference between the open circuit voltage, which is a battery voltage, and the externally applied voltage; correct?

Mr. Hruska said, correct.

And then Counsel continued. He asked the measurable difference between the open circuit voltage and the externally applied voltage ought to be proportional to the current flowing through the battery; correct? And here Mr. Hruska again confirmed.

So what does this mean for our case? If we turn back to Patent Owner's slide 60, here it describes the experimental procedure and it describes the current density to be 2 milliampere centimeter square. There's no dispute that this is a measurable current. It's not 0, it's not one, it's not 0.01, it's 2 milliampere centimeter square.

Because there's a measurable current going through the battery system, there ought to be a measurable difference between the applied voltage and the battery voltage. So there can be no scenario under this kind of charging conditions that the applied voltage actually converged with the battery voltage at the end of the charging. And Dr. Yao's testimony that the battery voltage at the end of the charging was about 4 volts was unrebutted. There's no evidence against that.

So to overcome that kind of, like, failure to show battery voltage above 4.2 volts, Petitioner instead pivoted to a different argument. They say that a POSITA reading Yasunami would understand that constant current charging and constant voltage charging was used. And I think that was one of the questions that Your Honor was asking earlier. But that position is inconsistent with the plain text of Yasunami.

So again, if we look at slide 60, if there were a constant voltage phase, Yasunami would teach all the current drops from 2 milliampere centimeter square all the way to 0 or to a very minimal amount. But there is no teaching of that.

For example, Yasunami could teach the duration of the constant voltage phase. Alternatively, Yasunami could teach about, let's say, what is the end of the charging current is. But there is no such teaching at all.

Yasunami only teaches the current density that is applicable to the constant current phase. It shows that only constant current charging is used.

Both sides also agree that, like, constant current and constant voltage charging is a very conventional method of charging at the time. So it would be very easy for Yasunami to just say that. But again, they did not say that.

Then the secondary argument that Petitioner is making is that it would be obvious for POSITA to use constant current and constant voltage charging in this kind of context. But again, not so.

The problem Yasunami is trying to address is lithium plating. What does that mean? That means that there's too much lithium metal accumulated on the anode. What would cause this kind of situation?

One scenario is that you have to, like, the charge cutoff voltage is too high. So if you add a constant current, a constant voltage phase, that's only going to increase the amount of lithium circulating in the system, thus increasing the risk of lithium plating. And that's not something that Yasunami wants to happen.

So the POSITA reading Yasunami would actually understand that only constant current charging should be used to prevent lithium plating from happening.

JUDGE TORNQUIST: So this is Judge Tornquist. The one issue I have with what you just said previously is -- that means Yasunami is only trying to charge his battery to 60 percent possibly, and not trying to go all the way to the top. Why would one of skill in the art do that?

MR. ZHOU: So there's actually -- so the POSITA trying to charge a battery is balancing between, like, how fast it charges. If you are using a really high current, like, to -- well, I don't know if -- Yasunami actually does

not teach how high -- whether the two milliampere centimeter square is a high current or is a measurable current. It's a current that is not small. So when you use that kind of current, you are going to be able to charge the battery pretty quickly.

If you are using constant current and constant voltage charging, that is going to prolong the charging process, make it much less efficient. So one way for a POSITA to do that, the POSITA can use only constant current charging and charge all the way, let's say, to 4 volts, 4.1 volts, and just stop there, you know, relatively short period of time. So that would be the reason for a POSITA to only use constant current charging instead of CC/CV charging altogether.

JUDGE TORNQUIST: Okay. So I'm just going to repeat that, so I understand it. What you're saying is they would have used constant current here because it's quicker, and they would have just taken it up to its particular point of 60 or 80 percent and then just stopped?

MR. ZHOU: Yeah. So maybe I should show a different slide. So if we turn to slide 24, so this is from a reference that Petitioner relies upon. That's the Shen reference. So if we use a high voltage, like, let's say 4.3 volts for a short period of time, the battery is going to get, like, significant meaningful capacity in a short period of time, right? And then they use constant voltage and constant current charging for the eventual period, and then the battery voltage is 4.2 volts.

The same thing with constant current. You could use constant current and then you charge all the way to a maximum applied voltage, not 4.3 volts, and within that short period of time the battery is going to obtain meaningful capacity. But that does not mean the battery voltages also reaches 4.3 volts.

So that's basically like a shortcut for the processor to charge the battery quickly using a high current all the way through.

JUDGE TORNQUIST: Okay. And your reference shows the constant voltage time as well here on this figure.

MR. ZHOU: Correct.

JUDGE TORNQUIST: And if I understand your briefing, the reason you're saying you wouldn't do that is because 4.2 was the conventional top, and therefore you wouldn't want to exceed it because you're going to cause damage to the battery?

MR. ZHOU: Correct. And there is no suggestion in Yasunami saying that you want to actually increase that voltage to above 4.2 volts at all. And as we just discussed, lithium plating is an issue, and overcharging to above 4.2 volts is going to cause the issue of lithium plating.

So the next part that Petitioner argues is about the range disclosed in Yasunami. Yasunami discloses a range of 3.5 volts to 4.7 volts, and they argue that that also renders claim 5, the charge cutoff voltage range, obvious.

So we have two arguments there. The first argument in our briefing, and we show in the demonstratives starting from slide 64 and all the way to 67, is that Petitioner provides no evidence showing the disclosed range in Yasunami, applied voltage range, actually overlaps with the charge cutoff voltage range because those are applied voltage and you need to convert it to battery voltage, and there's no evidence of that conversion.

And even if there's an overlap, we have provided extensive evidence showing that there's unexpected results. So, a prior art can disclose a broad range without realizing that a narrower part, a subset of that range actually

works differently from the remainder. We think that's exactly what happened here.

So, let's assume for a moment -- but we don't agree with that. Let's say the 3.5 volts to the 4.7 volts is the battery voltage range. According, -- and 641 Patent shows conclusively that the range between 4.2 volts to 4.7 volts, they work very differently from 3.5 to 4.2. And we show you unexpected results in teaching away based on what 641 Patent says and also what Dr. Yao says in his declaration.

In the interest of time, I'm going to move to the motivations combined, but if there's any question about the criticality of that range, let me know.

Okay. The next argument, which is an independent reason why Yasunami-Koyama combination does not render claim 5 obvious, is because a POSITA would not combine them because those two references are fundamentally different.

Let's take a look at pattern owner's slide 68. Koyama wants to address the issue of lithium plating when the charging current is high. So it says that when you have a high charging current, lithium plating is more likely to happen, and you don't want that to happen. So to address that issue, Koyama says you want to increase the amount of anode material to make it even more than what the second model teaches.

So how to achieve that? A battery designer who wants to increase the anode material will only have two choices. First, to make the battery larger, but that's going to occupy more space.

Second, in a fixed-volume battery, the battery designer can increase the amount of anode material and reduce the amount of cathode material, which in turn is going to reduce its charge capacity.

What does Yasunami say about this approach? Yasunami says that if we turn to slide 69 of Patent Owner's demonstratives, here, this is what -- this is paragraph 2 of Yasunami. It says that, first, it also mentions overcharging or rapid charging can cause lithium metal to precipitate onto the carbonaceous material, again, leading to dendritic metal precipitation.

So Yasunami is also addressing the issue of lithium plating during high current charging. Then Yasunami said that the conventional method is to reduce the amount of positive electrode material to prevent overcharging. That's Koyama, to reduce the amount of cathode material to prevent lithium plating.

Yasunami says that you shouldn't do that. Doing that is going to reduce energy density and is also going to reduce the capacity per volume. Yasunami says, I have a different approach. I have a better approach. My approach is you don't need to reduce the amount of cathode material. What you can do is just use my normal anode material, which is lithium-containing transition metal oxide.

That material itself is less prone to lithium plating, so that's going to address the issue. Dr. Yao confirmed Yasunami's understanding as shown in slides 70 and 71. Lithium-containing transition metal oxide as the anode material has higher potential, so less prone to lithium plating.

Yasunami actually confirms Dr. Yao's understanding. In slide 72, Yasunami said that the negative electrode material of the present invention is

a negative electrode material that differs fundamentally in concept from carbonaceous material, such as the one used in Koyama.

So in slide 73 to 74, what Dr. Yao is explaining is that combining the two is going to be purely redundant because they are attempting to address the same issue, and Yasunami actually teaches, explicitly teaches away from the approach of Koyama. And combining them will only lead to redundant benefits and obvious drawback, which is energy reduction and energy density.

JUDGE TORNQUIST: So this is Judge Tornquist.

Remind me, doesn't Koyama contemplate using the same type of lithium metal oxide for the anode as Yasunami?

MR. ZHOU: Yeah, so in one of the paragraphs, I believe it's paragraph 9, there was a passing reference to Koyama saying that lithium transition metal oxide can be used as the anode material. But we think it's black-letter law that the references should be read together.

And Yasunami just cannot be clearer. Yasunami said that the kind of approach used by Koyama is not preferred, should not be used. Instead, you should use my approach, which is using a different anode material to address that. And you should not decrease the amount of cathode material to address the same thing because that's going to reduce energy density.

So reading everything together, it's our position that the POSITA would not combine them, would not have had the motivation to combine them.

JUDGE TORNQUIST: That's kind of a tough argument. I mean, you're telling us we should ignore the express disclosures of this reference

and that one of skill wouldn't even consider them. I have a hard time with that.

MR. ZHOU: So, actually, we think it's, like, we have two express statements, right? The first express statement is from Yasunami, which says you don't want to reduce the amount of cathode material. And my anode material addresses the same problem. The second reference in passing without any explanation says that this material should be used.

So we think Yasunami actually provides much more context and clear explanation about why that approach works, and why a POSITA should not use the approach in Koyama.

In contrast, Koyama is only a passing reference, provides no explanation for why to use lithium metal transition oxide as the anode material. So reading them two together, a POSITA would really, would understand that they will not combine the two references.

And there is a second reason for that. So in paragraph 32, which is shown -- not Yasunami -- which is shown in Patent Owner's slide 75, it said that the ratio can be set arbitrarily. So it shows to the POSITA that this is a ratio, it's a design parameter that does not really affect the battery performance. So as Dr. Yao explained, combining them wouldn't lead to minimal benefits.

If there is no further question, I return to George for claims 11 to 14.

JUDGE TORNQUIST: Okay. Thank you very much.

MR. STAMATOPOULOS: Thank you, Robert.

Your Honors, let me just ask how much -- how are we doing on time? If I may.

JUDGE TORNQUIST: Sorry. I have you with four minutes before you start hitting your reserve time of 20 minutes.

MR. STAMATOPOULOS: Very well, thank you.

So turning to claims 11 to 14, which would recite the capacity-retention limitations, Your Honors can find our slides that provide, I think, useful information on that argument. Those are slides 77 to 93.

The first issue here is whether claims 11 through 14 properly use functional language to narrow the structure of claim 5. We've briefed the issue on slide 79. You'll see a useful, I think, comparison between the Endo Pharm case and the 641 Patent.

The independent claims in Endo Pharm recited an oxymorphone-controlled release formulation with a range of amounts of active ingredients. The dependent claim did not add language regarding composition of the drug formulation. Instead it used functional language to narrow the scope by requiring the drug formulation to have certain pharmacokinetic properties. And the Federal Circuit rejected the argument that the functional limitation should not be afforded patentable weight.

This case is on all fours, really, with our case here, right? We have the structural language in the independent claim and dependent claim 5 about the CCV, the charge cutoff voltage, and the capacity ratio within certain claim ranges. And then what claims 11 through 14 do is they say that not every structure that satisfies those claim ranges will also have these performance characteristics. So that's proper functional claiming. And the same result as in Endo should be reached here.

Now, both experts -- and this is on slides 80 to 81 -- agreed or testified that a battery satisfying the elements of claim 5 will not necessarily satisfy

claims 11 through 14. Dr. Yao explained that; Mr. Hruska also explained that.

And I'll just point you or invite your attention on slide 81, bottom of the page. You can't say these two features would guarantee that you would reach that cycle life in all cases. No. It's a response to a question on this variation.

Now, for the Yamaki-Sakamoto combination battery, there is no evidence, no evidence whatsoever, that this combination would retain the claim capacity levels after 400 cycles. I spoke about this a little bit earlier in connection with the independent claims. That argument applies with even greater force here.

Patent Owners provided unrebutted evidence demonstrating that without more experimentation, a person of ordinary skill in the art cannot determine the capacity retention of a battery at 400 cycles based on what is preliminary testing at the 10th cycle.

And it's not just the fact that it's at the 10th cycle, Your Honors. It's also the fact that Yamaki discloses or is focused on what is essentially a new cathode material. The combination is one that concerns a higher charge cutoff voltage device with a lower charge cutoff voltage device, which Yamaki itself during the prosecution of the Japanese patent said would operate in a materially different way that only adds unpredictability.

There's also the fact that Yamaki's operating conditions, there's additional language from Endo that you'll also find in our slides. I just don't want to take up too much time walking you through every single element that's already been briefed. You can't extrapolate from one set of conditions, experimental conditions, to what would be normal operating conditions in

the same manner that you can't extrapolate from 10 cycles to 400 cycles, and that's what both experts have testified in this case.

And so all of the facts show that a person of ordinary skill in the art faced with either of these two references or these two references together in combination would need to conduct a lot more testing in order to form any type of certainty, let alone a reasonable certainty that you could actually practice the invention through the combination.

JUDGE TORNQUIST: So, Counsel, this is Judge Tornquist. Is that our standard then, reasonable certainty?

MR. STAMATOPOULOS: I think a reasonable expectation. I apologize, I misspoke, not reasonable certainty, reasonable expectation of success. So I'll revise my previous statement, a reasonable expectation of success. And again, I'll invite you to consider this question, what does a reasonable expectation of success mean? It means that there needs to be some basis from which to infer that the combination will be successful in practicing the invention.

And here you've got two experts, both of whom testify that a person of ordinary skill in the art would normally conduct a lot of testing in order to form that expectation. You've got a prior art reference that only discloses experimental operating conditions. It discloses a new cathode, okay? A new material with additional unpredictability. It's combined with a reference that the applicant himself or herself said in the Japanese prosecution that, you know, when you add these types of references with different charge cutoff voltages, you should expect a level of incompatibility.

So on the basis of all of these facts, we submit, Your Honors, that, you know, Mr. Hruska can't just say, well, a person of ordinary skill in the art would conduct some preliminary testing. And on that basis of that preliminary testing, we can infer here that 10 cycles are good for 400. I don't think that that's a proper argument. I think that that opinion, frankly, should be disregarded as fundamentally unreliable.

Dr. Yao, in fact -- and that's on slide 82 -- addressed the phenomenon that you yourself, Your Honor, mentioned during opposing Counsel's presentation of sudden death, rollover failure, or knee in the literature, in colorful terms.

Bottom line is that there is a non-linearity. And I called it unpredictability. There's a non-linearity in the performance of these batteries. Suddenly, you know, it could be doing quite well in 10 -- after 10 cycles. And then on the 50th cycle or the 100th cycle or the third -- after 300 cycles, it could unexpectedly fail.

What we have here on the claims is very specific -- very specific capacity retention levels that need to be met. And respectfully, the references don't meet them. And if you actually look at Sakamoto, you'll see, Your Honor, that even though it tests at 4.2 volts, the capacity retention levels don't even meet what's in dependent claims 11 through 14, right? You have 300 cycles and a 75 percent retention level, I believe. And that is at a much more favorable voltage. The question here is, can you exceed that conventional limit? Can you exceed that 4.2 volt voltage and still retain capacity?

Now, Petitioner has argued, and I would like to touch on this point, because I think it's -- it's important. I think the argument that was advanced

is misleading. And I'd like to invite your attention at pages 28 and 29 of the reply. And this is where the issue is.

On the bottom of page 28, Petitioner correctly says that there's no dispute that Yamaki and Sakamoto both aim to improve cycle length. I think that's a ubiquitous, that's a -- that aim is probably, you know, the aim of every single battery designer out there. So there's no dispute there.

There's also no dispute; there's a vast library of parameters available in service of achieving this objective. No dispute, this is also true. The issue is, and -- sorry, there's also no dispute that you could do routine adjustment of parameters to achieve better cycle length. You could do that too. There's no dispute that adjusting certain parameters, tweaking the battery, is within the can of a person of ordinary skill in the art and can be routine.

What's in dispute, however, is that, I mean, Petitioner has presented evidence of what constitutes routine experimentation. The evidence that's missing is that that routine experimentation would lead to the claimed result. That's what's missing. And that's what Petitioner needs to prove.

And Petitioner has said that the prior -- the patent doesn't actually show how you would attain this result. We disagree, Your Honor. As Your Honor pointed out, again, during opposing Counsel's presentation, there's a number of examples, okay? There's a number of examples that the patent provides in the specification that show functional devices that actually attain the claimed capacity retention levels after 400 cycles. There's an explanation as to why this is done. And it is true that the core mechanism through which that improvement attains is through the adjustment of the capacity ratio in tandem with the charge cutoff voltage.

But there's an additional thing that's disclosed in the patent, and that's the cathode material. You have cobalt oxide and nickel oxide. Those were conventional materials at the time. And the patent shows that you can use these conventional materials in tandem with the invented thrust of the patent, which is the charge cutoff voltage limitation and the capacity ratio limitation and attain those capacity levels.

What Yamaki does is it takes a different cathode material. And that combination of new cathode material and anode is not -- cannot possibly, a person of ordinary skill in the art would not possibly, without additional experiments, infer or extrapolate that they could attain the capacity levels that are recited in the 641 Patent.

So, with respect, though enablement I don't believe is an issue here, I think the 641 Patent provides ample detail as to how it attains the capacity levels. It claims them properly, and there's no evidence that they could be met either by Yamaki-Sakamoto or by Yasunami-Koyama. Because those references don't disclose data at those levels of cycling, 400 cycles, don't disclose the requisite capacity retention after those levels of cycling, and they disclose new materials.

So with that, unless there's questions by Your Honors, I'll reserve the rest of my time.

JUDGE TORNQUIST: Okay. I see no further questions.

We ran a little over. I'll give you a couple minutes. I'll give you 15 minutes for your surrebuttal time, just as we gave Petitioner a little extra time too.

MR. STAMATOPOULOS: Thank you.

JUDGE TORNQUIST: With that, Petitioner, when you're ready.

MS. DeVRIES: All right. Sorry about that. All right. Thanks very much.

So, Petitioner -- I'm sorry, Patent Owner's Counsel argued earlier that there's no way for a POSITA to know that Yamaki describes an operable battery. But Yamaki itself, at paragraph 60, characterizes its battery as having achieved excellent cycle characteristics.

So, if you turn to Petitioner's slide 16 for a moment, Patent Owner's own expert has confirmed how POSITA would interpret this phrase as meaning a few hundred cycles. So what this boils down to is that Yamaki represented what a POSITA would have understood as a battery achieving a cycle life of hundreds of cycles. We can't ignore this express disclosure of Yamaki.

This is a problem for Patent Owner. So they've proposed either that we disregard their own expert's testimony, or otherwise that we read it as saying something totally different than what it actually says. Patent Owner had every opportunity to clean up this testimony on redirect, deposition, or in their sur-reply, but they didn't.

And so, we can't use wishful thinking to make it go away. Instead we have to take this testimony, which is record evidence at face value.

Now, sure, testing might be necessary, as Patent Owner has contended, but we don't know what testing Yamaki did in the background to support its own conclusion. We simply have to trust what it says. Now, Patent Owner's Counsel also spent a lot of time telling us what it means for a battery to be configured to do something. It seems like maybe they're trying to read some kind of performance requirement into claim 5 that maybe Yamaki's 10-cycle testing isn't good enough to satisfy.

But take a minute and look at the words on claim 5. There isn't configured to anywhere in that claim. Claim 5 says that the battery has a charge cutoff voltage. It's not configured to do anything. So whatever Patent Owner thinks that configured to means, whatever performance criteria it might bring along implicitly, that's just not relevant. We have to read what the claim says. The claim says it has a charge cutoff voltage. Yamaki's battery has a charge cutoff voltage in the claimed range.

One last thing on the topic of claims is that Patent Owner's Counsel also argues that there was no previous recognition in the art to prove a relationship between charge cutoff voltage and a ratio of the electrode materials, and that that was really the inventive concept in the 641 Patent. And so I think they've said that to render the claims obvious, our art needs to have recognized a nexus between these two parameters.

And so I just want to say two things about this briefly. The first thing is that the claims say nothing about a relationship. They recite a range for the charge cutoff voltage. They recite a range for the ratio, but they don't link the two. They simply say that there are two ranges.

So there's nothing in the claim about a nexus between these two parameters. But even if you can read the claims to imply some kind of relationship implicit in the claims, even though it's not stated, both of our primary references contemplate both charge cutoff voltage and ratio of electrode materials.

Yamaki has a high charge cutoff voltage, and it tells us to look at the amount of negative and positive electrode material and adjust that because of what that charge cutoff voltage does. So Yamaki has, in fact, expressed interest in both parameters. And Yasunami, too, comments on both charge

cutoff voltage and ratio. So even if there is some kind of relationship requirement, we have that.

One last point on the Yamaki-Sakamoto combination, and then I'll turn it over to my colleagues, Patent Owner has also argued that Sakamoto teaches away from the combination. Sakamoto says that increasing the amount of lithium ions in circulation is bad for battery performance. And it says that by increasing the amount of negative material, we can help mitigate this problem.

This problem here, lithium ions and excess lithium ions in circulation, is the sort of thing that can happen at high charge cutoff voltage. But that doesn't mean that Sakamoto is teaching away from Yamaki's high charge cutoff voltage. Remember, we're starting with a high charge cutoff voltage. We're not increasing anybody's charge cutoff voltage.

And what we know in this context is that Sakamoto's ratio can solve this problem. It's not a teaching away. It's that Sakamoto is complementary. By increasing the amount of negative material, we can help mitigate this very problem of increased amounts of lithium ion in circulation. So there's no teaching away. Sakamoto is actually an improvement on the Yamaki battery that suffers from often similar problems as what Sakamoto itself was trying to solve.

So I'll stop there and hand this to my colleague.

MR. RENNER: Thank you, Gretchen.

Just one comment from me, and then there'll be one final from Dr. In, please. I simply wanted to confirm, and this is with respect to claims 11 to 14, a couple -- well, a thing that our representations are as follows: We don't change the cutoff charge voltage of the primary reference Yamaki. It

discloses over 4.2 volts. So statements that respect -- that are with respect to the idea of what would happen to Yamaki's teachings if you change those voltages, they're not relevant. We don't extrapolate from 10 cycles to 400 cycles. I think you've heard plenty from us on this, but just to be clear, there are excellent charge characteristics disclosed expressly by the reference. And we know from Dr. Yao, Patent Owner's expert, what this means to a POSITA. More than a few hundred cycles is where excellence is achieved. Patent Owner consistently asks for this to be disregarded, for you to distrust this express representation by Yamaki's author and instead look at the 10-cycle charge experiment that was done there. But that's not what we're representing.

So I'd happily take any questions you have on 11, 15, or 14, but I'd otherwise ask my colleague to give one final comment.

Thank you, Your Honors.

MR. IN: Just very quickly, Your Honors. I heard a lot of mischaracterizations about the Yasunami reference, so I want to very quickly clarify some of them.

Patent Owner's Counsel mentioned that Yasunami's discussion of the 4.3 volts doesn't satisfy the 4.2 volt limitation because the actual battery voltage would end up being slightly less. I think they say like 4 volts. We don't agree with this for various reasons, as provided by Mr. Hruska, but I just want to point out that the Patent Owner does not even address our argument that Yasunami actually goes up to 4.7 volts. And as shown in slide 43 of our demonstratives that would still, even if the battery voltage was slightly less than 4.7, that would still be well above 4.2 volts as required by claim 5.

And lastly, the Patent Owner's Counsel referred to paragraph 2 of Yasunami in saying that it somehow teaches away from having more anode materials. This is problematic for a couple of reasons. One, as I noted in paragraph 19, Yasunami actually explicitly contemplates having more anode materials than cathode materials. And also, as Judge Tornquist, I think, noted earlier, both Yasunami and Koyama contemplate the use of lithium-transition metal electrodes. And paragraph 2 of Yasunami is actually talking about potential drawbacks of carbonaceous electrode materials, which, of course, are not required by the reference.

So with that, unless there are any other questions, we'll yield.

JUDGE TORNQUIST: Okay. Seeing no further questions.

Thank you very much, Petitioner.

Patent Owner, when you're ready, and I have you with 15 minutes.

MR. STAMATOPOULOS: Thank you, Honor.

So I'd like to touch on a few points. They're all related to Dr. Yao's testimony about what excellent cycle characteristics means and the import of that testimony. So in addition to the testimony that Petitioner raised, there's other testimony by Dr. Yao, and you'll find that in pages -- page 36, lines 7 through 17 of his transcript, where Dr. Yao is asked, okay, so based on that, would it be fair to say that Yamaki is aiming to improving cycle life in lithium cobalt batteries? There's an objection to form. And then Dr. Yao responds, I can think the intention could be related to improve the cycle life, yeah. But I'm not sure. I don't think this Yamaki really demonstrates that. Indeed, they show that cycle life indeed has been improved, increased, because I think they only show 10 cycles in their test.

Clearly, what Dr. Yao is saying here is that there's an improvement, or there's, you know, there's maybe promise of an improvement, but there's no demonstration that this improvement actually would be manifest if one were to test the battery over hundreds of cycles, okay?

So I think there was reference to why we didn't clean up the testimony, or why we didn't take another deposition. I'm not sure what device we'd have there to clean it up. But I think the testimony is clean itself. It was honest testimony about what excellent cycle characteristics mean and don't mean, and what the reference shows and doesn't show. And I think Dr. Yao unequivocally said that Yamaki does not teach what Petitioner wants Yamaki to teach. So you can look at the testimony of Dr. Yao and see for yourselves.

But beyond that, and this is very important with respect to claims 11 through 14, even if the testimony means what Petitioner wants it to mean, that excellent cycle life is life over hundreds of cycles, and Yamaki, despite only having conducted tests for 10 cycles, actually is enabled for hundreds of cycles. And by the way, this is not an enablement issue. This is what a person of ordinary skill in the art would understand reading this reference. And I don't think a serious person of ordinary skill in the art, or serious person in general, would look at Yamaki and think that, you know, this reference that only has tests for 10 cycles actually means that it works, that the battery works for hundreds of cycles.

But even if you take it to mean that, even if you take it to mean that, claims 11 through 14 are still not rendered obvious because they require 400 cycles, not just some abstract number, and they require very specific capacity retention levels. And those capacity retention levels, Petitioner's

references are nowhere near them over 400 cycles. So there's no reasonable expectation of success for a POSITA that is combining these two disparate references, Yamaki and Sakamoto, or Yasunami and Koyama, to form that expectation. There's no evidence of that. There's no basis for that. And hence, no reasonable expectation.

With that, I will turn it over to my colleague, Mr. Zhou, who also has some points he wants to touch on, unless there are questions for me, Your Honors. Thank you.

MR. ZHOU: Yeah, I will be very brief.

So, Petitioner just mentioned that Yasunami discloses a range as high as 4.7 volts, but that's an applied voltage. And as we've shown in slide 24, which is, again, referring to Petitioner's own reference, the Shen reference, you can apply a very high applied voltage for a very brief period of time in order to gain meaningful capacity in that period of time. But that doesn't change the charge cutoff voltage, the battery voltage.

They can apply a 4.7 volts for, let's say, one minute, a few seconds. That may be the maximum applied voltage. But that does not change the charge cutoff voltage, the battery voltage, with 4.2 volts. And there's just no evidence in the Yasunami reference about how the charging was applied in that context, not the range, not the disclosed range. And Petitioner provides no evidence to that effect. That's the only point I want to make.

JUDGE TORNQUIST: I'd like to ask one quick question, maybe to get clarification. In Yasunami, there's a table 1, and we have a charge cutoff -- end-of-charge voltage, as they pointed to, at 4.3. But there's also a line that says cycles number. What does that mean?

MR. ZHOU: The cycles number means the number of cycles that is going to take the battery to drop to 60 percent of its capacity.

JUDGE TORNQUIST: Okay. So we know that at 220 cycles, it dropped to 60 percent for that 4.3 example?

MR. ZHOU: Correct. So none of the batteries actually in that example meets even the claims, dependent claims of this experiment.

JUDGE TORNQUIST: Okay. Thank you.

Okay. Patent Owner, did you have anything else that you were going to follow up with?

MR. STAMATOPOULOS: No, Your Honor.

JUDGE TORNQUIST: Okay. Thank you.

And we are -- let me say thank you to the parties for this argument, and thank you to the LEAP practitioners. It's always welcome to see the LEAP practitioners provide useful analysis for their sections. I appreciate it. And with that, we are adjourned.

(Whereupon, the above-entitled matter went off the record at 3:25 p.m.)

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