

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES, INC.,
Petitioner,

v.

GOOD KAISHA IP BRIDGE 1,
Patent Owner.

IPR2024-01494
Patent 11,968,909 B2

Record of Oral Hearing
Held: January 23, 2026

Before JUSTIN T. ARBES, SHEILA F. McSHANE, and
JOHN. D HAMANN, *Administrative Patent Judges*.

APPEARANCES:

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The above-entitled matter came on for hearing on Friday, January 23, 2026, commencing at 1:00 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia.

P R O C E E D I N G S

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1:06 p.m.

JUDGE ARBES: Good afternoon, everyone. This is our second hearing of the day. This is the oral hearing in Case IPR2024-01494 regarding Patent 11,968,909.

Can we please get counsel's appearances in this case? Counsel for Petitioner?

MS. ARMOND: Good afternoon, I'm Michelle Armond. I'm representing Petitioner and I am joined by our lucky LEAPer, Monica Arnold.

JUDGE ARBES: Counsel for Patent Owner?

MR. GIUNTA: Good afternoon, Your Honors. I'm Richard Giunta from Wolf Greenfield for the Patent Owner, IP Bridge. I'm joined by Adam Wichman.

JUDGE ARBES: Thank you. Per the revised Trial Hearing Order in this case, Petitioner will have 90 minutes of time to present argument, since they submitted a request for a LEAP practitioner to participate, which was granted. Patent Owner will have 75 minutes of time. We'll follow the same order of presentation as the hearing this morning.

Are there any questions from the parties before we begin?

(No response.)

JUDGE ARBES: Okay. Counsel for Petitioner?

MS. ARMOND: Good afternoon. Let's talk about the '909 Patent. If you look at our Slide 2, you can see that we have three sets of claims in the '909 Patent. We have one group that's already been disclaimed, so we don't

1 need to worry about those. And then there's a second set directed to a .1 to
2 .85 tunnel barrier height and then a third set, which is directed to a .2 to .5
3 electron volt tunnel barrier height.

4 So, if we take a step back, there are not many disputes in this case.
5 There's no claim construction to be resolved. The Patent Owner is not
6 disputing that all limitations are taught by the prior art. They are not even
7 disputing that the petition articulates a motivation to combine. If you look at
8 their sur-reply, at page 3, Patent Owner acknowledges that skilled artisans
9 were motivated to increase TMR. So, that leaves us only two issues to
10 address, both relating to attacks on the motivation to combine.

11 Now that we've had a full trial, neither of Patent Owner's arguments
12 has survived. The first argument Patent Owner makes is that Slonczewski's
13 model taught away from a relationship between the barrier height and TMR.
14 As has been shown in this trial, Slonczewski, there's no dispute, actually
15 taught a simple model involving the incoherent tunneling through an
16 aluminum oxide tunnel barrier that Butler and others recognized just simply
17 doesn't apply to the coherent tunneling through a magnesium oxide matrix.

18 Their second argument is that a skilled artisan never would have
19 thought there was a relationship between tunnel barrier height and TMR, but
20 that is not accurate because IPB admits that there is a relationship between
21 the two and that is in paragraph 11 of Dr. Ross' sur-reply declaration. Let's
22 start there and I will walk through it.

23 Let's talk a little bit about terminology. There's no dispute about
24 what the Fermi energy is, that's the highest energy level occupied by
25 electron at zero degrees Kelvin. Of course, that's important because only
26 electrons that are near the Fermi energy are going to participate in tunneling.

1 Then, let's talk about another concept which shows up in Butler and other
2 references and that is the density of states. There's also no dispute that the
3 density of state represents the likelihood that an electron on one electrode is
4 going to have an available slot in the other electrode to tunnel across the
5 barrier. So, that's kind of our basic steps.

6 Let's talk about relationships --

7 JUDGE HAMANN: Counsel?

8 MS. ARMOND: Yes?

9 JUDGE HAMANN: Counsel, this is Judge Hamann. Forgive me, are
10 we on a particular slide or are you heading into the slides?

11 MS. ARMOND: No, we're just talking, but we get --

12 JUDGE HAMANN: Fair enough, fair enough, I saw density --

13 MS. ARMOND: Yeah, we can go to --

14 JUDGE HAMANN: I saw these beginning slides so I thought I might
15 have been behind.

16 MS. ARMOND: I'm not a big slide fan. Okay, so we can go to a
17 slide, why don't we go to my Slide 11. Petitioner's Slide 11. Here's
18 something else that's not disputed. On Slide 11, you'll see I have an excerpt
19 from Patent Owner's response brief at page 14. Everyone agrees that the
20 tunnel barrier height of an MTJ represents the energy difference between the
21 Fermi energy of an electrode and the bottom of the conduction band of the
22 barrier. In other words, if you change the Fermi energy, you are necessarily
23 going to change the barrier height, this is undisputed. Keep that in mind and
24 let's go to my Slide 9.

25 Now, here we're talking about TMR, and it's also not dispute -- this is
26 actually an excerpt from Yuasa that's cited in Dr. Ross' reply declaration,

1 but it's not disputed. Here, Yuasa explains that the TMR effect is known to
2 originate from the spin polarization of the electrodes, in other words, it
3 represents the difference between densities of states, remember those are the
4 slots of the up and down spins sub-bands in the two electrodes.

5 Basically, if you have a difference of a density of states that generates
6 the TMR between the spin up and spin down electrons. What this is saying
7 is that if you change the density of states, you are necessarily going to
8 change the TMR.

9 Okay, so let's put this altogether. If you would turn with me to
10 Exhibit 1087 -- oh, that's not right. Hold on, I think that's supposed to
11 2087. I'm actually looking at Dr. Ross' sur-reply so let me get you the
12 exhibit number.

13 JUDGE ARBES: 2087.

14 MS. ARMOND: Yes, I apologize, Exhibit 2087. I'm looking at Dr.
15 Ross' sur-reply declaration. Turn to paragraph 11, and that is going to be
16 showing up at the bottom of PDF page 8 and top of PDF page 9. This is
17 what Dr. Ross explained. I'm looking at the last line on per page 6 or PDF
18 page 8. She explains moving the Fermi energy is equivalent to adding or
19 subtracting electrons, which would occur only if the structure were
20 modified, e.g., by replacing the iron by another metal or adding defects --
21 adding, obviously, oxygen vacancy defects.

22 Then she says, this would also be expected to change the density of
23 states. And then she points out that Giordano shows this. What is Dr. Ross
24 explaining to us here? She explains that if you change the Fermi energy by
25 adding -- if you add defects, you are necessarily going to be changing the
26 Fermi energy. Then, what does she say next? She says that's also then

1 going to change the density of states. So, again, if you add vacancy defects,
2 you're changing the Fermi energy, which is necessarily going to change the
3 density of states and what do we already know that's undisputed in the
4 record?

5 Okay, if you change the Fermi energy, that's going to change the
6 barrier height necessarily. If you change the density of states, you are
7 necessarily going to change the TMR, so change the barrier height, you're
8 changing the Fermi energy. That's going to change the density of states, that
9 changes TMR. We have an undisputed relationship between barrier height
10 and TMR and this argument is dispatched.

11 JUDGE ARBES: Counsel, where was this argument about density
12 and states made in the petition?

13 MS. ARMOND: Well, it's not in our briefing for a very simple
14 reason. It showed up for the first time in Dr. Ross' sur-reply declaration so
15 I'm responding to it.

16 JUDGE ARBES: Okay.

17 MS. ARMOND: But the motivation that you're asking about is on
18 our petition and what we explained and I'm looking at the petition at the
19 bottom of page 34, top of page 35.

20 JUDGE ARBES: Counsel, before I forget as well, would you like to
21 reserve time for rebuttal?

22 MS. ARMOND: Oh, sure, give me 30 minutes. Okay, what we
23 explained in the petition is one of skill in the art looking to increase TMR of
24 an MgO barrier, would have been motivated to explore lower barrier heights
25 to facilitate tunneling of parallel electrons. We articulated there in the
26 petition from the beginning that people of skill who wanted to improve

1 TMR, which remember is an undisputed motivation, would have been
2 motivated to explore lowering the barrier height to do that and that has been
3 our motivation this whole time and it is just as true today as it was when we
4 wrote it.

5 JUDGE ARBES: But, Counsel, it appears that you are arguing a
6 slightly different relationship now relying on density of states and, correct
7 me if I'm wrong, but I don't recall that that was argued at all in the petition
8 or the initial declaration or --

9 MS. ARMOND: The TMR and the density of states and the barrier
10 height are all related and it's undisputed actually that one of skill in the art
11 would have known that. The reason that this is coming out is because the
12 Patent Owner has challenged this and so throughout this trial, we have gone
13 into extremely granular detail about exactly how this tunneling works and in
14 the course of all the depositions and explaining exactly how it works, we
15 now are all in agreement that there yes, in fact, is a relationship between
16 TMR and the barrier height, just like we explained at the beginning.
17 Nothing has changed here.

18 JUDGE ARBES: Okay, can you address the arguments about that
19 relationship being uncertain, and if you don't know which way?

20 MS. ARMOND: Again, our motivation is that one of skill in the art
21 would have been motivated to explore barrier heights to increase TMR,
22 right? So, there was an incredible, undisputed motivation to increase TMR,
23 but all of these parameters, it's very detailed and people aren't always totally
24 sure how things are going to work and so when you mess with one
25 parameter it's not always sure, but Dr. Bokor testified it could go up, it could

1 go down, but you're definitely going to try it. It's at least a 50/50 and that
2 with the strong motivation provides a reasonable expectation of success.

3 The problem that we have here is that Patent Owner is demanding far
4 more than the law of obviousness requires. They're requiring a guarantee of
5 success, that someone would absolutely know it was totally going to work
6 and in this field, which is tunneling, it is quantum mechanics, people have to
7 try things. One of ordinary skill would have known from Bowen that the
8 oxygen vacancy defect was a handle that could be turned and the mechanism
9 was there. It was there in Soukup. Soukup explained that if you introduce
10 oxygen vacancy defects, it's going to lower the barrier height and because
11 all these relationships were known to one of skill in the art as is undisputed,
12 somebody would have tried this, especially with such a huge reward on the
13 other side because increasing TMR was very commercially valuable.

14 JUDGE ARBES: I don't think Patent Owner would necessarily
15 dispute that that is a goal in the art perhaps, but it is how you get there. The
16 motivation has to be to do this to get there.

17 MS. ARMOND: Yes.

18 JUDGE ARBES: And the page before, in your petition, page 34, the
19 middle paragraph, it says according to the equation for TMR, lowering the
20 resistance barrier height for parallel electrons would improve TMR. Patent
21 Owner has made the argument that that was your position at the time of the
22 petition, that that is the relationship. You lower the barrier height, you
23 increased TMR.

24 MS. ARMOND: That is still our position.

25 JUDGE ARBES: Okay, can you explain that?

1 MS. ARMOND: And this is why, okay, so again, as we explained on
2 Slide 9, the equation for TMR is undisputed, right? It's the difference
3 between the resistivity of the electrons that are trying to go across the barrier
4 so you need -- and this is all about what Butler was about, you need the
5 parallel spin up electrons to tunnel more effectively across the barrier than
6 the anti-parallel. The magic of MgO was because of the symmetric cubic
7 crystalline in some fashioned structure, you were able to basically pass
8 through the spin up as if they weren't there and you would block the anti-
9 parallel and so there's been a lot of testimony and other things about the
10 decay rates and why this is all true in Butler.

11 Basically, we have gone down to an incredibly deep level and every
12 sentence that we said in our petition about why someone would do that is
13 true and undisputed. There isn't a change and now, even Dr. Ross conceded
14 it.

15 JUDGE ARBES: I guess maybe I'm missing something then. On
16 page 34 of the petition where you set forth that relationship, Patent Owner
17 has pointed to, for instance, Moodera, which is cited by their -- Exhibit
18 1035, that appears to support the opposite relationship. Do you disagree
19 with that?

20 MS. ARMOND: Exhibit 1035, that is Moodera, and he talks about
21 this spatially obvious mathematical relationship from the TMR equation,
22 right? That is not in dispute. We were not relying on Moodera for the
23 relationship for tunneling across an aluminum oxide barrier, I mean, if you
24 look at our Slide 6, which shows these two barriers, no one is arguing that
25 the tunneling modeling crossed an incoherent aluminum oxide barrier is the
26 same as it is for MgO.

1 Of course, we also cite there, Dr. Bokor's paragraph 169. If you look
2 at 169, he walks through the undisputed TMR equation and he explains that
3 if you lower the resistivity for the parallel spin electrons compared to anti-
4 parallel, you improve TMR which is exactly what that mathematical
5 relationship says. I don't even know that we need an expert to look at this
6 equation, but that is still true. That's what we're talking about with the
7 density of states, this undisputed issue. The density of states measures that
8 difference between how effective it is going to be for a spin up versus a spin
9 down electron to get across the barrier. Obviously, you need to improve the
10 parallel compared to the anti-parallel to get that high TMR and that's true,
11 it's undisputed. We're all talking about the same things.

12 You don't have to just rely on Dr. Ross for this because it is also in
13 Giordano. Giordano ran the experiments and Giordano is Exhibit 1106,
14 Figure 3, so let's go there. His Figure 3 is on PDF page 5, but if you see
15 there on the left hand side, we have a regular magnesium oxide barrier and
16 then on the other side, we have magnesium oxide with vacancy defects.

17 JUDGE ARBES: I'm sorry, Counsel, if you can go back for just a
18 moment. Can you start that again, please?

19 MS. ARMOND: Okay, Exhibit 1106, Figure 3. If you're looking at
20 Giordano's figure, and there's no disagreement about this, what he's
21 showing is magnesium oxide on the left and then he introduces vacancy
22 defects which are actually that gray shaded on the right. There's like an A
23 side and a B side and then he compares it and he mentions that when you
24 add these vacancy defects, you actually are moving the Fermi energy. You
25 see how there's different lines on each side for EF? That's the Fermi energy
26 and then you can see the squiggly lines on each side, the solid lines which is

1 what we care about that is how the density of states has changed when he
2 adds oxygen vacancy defects. At her last deposition about the sur-reply,
3 which is our Exhibit 1107, looking at page 48, 1 through 11 --

4 JUDGE ARBES: Just one minute, Counsel, while we go to that page.

5 MS. ARMOND: Let me know when you're there. I'm at Exhibit
6 1107, page 48. The question was about in Giordano how oxygen vacancies
7 impact the Fermi level and this is exactly what Dr. Ross explained. She
8 says, so, Giordano's figure shows a change in both the Fermi level and the
9 density of states between the two situations he modeled; one with and one
10 without oxygen vacancies.

11 Again, the relationships between these parameters which are
12 impacting the barrier height and TMR this is not a dispute, it's just quantum
13 mechanics. Again, just to reiterate, we don't have a dispute here. It's
14 undisputed that if you change the barrier height, you are necessarily
15 changing the Fermi energy, which necessarily is changing those density of
16 states which is again the resistivity that relates to the resistivity of the
17 electrons getting across the channel and that is directly going to impact your
18 TMR.

19 This argument that sort of --

20 JUDGE ARBES: Sorry, Counsel. Can you say that sentence one
21 more time?

22 MS. ARMOND: Yes.

23 JUDGE ARBES: The chain of relationship --

24 MS. ARMOND: Yes.

25 JUDGE ARBES: When you change the barrier height --

1 MS. ARMOND: Yes. Let me step you through it. I know it's
2 quantum mechanics. Okay, so this is the relationship. When you change the
3 barrier height, you are necessarily changing the Fermi energy and that is
4 shown on our Slide 11 and you can see there, there's a cite to Patent
5 Owner's response brief at 14. Okay? Then, we know from Dr. Ross at
6 paragraph 11 that when you change the Fermi energy, you're also going to
7 change the density of states and that's also shown in Giordano, which of
8 course is Exhibit 1106, particularly his Figure 3. And then we have
9 testimony from Dr. Ross at Exhibit 1107, column 48, 1 through 11. Again,
10 this is hot off the press, it just showed up at her very last deposition on the
11 bonus sur-reply that she was allowed to file.

12 Okay, so then because changing the Fermi energy will necessarily
13 change the density of states, that is directly going to impact TMR. For that
14 support, you can look at what is cited, I mean among many other things, on
15 Slide 9. This is Yuasa. It's also in Dr. Ross' sur-reply declaration, Exhibit -
16 - let me make sure I have this right, I'm sorry, Dr. Ross' original declaration,
17 Exhibit 2053 at paragraph 38. That's the relationship when you change the
18 density of states, you are necessarily changing TMR and that's because of
19 the mathematical equation that we were just talking about in the petition
20 about how when you change that resistivity of getting the parallel electrons
21 across the barrier versus anti-parallel, you are necessarily going to change
22 the electrons, which is what we explained here in our petition and also Dr.
23 Bokor explained in his first declaration, Exhibit 1024, paragraph 169. He
24 has a whole paragraph about TMR.

25 JUDGE ARBES: Counsel, can we take a step back for a moment and
26 I want to inquire a bit as to why this argument is proper, when it appears to

1 be premised in large part on Dr. Ross' sur-reply declaration and deposition
2 after that, which Petitioner agreed to, right?

3 MS. ARMOND: Hmm?

4 JUDGE ARBES: Petitioner agreed to have --

5 MS. ARMOND: We did not oppose it, I mean, you know.

6 JUDGE ARBES: I guess what I'm asking is -- the argument that's
7 being made now, that does not appear to have been made in the petition, but
8 was only by virtue of the sur-reply declaration existing and a deposition
9 following that. Why is that proper?

10 MS. ARMOND: All of these relationships are in the Fermi energy,
11 the density states, how those affect barrier height and TMR, those are not
12 disputed and those showed up. Also, if you look at Bowen, Bowen talks
13 about how he understands that his barrier height is driven by oxygen
14 vacancies which is exactly what Dr. Ross is teaching here. So, this is not a
15 new concept --

16 JUDGE ARBES: I don't think that --

17 MS. ARMOND: But they disagreed so we put this correct motivation
18 in our petition and we had a trial and Patent Owner has decided to go and
19 question fundamental quantum mechanics and now all of the experts agree
20 there is a relationship so that's it. That's what happened and so, you know, I
21 don't know why they chose to bring it up in the sur-reply versus her original
22 declaration, but the experts agree about this.

23 JUDGE ARBES: Why don't I ask it a different way -- let's assume
24 for the sake of argument that the Board were to grant the motion to strike, in
25 which case the sur-reply declaration becomes irrelevant, right?

26 MS. ARMOND: Yes.

1 JUDGE ARBES: Okay, if that were the case, how is this argument
2 that you're making now present in the petition and reply?

3 MS. ARMOND: Because as I pointed out here, at the bottom of page
4 34, top of page 35, we said from the beginning that one of skill, I'm quoting,
5 "One of skill in the art, looking to increase TMR of an MgO barrier, would
6 have been motivated to explore lower barrier heights to facilitate tunneling
7 of parallel electrons." So, to be clear, Dr. Ross is not opposing anymore and
8 that's the only thing that changed in the sur-reply, but these relationships
9 that I'm talking about those were present all along and we alleged them. We
10 talk about how someone would be looking at Bowen, would have looked at
11 Soukup's teachings about MgO barriers and how defects lowered the barrier
12 height, right? Because remember in our ground we noted how Bowen got a
13 particular value and he said this could be explained by oxygen vacancy
14 defects. Then, Soukup indisputably shows a relationship where if you
15 introduce oxygen vacancy defects, you lower the barrier -- I'm sorry, if you
16 introduce oxygen vacancy defects, you lower the barrier height, so all of
17 these things have been here all along. What changed in the sur-reply, which
18 they asked for and got, is that now Dr. Ross agrees. We don't have that --
19 there's no technical dispute here. All the experts agree that this is true and
20 this relationship exists. So, it's not hard. There's no real fact finding to do
21 here now because the experts and all the technical things show that the
22 motivation to combine that we articulated from the very beginning is not just
23 true, it's true at whatever level of granularity you want to look at.

24 JUDGE ARBES: That there is some relationship --

25 MS. ARMOND: But there --

1 JUDGE ARBES: On the four-part chain beginning with lowering the
2 barrier height to impacting TMR, it could go up, it could go down, but there
3 will be some relationship?

4 MS. ARMOND: But there's a relationship, yeah. When you're
5 messing with the barrier height, you are necessarily also going to be messing
6 with your TMR and one of skill in the art was aware of that relationship and
7 that was a lever that they knew they could turn and remember, the whole
8 point of Bowen is Bowen was trying to achieve the theoretical TMR values
9 that Butler and others had predicted. He was trying to show an experiment
10 so he was trying to do TMR, he found this lower barrier height that was
11 lower than was predicted and he said, this looks like it might be due to
12 stoichiometric and homogeneities and I had that exact passage on our Slide
13 10 and that's not disputed.

14 JUDGE HAMANN: Counsel?

15 MS. ARMOND: Yes, Your Honor.

16 JUDGE HAMANN: This is Judge Hamann. And I certainly am
17 following an aspect of this, and I'm just trying to understand, I guess the rest
18 of it. I just want to understand the relationship between oxygen defects and
19 barrier height and TMR. And what this relationship is, you know, that
20 obviously it's one thing, but there is a relationship between those two. That
21 aspect of it I understand from the Petitioner's reply.

22 The density of states and all this other stuff, I don't understand why
23 that argument is necessary or defensive in the case-in-chief for us to look at
24 when we look at the Petitioner whether they've met it's burden on the papers.
25 How that's coming into the mix. I guess for the higher level, I'm trying to
26 understand why we need to turn to density of states beyond just that initial

1 relationship that we just talked about, which again is just defects, barrier
2 height, and TMR.

3 MS. ARMOND: I mean, this case can be decided on many levels.
4 You know, the reason -- okay, so we have a motivation to combine that is in
5 the petition that we've just been talking about at 34 to 35 that is undisputedly
6 true. It was true when we wrote it. It's still true today. There's no dispute
7 between the experts, and that's why we were talking about Dr. Ross's
8 paragraph 11, okay?

9 So the reason that we're bringing this all up is remember Patent Owner
10 is trying to challenge this prima facie obviousness case that we put forward
11 in our petition, and they're saying no one would have ever thought there was
12 this relationship, and that is demonstrably incorrect. It's, you know, Bowen
13 refutes it, Soukup refutes it, and now both of the experts have acknowledged
14 that, yes, there is a relationship. So it's -- so this is why we're talking about
15 all this. There's no dispute between the experts to decide.

16 JUDGE HAMANN: Let me, Counsel, let me ask you this one then.
17 Would it be fair to say that no discussion about density of states relates to
18 evaluating Dr. Ross's testimony rather than the Petitioner's case-in-chief?

19 MS. ARMOND: Yes. It goes to the extent Dr. Ross has opined at
20 certain stages of this case that there is no relationship, which she did make
21 that opinion. She has now contradicted herself and so her testimony on that
22 point is not credible. So the density of states comes from that. It's from,
23 they had expert testimony saying there is no relationship to support this
24 attack on the motivation, and she has walked away from it.

25 And it wasn't just a mistake. Like, Giordano also shows exactly what
26 she testified about, that again, when you change the vacancy defects, you're

1 going to mess with Fermi energy and density of states. So Giordano also
2 shows that she's wrong. So, density of states, Giordano, it really truly just
3 goes to her credibility, to Dr. Ross's credibility about this point.

4 JUDGE HAMANN: Thank you.

5 MS. ARMOND: Okay.

6 JUDGE ARBES: Counsel, just to go back to pages 34 and 35 of the
7 petition again.

8 MS. ARMOND: Yes.

9 JUDGE ARBES: You appear to be arguing now that that was arguing
10 just the relationship between barrier height and TMR. But again, the one
11 sentence in the middle of page 34 that said what you believed and what Dr.
12 Bokor believed to be that relationship, that when you lower barrier height, it
13 would increase TMR. The deposition testimony appeared to be to the
14 contrary, that it's 50-50 or perhaps unchanged. That that relationship was
15 not accurate. Am I reading that deposition testimony wrong?

16 MS. ARMOND: So if you look at this sentence, the sentence says --
17 it doesn't say that you're going to have a guaranteed success, which of course
18 is not the law. It says, one of skill in the art looking to TMR of an MgO
19 barrier would have been motivated to explore lower barrier heights.

20 So they're going to, you know, like, this was something that
21 somebody would have thought to do, and that relationship was there.

22 JUDGE ARBES: I see your point about the sentence that uses the
23 word explore. What I'm concerned about is the sentence on page 34 that
24 appeared to set forth what you believe the relationship to be. And it's that
25 relationship that we addressed in the institution decision, and Patent Owner
26 responded to in their response.

1 MS. ARMOND: So are you talking about the sentence about TMR,
2 according to the equation for TMR, lowering the resistance, the barrier
3 height for parallel electrons would improve TMR?

4 JUDGE ARBES: Yes.

5 MS. ARMOND: Yeah. So, again, that is the TMR relationship,
6 which is undisputed. And that is the mathematical expression that it's about
7 the resistivity, which relates to those density of states. And again, this is
8 from Butler, and he explained it down two or three more sentences.

9 Butler and Mathon taught barriers would achieve higher TMRs
10 because of improved symmetry matching between the barrier and the
11 electrodes, which would facilitate the tunneling of the parallel electrodes
12 across the barrier compared to anti-parallel. All of this is -- this is what we
13 said and it's all still absolutely correct, and none of this is disputed.

14 JUDGE ARBES: Well, but then why did Dr. Bokor testify repeatedly
15 that there's a 50-50 chance that --

16 MS. ARMOND: Because they were asking him, like, what would
17 happen? How do you know? Would it be sure? And he's like, no one
18 knows. It's like quantum mechanics, but people knew about this relationship
19 and they'd want to try it. Like, they were asking questions about their legal
20 theory, which is that not only do we have to show the teachings, right?
21 Which they're not disputed, or the motivation, which is also not disputed, but
22 we have to like guarantee success here.

23 And so, in answering those questions, he's like, look, I don't know.
24 It's quantum mechanics. There's a lot of things going on here. You mess
25 with one thing, it might make something better. You mess with something
26 else, it might make it worse, right? But people knew about this relationship.

1 And in the gold rush to try to achieve higher TMR, people would have
2 explored this area and tried to see if lowering the barrier height would
3 improve TMR, which is the relationship that Soukup taught.

4 Bowen noted that his barrier height might be explored by introducing
5 these vacancies. Like, these were all concepts that were there. They're in
6 Butler. Like, all of these ideas were there. And we articulated that, and
7 there's been a lot of, you know, ink spilled trying to kind of challenge this
8 and try to pass doubt on it, but now all the experts agree. Like, there is a
9 relationship.

10 So, again, they have two arguments. Dr. Ross's testimony is not
11 credible based on her sur-reply declaration and her testimony. It can be
12 disregarded. Everyone's in agreement. That disposes of their first challenge
13 to the motivation, the undisputed motivation.

14 JUDGE ARBES: Can I ask about one particular piece of testimony?
15 Exhibit 2014, page 39. Patent Owner has cited that testimony from Dr.
16 Bowen, where he appeared to acknowledge that --

17 MS. ARMOND: I apologize. Give me the page number again.

18 JUDGE ARBES: Sure.

19 MS. ARMOND: You said 2014?

20 JUDGE ARBES: Page 39.

21 MS. ARMOND: Okay. Yes.

22 JUDGE ARBES: Patent Owner, I believe, has cited that testimony as
23 indicating that Dr. Bokor acknowledged that reducing the barrier height in
24 Bowen's magnesium oxide barrier layer could have left the TMR unchanged.
25 It says at line 18 that you could get the same TMR. Is that an

1 acknowledgment that TMR might not change at all? In which case there
2 would be no relationship.

3 MS. ARMOND: So he has -- so there was a lot of testimony about
4 this. And so what he explained, and I can give you some slides, is that when
5 you change the barrier height, there's going to be an impact on TMR, but it's
6 unclear exactly what the change is going to be or how significant it is. They
7 have cited testimony that claims that he conceded it could be zero.

8 Now, notice what he said here. He said, I think a person of ordinary
9 skill in the art would have barrier height, the TMR, to vary with barrier
10 height fairly strongly. So he's saying there's a strong relationship. He said it
11 could go up, it could be up, could go down, could go through zero. But he
12 doesn't say it is zero. And we cited in our reply brief his testimony where he
13 did not agree that it could be zero. He said there was a relationship. It might
14 be a small relationship in some circumstances, but there is a relationship. So
15 he did not testify to that.

16 JUDGE HAMANN: Counsel, this is Judge Hamann. And I don't
17 want to belabor this, but I think it's more important to make sure I
18 understand the sentence, and obviously I'm going to read the sentence on
19 page 34 of the petition. I wouldn't put in so much belaboring. Let's say read
20 the discussion. This is our discussion about it.

21 According to the equation for TMR, lowering your resistance, barrier
22 height, for parallel electrons RP would improve TMR. It seems like reading
23 that sentence and the sentence following on page 35, I'm about to explore, it
24 may be taken together. Should we read the sentence that is read about
25 lowering your resistance so we improve TMR and basically say sometimes?

1 MS. ARMOND: So the sentence about TMR which says, according
2 to the equation for TMR, lowering your resistance or the resistivity for
3 parallel electrons would improve TMR, that is just describing this
4 undisputed mathematical relationship between RP, the resistivity of the
5 parallel electrons, and TMR. It's not a prediction, it's not an expectation, it's
6 just the mathematical relationship. And that would help motivate a POSITA
7 to say, how can I get more of these parallel electrons across? What can I do
8 here? And obviously one solution is lowering the barrier height and
9 reducing the vacancies of that.

10 JUDGE HAMANN: Right. I guess my question, it seems like the
11 sentence should really say sometimes. I don't think we have a sentence that
12 should say always happens, right?

13 MS. ARMOND: Are you talking about, again, the TMR relationship?

14 JUDGE HAMANN: Yeah. Maybe I'm putting it between the two.
15 Yeah, TMR. Lowering the barrier height would always improve TMR or
16 sometimes improve TMR?

17 MS. ARMOND: So it's just trying to explain the mathematical
18 relationship between the RP and RAP. It's about the mathematical equation.
19 We're not trying to provide some sort of guarantee, and, of course, we don't
20 have to. We just have to show a reasonable expectation of success. So this
21 is not a statement of like one would know that this was going to happen. It's
22 just explaining the tunnel barrier height -- I'm sorry, the TMR equation,
23 which is $RAP \text{ minus } RP \text{ over } RP$. It's just explaining that basic math. And
24 the --

25 JUDGE HAMANN: Okay. Let me --

1 MS. ARMOND: -- equation is on page 6, if you need it, of our
2 petition. Yes.

3 JUDGE HAMANN: Okay, thank you. I just wanted to make sure I
4 understand. Let me just ask it this way.

5 MS. ARMOND: Okay.

6 JUDGE HAMANN: Does lowering the barrier height always
7 improve TMR?

8 MS. ARMOND: Again, it could go either way. So what we're really
9 talking about here is we're talking about the overall barrier height because
10 the barrier height is the barrier height for the whole thing. We're talking
11 about lowering resistance. Like, if you make it easier for the parallel
12 electrons to get across, you're going to improve the TMR, right? Like, that's
13 the magic of MgO is it blocks the anti-parallel or whatever.

14 So we're just talking about this relationship. We're not talking about
15 the overall barrier height, which, yes, it's a little confusing. The overall
16 barrier height for a particular MgO, it's a property of the MgO. We're just
17 talking here about the resistivity of getting that parallel electron across the
18 barrier as explained in the TMR equation, the mathematical equation.

19 So it's part of the motivation. It's not a promise. It's not demotivation.
20 But whatever you're still doing about this relationship, and that's what
21 everyone was trying to do is get the parallel across.

22 JUDGE HAMANN: I'm sorry, I may be missing something. But
23 from what I'm hearing, and I view reading this sentence in conjunction with
24 the explore sentence. It really suggests, this is I think Petitioner's argument,
25 that there is a relationship, and sometimes lowering the barrier height
26 improves TMR.

1 MS. ARMOND: Again, one of skill knew that there was a
2 relationship, and so they would have tried it. It might have worked, might
3 not have worked, as Dr. Bokor testified. But, yeah, this particular sentence,
4 we're talking about lowering the barrier that parallel electrons see, right?
5 Because, again, in an MgO, the parallel are seeing almost a zero barrier,
6 right? And then the anti-parallel are seeing like a very high barrier because
7 they're getting blocked out.

8 And so that's what this is talking about is just the TMR relationship.
9 It's not talking about the overall barrier height and the claims and the
10 relationship that we've just spent a lot of time discussing. It's just talking
11 about the barrier that the tunneling electron sees.

12 JUDGE HAMANN: Thank you.

13 MS. ARMOND: So, yes, it's very confusing. I'm, you know, I
14 appreciate the question.

15 JUDGE ARBES: Counsel, if I understand your position, again,
16 regarding this one sentence on page 34, that's basically just a restatement of
17 the equation from page 6. That's what you're saying?

18 MS. ARMOND: Yeah, it's just a restatement of the mathematical.
19 And it's part of, like, because one of skill in the art, of course, understood
20 this relationship and how to achieve higher TMR, like, that was part of the
21 motivation to get the higher TMR. It's not the motivation. The motivation is
22 we want to explore lower barrier heights to see if we can, you know,
23 increase the TMR because we know there will be some sort of effect. So it
24 supports the motivation. It's not the motivation. Does that make sense?

25 JUDGE ARBES: I think so. What I'm trying to figure out, it appears
26 then that you are arguing that the mere existence of TMR gives you a

1 motivation. Because there is this equation for calculating TMR, that that
2 automatically gives a motivation. Because there's a motivation to increase
3 it, and it exists, there's our motivation. Is that enough?

4 MS. ARMOND: That isn't our motivation. Our motivation, the
5 motivation is people wanted to obtain higher TMR which, of course, is
6 undisputed, right? So that is our overall motivation. But the reasonable
7 expectation of success, which is what we're really talking about here, is
8 because people knew about these relationships between barrier height and
9 TMR, and they would have, you know, tried to change and reduce the
10 barrier height to get these higher TMRs. So we're not really talking about
11 motivation. We're really talking about reasonable expectation of success.

12 JUDGE ARBES: Well, Patent Owner is arguing motivation, so I
13 think that's --

14 MS. ARMOND: The motivation is undisputed, but they're attacking
15 it to say that the TMR motivation, which they agree with. Sur-reply page 3,
16 they agree that that's a legitimate motivation. They're saying that there's no
17 connection between barrier height and TMR. And now, you know, all the
18 experts agree there's a lot of evidence that shows absolutely there is a
19 relationship. So that argument has fallen away.

20 JUDGE ARBES: I guess perhaps the dispute then is not increasing
21 TMR in the abstract, but the way in which you do it. And the petition
22 appeared to say that the way to do that was to lower the barrier height.

23 MS. ARMOND: We said, again -- so they're attacking kind of the
24 connection between barrier height and TMR. That's it, right? So they're
25 challenging that. And as we explained, bottom of 34, top of 35, one of skill
26 in the art, trying to increase it, is going to try. They're going to be motivated

1 to explore lower barrier heights to facilitate the tunneling of the parallel
2 electrons, right?

3 Okay. So there's one more argument that Patent Owner has
4 challenging this. Do we still have questions on this point about their
5 argument that supposedly there's no relationship between the two when
6 obviously there is?

7 Okay. So our second argument is they allege that a reference called
8 Slonczewski taught away from this relationship. Okay? But there is no
9 dispute at this point after our full trial that Slonczewski was a simple model
10 based on aluminum oxide barriers that was inapplicable to the much more
11 complex modeling you have for an MgO barrier where you have symmetries
12 which allow for tunneling of the parallel electrons and largely block the anti-
13 parallel electrons.

14 So if you look at the bottom of Patent Owner's sur-reply at page 10,
15 note 4, they concede that Al₂O₃ MTJs lack crystallographic symmetry and
16 coherent tunneling enhancement so they are not fully predictive of MgO
17 MTJs. Well, and that is of course completely true because we have Butler,
18 right?

19 So if you actually look at Butler, Butler described Slonczewski and
20 some of these other very simple models where they don't account for the
21 symmetries that you have in MgO because you have, as is shown in our
22 Slide 6, you know, aluminum oxide is amorphous. There is no crystalline
23 structure. And then you have magnesium oxide which has this very regular
24 cubic structure. So Butler says, and if you look at Butler which is Exhibit
25 1044.

1 JUDGE ARBES: Counsel, before we go to Butler, I'd like to drill
2 down on that point on this. Are you taking the position that the Slonczewski
3 model or the reference to Saito, that that is all irrelevant and a person of
4 ordinary skill in the art would not have considered that at all?

5 MS. ARMOND: Well, they obviously would have known about these
6 earlier models. They're in Butler, but they would not have considered them
7 predictive of what you're going to see in the magnesium oxide which has a
8 very different structure and has a very different mechanism for passing spin-
9 up and spin-down electrons through.

10 JUDGE ARBES: Let me ask you about that. On Exhibit 1105, which
11 is Dr. Bokor's reply declaration, in paragraph 27, where he does discuss
12 Slonczewski and describes it as an early attempt to model the behavior of
13 MTJs before the groundbreaking discoveries of Butler in 2001. So, why is it
14 irrelevant then? Why is Patent Owner -- why should we ignore what is
15 shown in that model?

16 MS. ARMOND: So Slonczewski is, again, very focused on
17 aluminum oxide. Of course, one of ordinary skill in the art would be
18 familiar with aluminum oxide and its properties. But they would know that
19 whatever relationship you're seeing between the barrier height and TMR is
20 not going to port over to MgO because with aluminum oxide, all of the
21 electrons are kind of passing through and there's not the blocking of the anti-
22 parallel bands, the strong blocking that you're seeing in MgO.

23 So the very simple models that were before Butler, which Butler
24 denigrates, which we can talk about, just would not have explained. I mean,
25 there could be a totally different relationship between this because, like, it's a

1 totally different structure and there's this very specific filtering effect that's
2 happening in addition to these very simple models. So that's why.

3 So if you look at Butler, he says, like, up front in the abstract, he says,
4 our results indicate that tunneling is much more interesting and complicated
5 than in the simple barrier model used previously. And then he concludes,
6 Butler, and I'm looking at Exhibit 1044 at page 7, he says, one of our
7 conclusions is that this approach is completely inadequate for understanding
8 tunneling. And he's talking about these previous simple theories.

9 And then, you know, we asked Dr. Ross about this and we pointed out
10 that the equation 9 in Butler that he denigrates, which is the simple model, is
11 actually Slonczewski's, and she does not deny it and taps out and does not
12 want to offer an opinion on it. Like, of course, Slonczewski is about these
13 Al₂O₃ and Butler taught there's a totally different model.

14 And so, when you're just looking at this mechanism for tunneling, one
15 of skill would not have taken the relationship between barrier height and
16 TMR from an, like, amorphous aluminum oxide barrier and said, this is
17 definitely what's going to happen in MgO. They would have wanted to
18 explore that.

19 So I want to point out that for the .1 to .85 claims, this is not the only
20 motivation that the petition offered. So we actually provided a second
21 motivation and --

22 JUDGE ARBES: Counsel, just to be clear, when you say this
23 motivation, can you be specific about what it is?

24 MS. ARMOND: Oh, I can. So if you look on our petition at page 35.

25 JUDGE ARBES: It's the explore sentence?

1 MS. ARMOND: No. There's another motivation, but this is for the
2 wider range, the .1 to .85 claims. So if you look on page 35 of our petition,
3 we have another second motivation for the wider range, and we say that the
4 claim tunnel barrier height range of .1 to .85 eV also would have been
5 obvious because it's just slightly below the .9 electron volts taught by Bowen
6 and others. Do you see that on page 35?

7 JUDGE ARBES: Yes.

8 MS. ARMOND: So we have the second basis for showing
9 unpatentability of this wider range. And IP Bridge doesn't really seriously
10 respond to this.

11 JUDGE ARBES: I guess, Counsel, why is that a motivation? Why is
12 that a motivation to go lower? The fact that it is close -- although it may be
13 exponential, right? The fact that it's close, .85 to .9, why is that a motivation
14 to go lower?

15 MS. ARMOND: Well, because again, we have this relationship that
16 we know about, but when you have the prior art that's right on this claimed
17 range and there's nothing that's been shown about this value that is surprising
18 at all. Like, of course people would have wanted to try. And also, you
19 know, Soukup actually shows values for the barrier height right in this range,
20 and they don't have a response to that at all. So regardless of what you think
21 of the first one, which is undisputed, like there's no reason that these broader
22 range claims should stand.

23 So my only last point that I would like to raise unless of course you
24 have questions is there's been some discussion of secondary considerations.
25 And this was actually kind of their lead argument in the response brief. But
26 of course, IP Bridge was using basically the same exact evidence from the

1 CoFeB patents that we just talked about, which obviously shows there's not
2 a lot of nexus there.

3 So now we have on reply that IPB has basically largely abandoned
4 this argument on secondary considerations and they're now down to three
5 exhibits. And I've put those on our Slide 19. But it's basically Exhibit 2022,
6 Exhibit 2024 and Exhibit 2029. And Exhibit 2024 and 2029 have nothing to
7 do with barrier height.

8 But if you go to my Slide 18, which is our last slide, they claim that
9 Exhibit 2022, which is an article, supports a nexus between the patent and
10 the barrier height. But if you actually look at this passage, what it says is
11 that the authors are talking about Butler and Mathon and their modeling of a
12 high TMR ratio for MgO. And they say, with this coherent tunneling
13 mechanism, the effective barrier height could be smaller than the case of
14 non-coherent tunneling, which makes a TMR sensor with low resistance and
15 high MR ratio possible.

16 So two problems with this for Patent Owner. One is they're not
17 talking about Yuasa, because he's further down. They're talking about
18 Butler, who provides the motivation. And even if you credit this, this again
19 just undermines this argument that there's no relationship between barrier
20 height and TMR because it shows that people of ordinary skill in the art
21 appreciated the relationship between barrier height and TMR. So this does
22 not help them at all. And if you have more questions, I'm happy to answer
23 them. Otherwise, I will pass the baton to Ms. Arnold to do the motions.

24 JUDGE ARBES: Can I ask first about Exhibit 2017, which is a Yuasa
25 Nature article that the Patent Owner cites, which does disclose a range of .37
26 to .40 and then a specific value of .39 that according to the Patent Owner

1 was cited 4,100 times and that the praise is tied to what was disclosed there.
2 What's your response to that?

3 MS. ARMOND: Again, when they point to all of his awards in this,
4 which again they've abandoned, they're not still pressing them in reply.
5 They're all about -- they have nothing to do with barrier height. They're just
6 about the TMR result that he got ultimately. So they have to show nexus --

7 JUDGE ARBES: From that barrier height though.

8 MS. ARMOND: What?

9 JUDGE ARBES: From that barrier height though.

10 MS. ARMOND: But again, people are praising the result, not the
11 mechanism. They have to show -- and again, it doesn't pertain -- these
12 claims don't recite TMR. They're only about the barrier height. And
13 remember, they've conceded that every other limitation in the claims is
14 unpatentable because they disclaimed them. We're just talking about this.
15 There's no TMR in the claims. Like, there is no nexus. They need to put
16 that together, and they haven't.

17 JUDGE ARBES: So, in your view, to constitute industry praise, that
18 article or award or whatever that praise is would have to specifically itself
19 mention the range?

20 MS. ARMOND: No, but it has to connect somehow to an alleged
21 insight about barrier height, right? And now, look, Soukup showed values in
22 the range. It's in the prior art. You're not allowed to show a nexus between
23 things that are already in the prior art at all. But, you know, if you look at
24 his awards and articles, it's all about the TMR result. They're not tying it to
25 the barrier height. Do you have anything else for me or should we talk about
26 motions?

1 MS. ARNOLD: Good afternoon, Your Honors. Monica Arnold for
2 Petitioner. At first, I'd like to start with Patent Owner's motion to strike and
3 our opposition. Petitioner's motion to strike should be denied -- excuse me,
4 strike that. Patent Owner's motion to strike should be denied. Patent Owner
5 is asking the Board to strike testimony that it itself elicited. During his first
6 deposition, Dr. Bokor was asked about his opinion that to increase TMR of
7 an MgO barrier, skilled artisans would have been motivated to explore lower
8 barrier height to facilitate tunneling of parallel electrons, and he answered
9 the question.

10 Patent Owner elicited his testimony, but did not object to his answers
11 during his deposition. Neither did it include its deposition testimony and its
12 original request to the Board to have certain arguments struck. Patent
13 Owner's motion to strike Dr. Bokor's testimony can be denied for this reason
14 alone.

15 In addition, in Dr. Bokor's reply declaration, he relied on the fact that
16 the Board relied on Butler's Figures 3 and 4 to explain the relationship
17 between barrier height and TMR. He did this specifically in response to Dr.
18 Ross opining in her declaration, Exhibit 2053, that Butler's model predicts
19 nothing about the effect of lowering barrier height on TMR, nor could it.

20 Dr. Bokor is entitled to respond to Dr. Ross's opinions, and this is
21 proper rebuttal. Neither can Patent Owner show any prejudice as Dr. Ross
22 responded to Dr. Bokor's opinions in her sur-reply declaration. And I'm
23 happy to take any questions on this motion.

24 JUDGE HAMANN: This is Judge Hamann. I'm just trying to ---
25 there's a couple of arguments. I've got a question about the arguments. You
26 know, obviously, we have a motion to strike here as to the arguments in the

1 reply. You know, obviously, motions to strike for new arguments in reply
2 still aren't always made, but does it mean that, you know, that we don't
3 decide often. During the hearing, a lot of times people identify things as
4 new arguments, and we can judge that even without a motion to strike.

5 So I guess the aspect of the timing of some of that, you know, whether
6 or not the deposition testimony should be struck or not, you know, things
7 like that, I don't understand how that would change that underlying,
8 fundamental approach that we have to whether or not a reply argument is
9 new.

10 MS. ARNOLD: I'm not sure that I understand your question.

11 JUDGE HAMANN: Let me put it this way. The Petitioner in no way
12 is arguing that the timing and the mechanism of the motion to strike should
13 influence whether or not a reply argument is new in our view. In other
14 words, obviously, we have a motion to strike, so we look at the arguments
15 and, you know, it provides I think a more fulsome record. But often, when
16 looking at whether a reply argument or a sur-reply argument is new, you
17 know, there is a motion to strike. We just do it on the papers.

18 And sometimes, people make an argument, like today, during the
19 hearing, or whatnot, or sometimes they just raise it as new. And often, you
20 know, we can evaluate ourselves whether something is new or not. So I just
21 wanted to make sure I understand. Petitioner's not in any way arguing that
22 anything about timing or anything else relates to whether we should
23 appropriately consider whether the reply arguments are new or not. Is
24 Petitioner?

25 MS. ARNOLD: As regards to the reply arguments themselves, no.
26 But as to the reply arguments as they -- insofar as the reply arguments rely

1 on Dr. Bokor's testimony that is subject to its motion, it shouldn't be struck,
2 because that deposition testimony was never properly objected to in the first
3 place.

4 One, number one, but number two, substantively it wasn't a new
5 argument, it wasn't a new theory, as Ms. Armond explained. And I won't
6 repeat everything that was just said, but Dr. Bokor had his opinion in his
7 original declaration about the motivation, a skilled artist's motivation to
8 explore higher TMR, and the facilitating tunneling of parallel electrons. He
9 was asked about that opinion during his deposition, and then he discussed
10 what a skilled artisan would potentially expect.

11 And that's where the whole uncertainty arguments come in. That
12 didn't change his original opinion. He was answering the questions about
13 his opinion on his motivation -- a skilled artisan's motivation to do this in the
14 first place. So, insofar as any reply arguments rely on that testimony, it
15 shouldn't be struck either. They're not -- one, they're not new, and two, the
16 deposition testimony that we rely on wasn't properly objected to in the first
17 place.

18 JUDGE HAMANN: I understand Petitioner's position as to that. Let
19 me just also clarify something. Obviously, we've talked and looked at the
20 sentence, I think it was page 35, about exploring, or exploring lower barrier
21 heights, and obviously it's in y'all's opposition here in this motion. I'm not
22 sure I've heard the correct phrase today, and I may have, but it seems like
23 this has been suggested as an obvious to try argument. Anyways, what's
24 been here to explore. Is that a fair characterization?

25 MS. ARNOLD: We weren't arguing an obvious to try argument. It
26 was -- the motivation to explore is the motivation. Ms. Armond spoke about

1 the separate obviousness argument related to Bowen. This argument related
2 to a skilled artisan's motivation to explore lowering tunnel barrier heights to
3 facilitate tunneling of parallel electrons is not about an obvious to try
4 argument. It is just the motivation. What a skilled artisan's motivation
5 would be.

6 JUDGE HAMANN: Thank you.

7 MS. ARNOLD: Okay. Are there any other questions, Your Honors?
8 Okay. So quickly, to the motion exclude, Patent Owner's motion to exclude.
9 Patent Owner's motion to exclude should also be denied. Patent Owner's
10 motion is really just a vehicle for it to challenge the sufficiency of the
11 evidence, which is improper, and can be denied for this reason.

12 Patent Owner hasn't shown that it's entitled to having Dr. Bokor's
13 written testimony excluded, and it does not directly address why his
14 testimony should not go to wait. Neither does IP Bridge -- excuse me,
15 Patent Owner directly challenge Dr. Bokor's qualifications. There's no
16 challenge to him not being a POSA.

17 IP Bridge's challenge to Dr. Bokor's methodology is, in fact, a
18 criticism of his use of Butler's Figures 3 and 4, the fact that he didn't repeat
19 Butler's calculations, and his deposition testimony in response to granular
20 questions about Butler and other prior art that were outside the scope of his
21 declaration.

22 It all comes down to just a disagreement on what he opined on, and
23 disagreement is not a reason to exclude evidence. So I can take questions on
24 this as well. Okay. Thank you, Your Honor. We'd like to reserve the rest of
25 our time if there's no questions.

1 JUDGE ARBES: Thank you, Counsel. Patent Owner, you may
2 proceed. Would you like to reserve time for rebuttal?

3 MR. GIUNTA: Twenty minutes please, Your Honor. All right.
4 Thank you, Your Honors. Starting on Slide 2, challenge claims cite a
5 magnetoresistive device with a tunnel layer that has to both be comprised
6 MgO and have a barrier height within one of two claimed ranges. It's that
7 combination of elements that must be proven obvious. Petitioner's Slide 7,
8 they didn't cover it, but on it, it says that the barrier height limitation in
9 isolation is obvious. That ignores section 103 of the patent statute, which
10 makes clear that it's the claim as a whole that Petitioner bears the burden to
11 show obvious.

12 Slide 7 is an exercise in obfuscation. They want you to believe that
13 the only thing meaningful in the claims is the barrier height limitation, and
14 it's not new. The barrier height is not an off-the-shelf component that one
15 can simply plug in or change. We'll look at the evidence, which will show
16 that it's undisputed that barrier height depends on the electrode material and
17 the barrier material.

18 So Petitioner's showing on its Slide 7 that devices with aluminum
19 oxide barriers had barrier heights close to or within the claimed range is
20 irrelevant. Our Slide 3 shows that every magnetoresistive device in the
21 record that has an MgO barrier layer had a barrier height above the claimed
22 ranges.

23 Petitioner's citation to Kishi on their Slide 7 is also irrelevant. Kishi is
24 not the basis of either of Petitioner's grounds, and it's not even in the record.
25 If Petitioner wanted to challenge the '909 claims as unpatentable over Kishi
26 or anything else on Slide 7, we would have defended that challenge because

1 we looked at Kishi and we don't think it discloses an MgO barrier layer
2 within the claim.

3 What matters in this case is whether Petitioner carried its burden to
4 prove any claim unpatentable based on the grounds in the petition. Now,
5 their slide didn't produce a single page of the petition. Frankly, we think
6 they want Your Honors to look anywhere else other than the petition
7 because the petition's grounds are facially deficient.

8 So we're going to ask you to look at the petition and the arguments
9 Petitioner made. We're also going to show you some of the overwhelming
10 evidence that Dr. Yuasa proceeded against the teachings of the art by
11 introducing defects into the MgO barrier layer to lower the barrier height
12 and the resistance. And despite that, he achieved high TMR results that
13 surprised the industry. Petitioner's assertion now, two decades later, that the
14 approach he took was obvious is baseless and it's refuted by
15 contemporaneous evidence.

16 So let's look at our Slide 4. They could not find a prior art reference
17 that discloses a magnetoresistive device with an MgO barrier layer and a
18 barrier height within either claim range. The only reference that the grounds
19 rely on to reportedly teach a barrier height within either range is Soukup, but
20 Soukup is not a magnetoresistive device. The grounds fail for a host of
21 independent reasons that we list on Slide 5. I hope that I can get through
22 most of these today, and I also plan to address the motions.

23 So the first issue I'll address is Petitioner's failure to establish a
24 motivation to combine. As shown on Slide 6, the law requires that to
25 demonstrate any claim obvious, they need to demonstrate a reason why
26 POSA would have modified Bowen and Nagahama to use Soukup's alleged

1 barrier height of .33. Your Honors noted that that's the law in the institution
2 decision. Turning to Slide 7, the petition presents a lot of evidence and
3 argument to establish that POSAs were motivated to increase TMR. We
4 don't dispute that.

5 In terms of why POSAs motivated to increase TMR allegedly would
6 have lowered the barrier height, they offered a single reason shown on Slide
7 7. Your Honors were looking at this statement with Petitioners. Petitioners
8 alleged that according to the equation for TMR, lowering the resistance for
9 parallel electrons would improve TMR, and it's undisputed that by improve
10 they mean increase. The petition's assertion that a POSA would have
11 expected lowering the barrier height to increase TMR is unsupported by any
12 evidence, and it's refuted by both experts.

13 If we look at Slide 8. Petitioner's counsel said over and over again
14 that they were just stating the TMR equation, but it's not true. What the
15 petition said is wrong, and it's demonstrably wrong by looking at the
16 equation. TMR would only increase if the resistance R_P were lowered by a
17 proportionally greater amount than the resistance R_{AP} . The petition never
18 alleged that lowering the barrier height would lower R_P by a proportionally
19 greater amount than R_{AP} .

20 Turning to Slide 10, at institution, as Judge Arbes noted, Your Honors
21 recognized that the Petitioner's contention was that lowering the barrier
22 height would increase TMR. Your Honors cited two pieces of evidence that
23 we highlighted upper right on Slide 10 that you found might support that
24 assertion. It's now undisputed that neither does.

25 Turning to Slide 11, it appears to us that Your Honors believe that in
26 paragraph 169, Dr. Bokor must have meant that lowering the barrier height

1 would lower RP by a proportionally greater amount than RAP, because that's
2 the only way his testimony would have supported the petition's argument.

3 As shown on Slide 11, Dr. Bokor admitted he didn't say that in
4 paragraph 169. Indeed, as shown on Slide 12, he said over and over again
5 that a POSA would not have known what impact lowering the barrier height
6 would have had on TMR. And as Judge Arbes noted, he even said it might
7 stay the same. He said that twice. Exhibit 2014, 39, 16 to 19, and also
8 Exhibit 2014, page 40 line 12. He said --

9 JUDGE HAMANN: Counsel?

10 MR. GIUNTA: Yes, Your Honor.

11 JUDGE HAMANN: This is Judge Hamann. I'm just kind of
12 uncertain I'm following this. Obviously, some of this goes to the earlier
13 question to Petitioner. Is it Patent Owner's position that changing the barrier
14 height has no impact on TMR ever?

15 MR. GIUNTA: Are you asking me today or what a POSA's
16 expectation was at the time?

17 JUDGE HAMANN: Let me put a better question then. Is it Patent
18 Owner's position that there's nothing in the record to support at least the
19 aspect of the Petitioner's argument that changing the barrier height could
20 impact TMR?

21 MR. GIUNTA: We think that -- well, we think they cited a POSA
22 would have expected it to increase. No evidence supports that. All the
23 evidence refutes it. We think there is evidence of what would happen to
24 TMR with barrier height, and then it would go down and do exactly the
25 opposite of what they were alleging that people would do. We'll get to it,
26 Your Honor, but there is substantial evidence that with aluminum oxide

1 barriers, the lower the TMR -- sorry, at lower barrier heights, TMR
2 decreased.

3 And Dr. Ross testified unequivocally that POSAs would have
4 expected that relationship to hold for MgO barrier layers, and she cites a lot
5 of corroborating evidence. And what they have is Dr. Bokor saying he has
6 no idea what would have happened.

7 JUDGE HAMANN: So Patent Owner has taken the position, just
8 making sure I understand, that exploring the barrier heights at best would
9 lead to a lower TMR. Is that a fair position?

10 MR. GIUNTA: Both, yes. The evidence, and we'll go to it, but there
11 is -- we believe Dr. Yuasa went against the grain. A POSA would have
12 thought that lowering the barrier height would have had the opposite effect,
13 decreased TMR.

14 And also the technique that they're using, the approach, the way
15 they're saying you would reduce barrier height is by introducing defects,
16 there's a ton of evidence that nobody would have done that because
17 everybody in the MgO art was trying to do the opposite and eliminate
18 defects to get increased TMR, and it is undisputed that defects would cause
19 scattering that would decrease TMR.

20 JUDGE HAMANN: Thank you.

21 MR. GIUNTA: Thank you, Your Honors. Okay. So Slide 14 shows
22 the other evidence Your Honor cited, and that's this Moodera paper. So the
23 POR at pages 37 to 43, we demonstrated that Moodera predicted the exact
24 opposite of what the Petitioner alleged, because Moodera taught that
25 lowering the barrier height would decrease, not increase TMR. Petitioner's
26 reply doesn't dispute this.

1 In fact, on Slide 14, in its reply, they changed their tune on Moodera
2 entirely. They say it's insufficient to predict the impact on TMR for an MTJ
3 with an MgO barrier, because Moodera's MTJ had an aluminum oxide
4 barrier.

5 As shown upper left on Slide 14, Moodera was one of only four
6 exhibits the petition cited to support its assertion that lowering the barrier
7 height for an MgO MTJ would increase TMR. After we proved that
8 Moodera teaches the opposite, they now say, Your Honor should ignore
9 Moodera's teachings about the relationship between TMR and barrier height
10 entirely. You should do no such thing. As shown upper left --

11 JUDGE ARBES: Counsel, it appears that Petitioner lumps Moodera
12 in with a number of other references as pertaining to the Slonczewski model.
13 Do you agree that that's at least what Moodera discusses? We can discuss
14 those together, or --

15 MR. GIUNTA: Sorry. I don't recall exactly what his model is, but it
16 is true that we have a number of references. There's Moodera, there's
17 Slonczewski, there's Saito. A number of them have models. What I plan to
18 talk about today is Saito specifically, because Saito has more than a model.
19 Saito tested devices, and we have it on the slide. We'll show you the TMR
20 curve and that TMR decreased at lower barrier heights.

21 JUDGE ARBES: Okay. But those all used the -- I recognize that
22 Saito was actual devices, but they all at least mention the Slonczewski
23 model, right?

24 MR. GIUNTA: Yeah.

25 JUDGE ARBES: Okay.

1 MR. GIUNTA: Yeah, and we'll get to it. There's some question. We
2 don't disagree that what Butler contributed with his theory of MgO is that
3 MgO is different than aluminum oxide, and there's going to be some
4 different things that happen that will impact TMR. We don't dispute that,
5 but what we do dispute is that a POSA would have thrown away everything
6 they ever knew about the impact of things, and we'll get to it, because they
7 said the exact opposite to Your Honors in the cases that were argued this
8 morning. It didn't come up in the hearing, but we have it on the slide. We'll
9 show you.

10 Okay. So it's undisputed. There is no evidence the petition cited to
11 support its motivation to lower the barrier height, which is to increase TMR.
12 If Your Honors agree with us that their motivation was to increase TMR,
13 these grounds fail. And I honestly -- there were questions around -- they're
14 saying, well our motivation was just to have high TMR. We weren't saying
15 that a POSA expected a lower barrier height to increase TMR. Your Honors
16 can read what they wrote just as easily as we.

17 They made a statement that was technically wrong based on the TMR
18 equation. They certainly said that the goal was to increase TMR. And when
19 asked, well is it an obvious to try argument? Because if you want to be -- if
20 you want to give them some leeway and say, well okay, what they are
21 arguing is this might change TMR in a way that somebody has no idea. So
22 let's give it a try. They're saying it's not an obvious to try argument, so it's
23 not obvious to try.

24 And they have no evidence that it would have actually increased
25 TMR. So what is the motivation? They can't just say because everybody
26 wanted TMR, they get to, in hindsight, change anything they want in the

1 references and say, maybe this will increase TMR, so that's our motivation
2 to do it. But that's exactly what they've done.

3 JUDGE ARBES: So just to make sure I understand the parties'
4 positions, you don't dispute that there was an impetus in the art. You wanted
5 higher TMR, right? But to show a motivation, they have to say that a person
6 of ordinary skill in the art would have been motivated to do this to get higher
7 TMR.

8 MR. GIUNTA: Absolutely, Your Honor.

9 JUDGE ARBES: Okay.

10 MR. GIUNTA: Absolutely. And specifically what's the this? They
11 said introduce defects to lower the barrier height, because they said that
12 would increase TMR. And there's no evidence that that's true.

13 JUDGE ARBES: And perhaps the dispute between the parties then is
14 whether they said that the this is lowering the barrier height or exploring the
15 barrier height.

16 MR. GIUNTA: Well, that exploring statement, Your Honor, comes
17 later on page 35, right? And what it says is explore lower barrier height to
18 facilitate tunneling of parallel electrons. Okay? That's the same statement
19 they made about reducing the parallel resistance. We have evidence. I have
20 it on a slide somewhere, we'll get to it.

21 Conductance and resistance are inversely related. So asserting that
22 something would lower the resistance of parallel electrons or facilitate
23 tunneling of parallel electrons, it's the same statement just worded in the
24 inverse. So the statement they make about exploring this thing is they're
25 saying, if you get better conductance in the parallel state, that's going to
26 lower TMR. But it's not true. It would only be true if it were increased

1 proportionally relative to the conductance you get in the anti-parallel
2 resistance.

3 I'll give you an example. If you lowered the barrier height to zero,
4 there would be no tunneling. Current would flow in both states. You would
5 have increased the conductance in the parallel state, but your TMR would go
6 to zero because you would have also increased your conductance in the anti-
7 parallel state.

8 Okay. So on Slides 15 and 16, we just demonstrate that they made
9 exactly this -- all the arguments we've been looking at are for Claim 5. They
10 made the same -- they relied on those arguments for Claim 6, even though it
11 has a narrower range, and for all the other claims. So their entire case falls if
12 you agree with us that they didn't show the motivation that we've been
13 looking at for Claim 5.

14 Okay. Can we look at Slide 17? I want to address Counsel's
15 argument that -- they made this other argument about also would have been
16 obvious. She admitted they only made this for the broader claim, so this
17 argument doesn't help them for the narrower. Now, so they didn't cite any
18 authority supporting the assertion that finding prior art that's allegedly close
19 to the claim somehow proves it obvious.

20 On Slide 17, we show the POR where we cited the Federal Circuit's
21 Patel decision. Your Honors should look at it. If you have any questions,
22 the facts are really close. The Court made it clear that proximity to the
23 claims is not enough, and I'd like to explain why that's the law. So, as I
24 mentioned in my introduction, barrier height, this is not an off-the-shelf
25 component. A POSA just can't go out and pick a barrier height and say, I'm
26 going to use this in Bowen and Nagahama. It's a property of the Federal --

1 JUDGE HAMANN: Counsel?

2 MR. GIUNTA: Yes, Your Honor.

3 JUDGE HAMANN: I hate to interrupt. Does this *Patel* case relate to
4 ranges?

5 MR. GIUNTA: Well, it's not an overlapping range case. There was a
6 claim to a range, and then the prior art disclosed a range that was higher.
7 But the two values were really close. The top of one range was very, very
8 close to the bottom of the other range. And the challenger said, this shows
9 it's obvious. And the Federal Circuit said, just showing that you're close isn't
10 good enough.

11 JUDGE HAMANN: Okay. I knew that from the sentence -- just from
12 what I read. I couldn't tell if it was that, what they're referring to, being
13 close. It was a range you're close to as opposed to just generally limitations.

14 MR. GIUNTA: Yeah. Sorry, Your Honor. They are ranges. They
15 are ranges. It's a range of a weight percentage. And the claim range was 26
16 to 80, and the prior art taught .5 to 25. So there was just one percent
17 difference between the two. And the Petitioner, like these guys did, said,
18 well, that shows it's obvious. And the Federal Circuit said no.

19 JUDGE HAMANN: Thank you.

20 MR. GIUNTA: Yes, Your Honor. Okay. And the reason why that's
21 important, again, barrier height, they can't just take it off the shelf. If they
22 want to say there's a new barrier height in Bowen, they need to tell you how
23 a POSA would have done it. They need to explain how a POSA would have
24 changed Bowen to lower its barrier height and provide some supportable
25 reason why a POSA would have gone about changing Bowen's structure in
26 that way.

1 Slide 18 shows there also would have been obvious argument. So
2 they allege POSAs would have lowered Bowen's barrier height by
3 introducing oxygen defects. As for why, the only reason they say was to,
4 quote, improve TMR by lowering the barrier height, end quote. So this also
5 would have been obvious argument rest entirely on their unsupported
6 assertion, POSAs would have lowered the barrier height because they would
7 have expected it to increase TMR. And that fails for the reasons we've
8 talked about.

9 Turning to Slide 19. So in the institution decision, Your Honors cited
10 the *Titanium Metals* case. I'll just point out to Your Honors that the Patel
11 case that I just discussed expressly distinguishes *Titanium Metals*. If you
12 read both cases, I think you'll see that our facts are on all fours with Patel
13 and not *Titanium Metals*.

14 So in *Titanium Metals*, the claims are directed to an alloy with
15 specific percentages of different materials. And the Court said the claim was
16 prima facie obvious because the claim percentage was surrounded by the
17 prior art. There were two prior art references. One, the values -- they were
18 both really close. One, the values were just below the claim, and one, the
19 values were just above the claim.

20 And the Court said those proportions are so close that POSAs would
21 have expected these materials to have the same properties. Petitioner did not
22 make any kind of evidentiary showing that that's true here. No evidence
23 establishes that Bowen's device would have had the same properties if he
24 lowered its barrier height to .85 eV.

25 As shown on Slides 20 to 21, when we asked what the TMR would
26 be, if Bowen's barrier height were lowered to .85 EV, their expert, Dr.

1 Bokor, had no idea. The POR at 45 to 46 explained that POSAs would not
2 have considered this change to Bowen to be insignificant. We support it
3 with testimony from Dr. Ross, some of which is on Slide 22. She was
4 unequivocal that the difference between .85 and .9 is not slight in the context
5 of an MTJ. She explained that this would change the device's resistance area
6 by 68 percent.

7 Dr. Bokor filed a reply declaration. He didn't say anything about this.
8 So this testimony is undisputed. No evidence supports that changing
9 Bowen's barrier height to be within either claimed range would be an
10 insignificant change to Bowen.

11 Okay. So it's undisputed that if Your Honors agree that the petition's
12 motivation was that a POSA would have thought that lowering the barrier
13 height would increase TMR, no evidence supports it. We think Your
14 Honors should find that that's what their argument was, find that they didn't
15 support it, and find that both grounds fail. It's not a problem that they can
16 fix in reply.

17 The petition needed to establish a supportable reason to modify
18 Bowen and Nagahama to establish a prima facie case of obviousness. And
19 it's too late for Petitioner in reply to offer a new theory in an attempt to
20 establish a prima facie obvious. Unless Your Honors have questions on that,
21 I'll turn to the reply arguments.

22 All right. Slide 23. So the reply newly argues that Butler allegedly
23 provides data teaching that lowering the barrier height would change TMR
24 in some uncertain way. It might increase or undesirably decrease, and that
25 this is allegedly legally sufficient motivation to lower the barrier height in
26 Bowen and Nagahama.

1 Now, Counsel said when they were showing those DOS slides,
2 density of state slides, not that that's in the petition. She said, well this came
3 up in Ross's sur-reply declaration. It came up in Bowen -- in Bokor's
4 declaration because it was the basis of his sleight of hand in trying to come
5 up with a teaching in Butler. So these arguments are subject to our motion
6 to strike, which we believe should be granted because petition didn't make
7 these arguments.

8 Slide 24 shows you -- well, we don't dispute that the petition cited
9 Butler, but this is how they cited Butler in the petition. The petition said that
10 Butler and Mathon taught that MgO barriers would achieve high TMR due
11 to something called symmetry matching between the MgO barrier and the
12 electrodes. The Petitioner relied on Butler and Mathon in the same way, and
13 they only cited page 1 of each.

14 The reason I'm mentioning Mathon is you noted in reply they didn't
15 say in reply that Mathon teaches this barrier height TMR relationship. They
16 only said that Butler did. And I think it just reinforces that they're trying to
17 come up with a new argument based on Butler because this argument was
18 what the petition said. They should have been telling you that Mathon
19 taught this too.

20 So the petition makes no allegation that Butler says anything about
21 barrier height, let alone that Butler taught an uncertain relationship, which is
22 somehow legally sufficient motivation. Your Honors can look, the word
23 uncertain, you're not going to find it anywhere in the petition. If they made
24 this argument, they should be able to give you a pinpoint cite to where it is.
25 They can't do that because this uncertain argument and this legally sufficient
26 argument, they're not in the petition.

1 So turning to Slide 25, let's talk about the symmetry matching
2 teachings in Butler, which is what they pointed to. So conventional MTJs
3 had used barrier layers from aluminum oxide. Butler developed a really
4 complicated model and performed calculations predicting that an MTJ
5 formed with iron electrodes and an MgO barrier, all epitaxially grown with
6 the same crystalline structure, would produce a high TMR due to something
7 called coherent tunneling enhancement, which the parties sometimes call
8 symmetry matching.

9 The technology is complicated, but in simple terms, iron has
10 electrodes that occupy a particular state called a delta one state only when
11 the MTJ is at its parallel configuration. Symmetry between the crystalline
12 structures of the iron electrodes and the MgO facilitates these delta one
13 states tunneling through the barrier from one electrode to the other when the
14 device is in the parallel configuration. That increases TMR compared to an
15 aluminum oxide barrier, which is not crystalline and lacks symmetry
16 matching, so fewer of these delta one electrodes are able to tunnel through
17 an aluminum oxide barrier.

18 Butler's description of symmetry matching indisputably does not
19 describe a TMR barrier height relationship. As shown on Slide 26, we asked
20 their expert, where is this disclosure of a barrier height relationship? He
21 admitted it is not, quote, explicitly, end quote, described in Butler, and it is
22 not explored anywhere within the confines of Butler's paper.

23 Turning to Slide 27, another indicator that the reply argument is new
24 is that it relies entirely on new evidence. Slide 27 reproduces the portions of
25 our sur-reply and motion to strike, and highlights all the new evidence
26 Petitioner submitted, including new portions of Butler not cited in the

1 petition, a new Bokor reply declaration, and testimony he first introduced at
2 deposition.

3 Slide 29 shows some of our citations to the statute, the Board's rules,
4 and some Federal Circuit case law that prohibit petitioners from doing
5 exactly what Petitioner is trying to do here, which is change its argument in
6 reply after the petition's argument was shown deficient, and then suggest to
7 you that if you squint really hard, you can see some hint of a suggestion that
8 the petition made that argument all along.

9 In the petition, Petitioner needed to state its grounds with particularity,
10 provide a detailed explanation of its case, and identify specific portions of
11 Butler that purportedly support its case and explain the relevance of those
12 portions of Butler. That's Rule 104. Federal Circuit's --

13 JUDGE ARBES: Counsel, can you respond to Petitioner's argument
14 that Dr. Bokor's testimony about Butler was responsive to what Dr. Ross
15 asserted? In particular, she said that Butler's model predicts nothing about
16 the effect of lowering the barrier height on TMR, so it was responding to
17 that testimony.

18 MR. GIUNTA: I would say two things. I would say it's a ruse,
19 because they say that they're refuting -- she said Butler doesn't have a model
20 that has any data on any other structure than the one he built, and it's true.
21 They don't show you any data, and we'll get to what he did. All he did was
22 redraw a Fermi level on Butler's figures. He didn't point to data of a
23 different structure where the Fermi level was somewhere else. So, frankly, I
24 just think they're pretending that he was responding to what Ross said.

1 JUDGE ARBES: But that goes more to the merits. What I'm asking
2 is why it was improper to -- if Dr. Bokor disagreed with that statement by
3 Dr. Ross, why was it improper to explain why he disagreed?

4 MR. GIUNTA: I mean, it may be -- you may find that -- if you
5 believe he really did respond to Dr. Ross, which I don't agree is true, you
6 might find it's okay for them to submit some evidence so that if you
7 determine that their reply argument is not new, you can consider it. It is not
8 a license for them to come up with a new argument. They don't cite any
9 case or any rule that says if you have your expert say something in the POR,
10 that entitles them to make new prima facie obviousness arguments in reply,
11 right?

12 So, you could find that it was okay for him to submit a declaration
13 that said whatever he said, but that's different from saying it's okay for them
14 to come up with a new argument that establishes a different prima facie case
15 of obviousness. Okay. Did I answer your question, Your Honor?

16 JUDGE ARBES: Yes, thank you.

17 MR. GIUNTA: All right. So I want to talk about *Ariososa*. So the
18 Federal Circuit's *Ariososa* decision, which cites Rule 104, says that just
19 because they cited page 1 of Butler to support its assertion that MgO barriers
20 would increase TMR due to symmetry matching, that does not entitle them
21 in reply to cite different parts of Butler to make a materially distinct
22 contention that Butler taught an uncertain relationship between TMR and
23 barrier height, because that argument is nowhere in the petition.

24 Your Honors should hold them to their failed argument in petition and
25 find that both grounds fail. Unless Your Honors have questions, I'll turn to
26 why their reply arguments fail on the merits if you do consider it.

1 All right. Slide 30 lists multiple reasons why these reply arguments
2 fail, and let's take them in order. So as shown on Slide 31, the reply alleges
3 that Butler would have motivated a POSA seeking increased TMR to lower
4 the barrier height in Bowen and Nagahama, and that the mechanism a POSA
5 would have used was by introducing oxygen defects. The assertion that a
6 POSA seeking increased TMR would have introduced oxygen defects is
7 refuted by overwhelming evidence, cited in our papers shown on Slide 31
8 and by admissions from both experts.

9 So on Slide 32, Dr. Bokor admitted Butler and Mathon predicted high
10 TMR from perfect crystalline MgO layers, and Bowen and Nagahama were
11 following those teachings and were seeking to make their MgO layers
12 defect-free. Slide 33 shows testimony from Dr. Ross in which she cites
13 corroborating evidence showing that it was known that defects in the MgO
14 would decrease TMR.

15 On Slide 34, both experts agree POSAs would have expected defects
16 in the MgO layer would have caused scattering, which would decrease
17 TMR. Remember what we talked about with Butler in asymmetry matching,
18 is you have this perfect crystalline structure that is allowing these delta one
19 state electrons to flow. If you have defects in the crystalline structure, few
20 of those delta one state electrons are going to make it across, and that's going
21 to reduce TMR.

22 Slide 35 shows Petitioner's response to these undisputed facts.
23 Petitioner says MTJs were known to have some naturally occurring defects,
24 and they could still function despite them. But that does not refute that
25 Bowen and Nagahama were trying to eliminate defects as much as possible
26 to achieve high TMR. So POSAs never would have intentionally introduced

1 defects in the hopes of increasing TMR when it was known that defects had
2 the opposite effect, they were known to decrease TMR.

3 And here's where I will note, Dr. Yuasa went against these teachings.
4 He did the opposite. He intentionally introduced defects as explained in the
5 '909 Patent, for example, at column 9, lines 4 to 10, cited in the POR, at
6 page 19.

7 Okay. Slide 36 illustrates the Petitioner's only other response to this.
8 Petitioner incredibly says, we have not shown that oxygen defects were
9 known to be harmful. So that's demonstrably untrue. We already saw the
10 evidence on Slides 33 and 34, including admissions from Petitioner's own
11 expert, that defects cause scattering, which degrades TMR.

12 Petitioner then says, well, even if defects were harmful, the benefit of
13 introducing them outweighs the harm, so POSAs would have been motivated
14 to use them anyway. The sleight of hand here is extraordinary. The benefit,
15 they allege, from introducing defects is that it would lower the barrier
16 height, which would have an uncertain impact on TMR. But as the evidence
17 shown on Slides 33 to 34 shows, the harm from defects was that it was
18 known to decrease TMR.

19 So Petitioner alleges that POSAs who knew that defects would cause
20 scattering, which would decrease TMR, would have still introduced them,
21 because it might change TMR in some uncertain way POSAs could not have
22 predicted in the hope that this might overcome the degradation to TMR from
23 scattering and cause TMR to magically increase. That assertion is based on
24 nothing but hindsight. It fails to establish a motivation to add defects to
25 Bowen and Nagahama with a reasonable expectation that this would

1 increase TMR when Bowen and Nagahama were trying to do exactly the
2 opposite.

3 JUDGE ARBES: Counsel, can you give perhaps an explanation --
4 what is the universe of factors that can impact TMR? Can you give -- what
5 are the -- give some examples of what are the many things that could impact
6 TMR.

7 MR. GIUNTA: Dr. Wichman might be better than I at this. I mean,
8 one certainly is the symmetry matching. What Bowen added to the magic
9 sauce was the symmetry matching, and that certain electrodes will go across
10 better than others. Some of the teachings, though, in the art -- the teachings
11 away from lowering the barrier height, though, and we'll get to it, is whether
12 -- yeah, I'm going to talk about it right now. So could I do this, and then
13 we'll come back to it?

14 JUDGE ARBES: Sure. The reason I'm asking is you were discussing
15 there some factors that might decrease TMR, something else that might
16 increase it or decrease it and how those are all balanced.

17 MR. GIUNTA: Yeah. And to be clear, part of the -- and we'll get to
18 it when we get to the secondary considerations. The critical thing about this
19 invention in the '909 Patent was not just good TMR. It's like it was being
20 discussed this morning. Everybody wanted good TMR, but you needed
21 good TMR in a device that you could make and use. And so some of the
22 discussion this morning was about, well, how do you make something? The
23 contribution that Dr. Yuasa had here was that, like Butler's, he recognized
24 that the perfect crystalline MgO layers had a barrier height so that the
25 resistance would be really high. And it was a problem that those devices
26 wouldn't work in circuits.

1 And so what he did is he went about trying to figure out a way to
2 reduce the resistance so it could work in circuits while still achieving high
3 TMR. And that's what he did. That's the magic in this '909 invention.

4 So in terms of other things that will impact TMR, let's talk about what
5 the teachings in the art were about barrier height. Slide 37. There is a lot of
6 evidence that lowering the barrier height would decrease TMR for reasons
7 separate and apart from scattering. So Saito -- so, just take a look at that
8 chart, Your Honor, if you want to see why their case doesn't really hold.
9 That is a curve of TMR that shows barrier height on the x-axis. So if you
10 were at a barrier height of .9 in Bowen and you wanted to increase the TMR,
11 you're going to increase the barrier height. You're not going to lower it.

12 So Dr. Ross explained that POSAs seeking to increase TMR would
13 have never reduced the barrier height. And she cited multiple corroborating
14 references in addition to Saito. And the reason I put Saito on the slide is as I
15 mentioned to Judge Arbes earlier, Saito didn't just have a model. He tested
16 the data. And so the data that matters, the closest is the room temperature
17 data which are the circles.

18 And in particular, what's noteworthy about this is his model predicted
19 that this TMR would somehow spike back up at really low barrier heights.
20 But that's not what he saw in his data. So you can see those two data points
21 on the left below .3. When he actually made these devices, the TMR went
22 down. And we'll talk about it. And the reason is that at really low barrier
23 heights, other current sources come into play besides tunneling. And if
24 there's any current source that's not tunneling, it's going to reduce TMR.

25 JUDGE ARBES: And that was for an aluminum oxide barrier. But in
26 your view -- Dr. Ross's view, a person of ordinary skill in the art would have

1 considered that that would have -- thought that that would apply to MgO as
2 well?

3 MR. GIUNTA: Dr. Ross, and we'll get to it, she cited another
4 reference that said it. And we'll get to -- there's contemporaneous evidence
5 in the art showing that others expected that this relationship would hold, and
6 all they have is Dr. Bokor's say so two decades later, and he admitted he
7 wasn't practicing in this space at the time.

8 JUDGE MCSHANE: Counsel, on this one -- I'm sorry. On the graph
9 there, I think I heard this, but I just want to make sure. That line is the
10 theoretical model, the one with the sag in the middle, if you will, at around
11 .5.

12 MR. GIUNTA: Yes, Your Honor.

13 JUDGE MCSHANE: And the others are all just actual data. There is
14 no modeling -- there is no fit of any line to the actual data, right?

15 MR. GIUNTA: Well, I don't know about the conclusion. I mean, this
16 is the data and that's the curve. I don't recall whether they considered this to
17 fit particularly well or not. I mean, you will see a general relationship that in
18 the actual devices, TMR is at higher barrier heights than lower barrier
19 heights. So, to that extent, the model was correct.

20 JUDGE MCSHANE: I got you. Okay, thank you. The line is purely
21 theoretical, right?

22 MR. GIUNTA: Well, it was based on a model.

23 JUDGE MCSHANE: Yeah. Right.

24 MR. GIUNTA: Well, what's interesting is, I mean, so is Butler, right?
25 I mean, their whole case now is based on Butler. Butler was a theory.
26 Butler was a model. Butler didn't build anything. And so, a lot of -- you

1 know, this work was all going on in the really, really early stages of this
2 very, very complicated technology. So, in some ways, a lot of people -- the
3 leading research in the space was models.

4 JUDGE MCSHANE: Thank you.

5 MR. GIUNTA: Okay. So, again, all they have is Bokor saying a
6 POSA wouldn't have expected this to happen. They didn't cite any
7 corroborating evidence. So, let's contrast what we have on Slides 38 to 40.
8 So, we have contemporaneous evidence showing that POSAs did expect this
9 relationship, that lower barrier heights would yield lower TMR to apply to
10 MTJs or MgOs. So, that evidence includes Dr. Yuasa's 2004 article in
11 Nature Materials.

12 So, as shown on Slide 38, the article explained that Yuasa lowered the
13 barrier height to achieve a sufficiently low resistance to make an MTJ
14 suitable for applications and noted that the aluminum barriers -- noted that
15 with aluminum barriers, a lower barrier height had led to a lower TMR. He
16 then said it was surprising that he achieved a different result in a high TMR
17 despite a lower barrier height.

18 So in the POR, page 22, we cited evidence establishing that Nature
19 Materials is a prestigious peer-reviewed journal. This article has been cited
20 more than 4,000 times. So Petitioner's never disputed this. I suppose
21 they're going to get up and say, well, this is just Dr. Yuasa saying it. But as
22 Mr. Wichman said about one of these other papers, so the editors of Nature
23 Materials, one of the leading journals in the space, endorsed his results as
24 surprising and so did the peer reviewers.

25 And what's interesting in reading the cases again on our motion to
26 exclude, if you look at the *Daubert*, both the Supreme Court case and the

1 Ninth Circuit, they go on and on about the benefits of peer review for
2 determining whether things are reliable. So, respectfully, I think the fact this
3 paper has been cited 4,000 times, peer-reviewed in one of the leading
4 journals, it's pretty solid evidence that the contemporaneous reaction was
5 people expected the relationship that Saito saw to apply.

6 But there's even more than this. So, as shown on Slide 39, Dr. Ross
7 cited Exhibit 1053 to corroborate her testimony that, quote, a POSA had the
8 expectation that lowering the barrier height in MgO-based MTJs would
9 decrease TMR, as was the expectation for amorphous barriers such as
10 aluminum oxide, end quote.

11 Turning to Slide 40. Dr. Yuasa also won an award that praised his
12 work in developing an MTJ with a high TMR and reduced resistivity, which
13 was indispensable for increasing the density of storage products. Petitioner
14 showed you this on their Slide 17, but they misleadingly omit the part about
15 reduced resistivity. They want you to believe that the only thing that people
16 were praising Yuasa for here was a high TMR. But again, people like TMR,
17 but this specific award was talking about his reducing of resistivity.

18 So Petitioner says this lacks nexus to the claim because the word
19 doesn't talk about barrier height, but they never refute it. The evidence that
20 we have in the POR, pages 17 to 20, some of which we have on Slide 41,
21 showing that the way Dr. Yuasa reduced resistivity was by lowering the
22 barrier height. So there's a direct nexus between his introducing of defects
23 to lower the barrier height to get reduced resistivity, which he was praised
24 for in the industry.

25 So all this evidence that we just covered, Slides 31 to 41, it shows that
26 Yuasa went against the conventional teachings in the art, which taught that

1 lowering barrier height by introducing defects would have undesirably
2 decreased TMR.

3 On Slide 42, this is where we'll talk about what they said about
4 aluminum. So the reply argues that any of the evidence relating to
5 aluminum was insufficient to predict all performance of MgO. So we don't
6 dispute, again, that aluminum is not fully predictive of MgO.

7 In the POR, we acknowledge that aluminum lacks symmetry
8 matching, so they weren't fully predictive of MgO. But that doesn't mean
9 that POSAs would have expected that every teaching relating to aluminum
10 MTJs would have been inapplicable to MgO. They don't cite any prior art
11 reference that says that, and in the two cases that were argued this morning,
12 they told Your Honors the opposite.

13 So in those cases, Petitioner argued that aluminum MTJs were, quote,
14 not irrelevant to MTJs, MgO MTJs, and POSAs would not have discarded
15 all those teachings as being inapplicable to MgO MTJs. They have never
16 attempted to reconcile their arguments across these proceedings. The only
17 argument they made in this case for why POSAs would have ignored the
18 teachings in the art about lowering the barrier height was that those
19 teachings were based on aluminum.

20 That's insufficient to carry their burden because by their own
21 admission, POSAs would have considered some aluminum teachings
22 relevant to MgO, and Petitioner cites no evidence that these barrier height
23 teachings were not among the ones that POSAs would have considered to be
24 relevant. So unless Your Honors have questions, that's all I have for the
25 second reason why their argument based on Butler fails.

1 All right. Let me turn to the third reason on Slide 30 for why the new
2 reply argument fails, and that's because it's based on Bokor's unreliable
3 naked say so and testimony that's inadmissible. So starting on Slide 43,
4 Petitioner's reply argument is based on Bokor's assertion that Butler teaches
5 a relationship between barrier height and TMR. It's undisputed that Butler
6 is an extremely complicated reference, but you don't need to dive very
7 deeply into Butler to see that Bokor's opinion is unreliable.

8 Slide 43 has several admissions from Dr. Bokor. On the left, he
9 admitted, as I mentioned earlier, Butler does not explicitly describe a TMR-
10 barrier height relationship. Bottom right, he admitted he looked, but he
11 could not find any publication that has ever characterized Butler as having
12 this teaching, despite Butler being a famous paper that has been cited almost
13 3,000 times.

14 Moreover, if Butler taught a TMR-barrier height relationship, surely
15 Dr. Bokor would have been able to explain to Your Honors what that
16 relationship is. But as shown on Slide 44, Bokor admitted he had no idea.
17 He said it was equally likely that it might undesirably decrease or increase if
18 barrier height was lowered, and as I mentioned earlier, he also said it could
19 stay the same. Bokor's testimony that Butler teaches a relationship that
20 Butler never mentions, that Bokor cannot explain, and that no one has ever
21 seen in Butler, despite it being cited 3,000 times, is not credible.

22 Now, we recognize that the Board rarely excludes testimony, and in
23 most cases, you just give it no weight if it's unreliable. But if Your Honors
24 haven't read it, the Third Circuit decision in the *UGI Sunbury* case that we've
25 cited in our reply and the motion to exclude at one has a great explanation of
26 why the gatekeeping function of FRE 702 applies even to a bench trial.

1 Your Honors, you do not have discretion to give weight to things that are not
2 admissible under the Federal Rules of Evidence.

3 Now, if you grant our motion to strike his replied testimony, that
4 would moot our motion to exclude. But if you don't strike it, I'd like to
5 explain why it would be legal error to admit it, and that that error would only
6 be harmless if you don't give it any weight. Slides 45 to 46 show some
7 additional admissions from Bokor, revealing that he's not qualified to offer
8 the opinion he gave. Bokor admitted he did not have the expertise required
9 to understand Butler's details, and he said all he did was trust Butler's
10 bottom-line conclusions.

11 Bokor's opinion that Butler teaches a TMR-barrier height relationship
12 is not a bottom-line conclusion of Butler, because as we discussed on Slide
13 43, Bokor admitted Butler doesn't describe this relationship explicitly or
14 anywhere within the confines of Butler's paper.

15 But even if you find that Bokor has expertise that qualified him to
16 offer this testimony, as shown on Slide 47, that testimony is not admissible
17 unless Petitioner demonstrates that it is the product of a reliable application
18 of reliable principles and methods to the facts of this case. Bokor's opinion
19 is the furthest thing from that.

20 So there was an argument about burden here. Frankly, Petitioner has
21 it wrong. Federal Rule of Evidence 702 is explicit that the Petitioner, as the
22 proponent of the testimony, carries the burden to demonstrate to Your
23 Honors that it is admissible.

24 So, turning to Slide 48, let's look at whether the methodology Bokor
25 used is reliable. So he purports to base his testimony on Butler. Butler's
26 methodology for determining the TMR of an MTJ with an MgO barrier layer

1 required a reliable physical model, which Butler said was, quote, necessary,
2 end quote.

3 As explained in our sur-reply at 15 to 17, with extensive citation of
4 both experts, it is undisputed that Petitioner's combinations with oxygen
5 defects in the MgO layers are different physical structures than the one
6 Butler modeled. To understand what, if any, impact oxygen defects would
7 have been expected to have on TMR under Butler's teachings, a different
8 reliable physical model was necessary. Bokor didn't build such a model.

9 In testimony cited in our sur-reply at 15 to 17, and as shown on Slide
10 71, he admitted that such a model would be much more complicated than
11 Butler's model, and that it was well beyond Bokor's capabilities and those of
12 a POSA to make such a model. So, despite his testimony being purportedly
13 based on Butler, he didn't follow the reliable principles and methods that
14 Butler taught to require a reliable physical model.

15 Turning to Slides 49 to 50, let's look at the methodology that Bokor
16 applied instead. His testimony was based on moving the Fermi level in
17 Butler's figures. So, what are these figures? Butler built, again, an accurate
18 physical model for the iron-MgO iron structure, and he used it, he used that
19 model to calculate the density of states shown on Figures 3 to 4 and the
20 Fermi level, which is the black vertical line on the figures shown on Slide
21 50.

22 What Bokor did is he drew the red lines on Slide 50, and he said, well,
23 things would be different if the Fermi level was over here instead. But, of
24 course, the Fermi level is where Butler showed it, not where Bokor redrew
25 it. So this exercise is meaningless. As shown on Slide 49, even Bokor's
26 reply declaration admitted it's not as simple as that, and that Butler's

1 calculations would have had to have been repeated. But Bokor didn't do that
2 because, as shown on Slide 49, he admitted he couldn't repeat Butler's
3 calculations.

4 Dr. Bokor fabricated this methodology for finding a TMR-barrier
5 height relationship in Butler out of whole cloth. Petitioner cites no evidence
6 of anyone moving the Fermi level or density of states in figures, and then
7 suggesting that it provides any reliable indication of what changing the
8 barrier height impact might have on TMR.

9 And just briefly to explain why, Counsel says if you move the Fermi
10 level, you change the barrier height. But if you move the Fermi level, the
11 way they move the Fermi level is by changing the structure. If you change
12 the structure, you're going to have different density of states too. So it is a
13 completely artificial thing to say, well, the density of states are going to be
14 the same, but I'm going to move the Fermi level so it intersects the density of
15 states on these curves in a different place. That is why Dr. Ross said this is a
16 meaningless exercise.

17 And again, you don't have to take Dr. Ross's testimony. They needed
18 to show -- they needed to provide you some evidence that this was a reliable
19 methodology accepted in the art. And they submitted no evidence.

20 As shown upper left on Slide 52, so in *Daubert*, the Supreme Court
21 listed factors judges like yourselves should consider in determining whether
22 offered testimony is scientifically valid under FRE 702. Those factors
23 include whether this methodology has ever been tested, whether it has an
24 error rate so you can know how reliable it is, whether it's been peer-
25 reviewed, and whether it's gained widespread acceptance. So they don't
26 demonstrate that any of these factors are valid. Again, they don't cite a

1 single piece of evidence showing that anyone has ever applied this
2 methodology.

3 The Supreme Court noted that even approaches that have some
4 minimal support in the community should be viewed with skepticism. But
5 here, there's no evidence of any support in the community for Bokor's
6 approach. The only evidence Petitioner cites allegedly showing that Bokor's
7 approach is reliable is Bokor's naked say so. But as shown on Slide 52
8 under the law, that's not enough.

9 So Petitioner failed to carry its burden to demonstrate that Bokor's
10 opinion is a product of applying reliable principles and methods. It would
11 be legal error to admit it under FRE 702. And the only way, if you do admit
12 it, that that error would be harmless is if you give it no weight. Now, if you
13 don't give this testimony any weight, or you don't admit it, their entire reply
14 argument goes away because their entire new reply motivation to combine
15 argument hinges on this inadmissible testimony.

16 And so if we agree that the petition -- even if you want to let them
17 say, well, in the petition we said that changing the barrier height we're only
18 saying would have an uncertain impact on TMR, their only evidence of that
19 is this inadmissible reply testimony from Bokor.

20 All right. Turning to Slide 52, I want to talk a little bit about the legal
21 aspect of their theory. So even if you believed that they have proven to you
22 that there was an uncertain relationship between barrier height and TMR,
23 their assertion that that is legally sufficient motivation fails as a matter of
24 law.

25 So on Slide 52, they cited *KSR* and *Pfizer* for the proposition that
26 applying well-known strategies may be obvious. This is the furthest thing

1 from a well-known strategy as we've just discussed. It's something Bokor
2 made up. Neither *KSR* or *Pfizer* supports their legally sufficient motivation
3 theory because they don't cite any evidence that lowering the barrier height
4 by introducing defects was a known strategy to increase TMR.

5 As shown on Slide 55, in *Pfizer* a claim was shown obvious because
6 the prior art predicted the results. And *KSR* says when there are finite
7 number of predictable solutions that were already identified in the art,
8 choosing among them may be obvious. Those cases don't apply to our facts
9 because Bokor admitted POSAs could not have predicted whether lowering
10 the barrier height would have increased or undesirably decreased TMR. So
11 unless Your Honors have any questions on that, that's all I have on their
12 reply arguments based on Butler.

13 All right. Next I'd like to turn to Soukup because there are a lot of
14 problems with their reliance on Soukup. As shown on Slide 56, the petition
15 relied on Soukup's alleged barrier height of .33 to both motivate adoption of
16 that specific barrier height in Bowen and Nagahama and to purportedly teach
17 a reasonable expectation of success in achieving, quote, Soukup's barrier
18 height, end quote, of .33. So while Petitioner's reply relies on Butler to
19 purportedly motivate lowering the barrier height in Bowen and Nagahama,
20 Butler doesn't teach any specific barrier height value and Petitioner doesn't
21 allege otherwise.

22 The only prior art reference that their grounds rely on to allegedly
23 teach a barrier height with any other claim is Soukup. So Slide 57 lists the
24 problems with Soukup and I plan to walk through most of them. While we
25 believe Soukup is non-analogous art, we're going to rest on our papers on
26 that argument because even if Your Honors disagree and find that a POSA

1 would have considered Soukup, Soukup would not have motivated a POSA
2 to adopt a barrier height within either claimed range for a bunch of reasons.

3 So their theory is that POSAs seeking to increase barrier height --
4 sorry, increase TMR would have adopted Soukup's alleged barrier height.
5 It's undisputed that Soukup does not teach that any particular barrier height
6 would yield an increased TMR. In fact, Soukup is not a magnetoresistive
7 device. It doesn't even have a TMR. Okay?

8 So they're telling you based on Soukup and now Butler, somebody
9 would have chosen this particular barrier height of .33 because it would give
10 you a good TMR. Butler doesn't say anything about that barrier height value
11 and Soukup doesn't tell you that that barrier height would give you a good
12 TMR.

13 So Slide 57 shows the reply. How did the Petitioner respond to this?
14 So they say Soukup not having a TMR is not a problem because POSAs still
15 could have learned from Soukup. But that begs the question what is it that
16 POSAs allegedly would have learned from Soukup that would have
17 motivated them to modify Bowen or Nagahama's MTJ?

18 So they don't dispute that Soukup's devices don't have a TMR. So
19 certainly, POSAs wouldn't have learned that any particular barrier height
20 would yield a high TMR. Petitioner says, well, that's not a problem for them
21 because the motivation to lower barrier height comes from Butler and
22 Mathon. But again, as we just discussed, neither Butler or Mathon mentions
23 any specific barrier height.

24 Petitioner cites no teaching in Soukup or any other prior art reference
25 that a barrier height within either claimed range was a desirable barrier

1 height for somebody seeking high TMR. Their assertion is based on nothing
2 but an attempt to reconstruct the claims in hindsight.

3 Second reason why their reliance on Soukup fails is because it's
4 undisputed that Soukup taught that thermionic emissions were the dominant
5 current flow mechanism for his devices with alleged barrier heights within
6 the claimed range. And it's undisputed that POSAs would have avoided
7 lowering the barrier height to a value at which thermionic emissions
8 dominate because that would reduce TMR.

9 As shown on Slide 59, we made this point in our POR at 64 to 66 with
10 extensive citation to Dr. Ross and admissions from Bokor. Petitioner did not
11 dispute these facts in their reply or in Bokor's declaration. Again, Bokor
12 filed a reply declaration. If this was untrue, there was every opportunity to
13 refute it. He said nothing about this. So that's fatal to both grounds.

14 Looking at Slide 60, I just want to make a point that at the institution
15 stage, Your Honors preliminary found that Soukup wasn't really definitive
16 about whether Schottky emission was the dominant current flow mechanism
17 in these devices. Respectfully, that finding can't be maintained because as
18 you can see bottom right on Slide 60, Petitioners admitted that that's how a
19 POSA would have read Soukup. But you don't need to find that Soukup's
20 dominant mechanism was definitely Schottky to find that there are blinds
21 and Soukup fails.

22 The critical fact is not that the dominant mechanism was Schottky, but
23 rather that it was not told. And that point is undisputed. As shown on Slide
24 60, Dr. Ross was unequivocal about this. And again, Bokor filed a reply
25 declaration. He didn't talk about this. This is undisputed. So let's look at
26 Slide 61.

1 JUDGE ARBES: Counsel, just to make sure I understand, for one of
2 the devices in Soukup, there was a possibility of tunneling, but that had a
3 barrier height outside of the range, is that right?

4 MR. GIUNTA: Almost twice as high as the range, that's right. and
5 they didn't rely on that. They didn't rely on that. And we'll talk about it.
6 It's actually just additional evidence about why their argument fails. You
7 could read Soukup as saying well, if you make the barrier height really low,
8 some other mechanism is going to take over and be the dominant mechanism
9 and not tunneling, which is again, another teaching -- we would never do
10 that if we were trying to. Like, Soukup's not doing it because it doesn't
11 have a TMR, but you can look at Soukup's teaching and say, if you make the
12 barrier height really, really low, other tunneling mechanisms take over.
13 Sorry, other current flow mechanisms take over, not tunneling. And we'll
14 talk about it. Both experts agree, a POSA's not going to do that, because it's
15 going to destroy the TMR.

16 So, at Slide 61, both experts say, a POSA seeking to increase TMR
17 would have avoided lowering the barrier height from a value at which a
18 significant portion of a current flow is above any current source other than
19 the tunnel. So, the reason is explained in Dr. Ross's testimony here on Slide
20 61, on the left. In simple terms, high TMR occurs when there's a substantial
21 difference in the current flow or conductance, G , between the MTJ's parallel
22 and non-parallel states. Non-tunneling current sources are present all the
23 time. They're there in the parallel and non-parallel states. So, non-tunneling
24 counting sources dominate. They dilute the impact of the tunneling kind,
25 and thereby reduce the TMR. That's fatal to their reliance on any of
26 Soukup's alleged barrier height values in Table 1 that fall within the claim

1 range. Whether you consider the yellow highlighted values we have here or
2 the green ones, it doesn't matter. Soukup says, well these devices, whatever
3 the right barrier height is, non-tunneling current sources dominate, and a
4 POSA wouldn't use it, because it would destroy the TMR.

5 Okay, let's look at Petitioner's only response. So, in the reply at 25 to
6 26, they obfuscate -- they note Dr. Ross's explanation that it is unsurprising
7 that tunneling was not the dominate current flow mechanism in Soukup,
8 because Soukup's barrier layers are too thick to support tunneling. They
9 would have you believe that Dr. Ross said a thick barrier is required for
10 Schottky emission. So, Schottky emissions dominating a low barrier height
11 wasn't a concern to Bowen and Nagahama, because those barrier layers are
12 thin. But as we explained in the sur-reply, she never said that Schottky
13 emissions require a thicker barrier. That's pointed out. She was
14 unequivocal in Exhibit 2053, paragraphs 136 to 139, that based on Soukup's
15 teachings that non-tunneling current sources dominate at low barrier height,
16 along the barrier height, Bowen and Nagahama, to the value Soukup
17 discloses would have decreased TMR. And again, Bokor filed a reply
18 declaration, he didn't say anything about this. So, that's an independent
19 reason why their briefs failed. Do Your Honors have any questions about
20 that?

21 JUDGE ARBES: No. Counsel, just a reminder, because you're into
22 your rebuttal time.

23 MR. GIUNTA: Thank you, Your Honor. I'll just go through this
24 point. So, there's two other independent reasons why their grounds fail.
25 One of -- and they both rely on the uncertainty of Soukup's values. So, they
26 say that Soukup teaches a barrier height of .33, that's shown on Slide 62. In

1 denying institution in a later IPR, the Board found that they failed to show
2 that was the actual barrier height of any Soukup device, and there's no
3 reason for Your Honors to reach a different conclusion here.

4 Looking at Slide 63, the evidence is overwhelming that the Board got
5 it right in that case. Soukup's Table 1 shows that the .33 value was
6 determined using the Arrhenius plot method. Soukup's dissertation has
7 more detail, as shown top right on Slide 63. The dissertation is explicit that
8 the barrier height values increase the temperature. So the values determined
9 using the Arrhenius plot method were less than the real barrier values. As
10 shown in the two snippets bottom right on Slide 63. Soukup itself repeats
11 those same two critical facts. He said that if the barrier height increases with
12 temperature, the Arrhenius clause values will be smaller than the actual
13 barrier height. And he confirmed that the barrier height became higher and
14 higher temperature.

15 JUDGE ARBES: Counsel, just as a general matter, how are we to
16 deal with a situation like this that has a reference that discloses a particular
17 value, but that value later on is questioned as maybe not accurate? How do
18 we deal with that?

19 MR. GIUNTA: You should find that Petitioner failed to prove its
20 case, that Soukup has a value of .33. So, as shown on Slide 64, they want
21 you to ignore Soukup's dissertation, and they say well, Soukup fixed his
22 data, so there's a single device here, PYG 11, with a barrier height of .33,
23 and we should accept that that's the right value.

24 That's wrong for three reasons that we show on Slide 65. The first is
25 what I just said, Soukup repeats the same conclusions. Soukup expressly
26 says that the barrier height was .33, so the Arrhenius plot values are wrong.

1 Secondly, despite their assertion of different data, it is true that there is a
2 data point that's different on the figures, but Soukup, for this exact same
3 device, reports an Arrhenius plot value of .33. That's the exact same value
4 that the dissertation said was wrong.

5 JUDGE ARBES: Counsel, do you have any case law you can point us
6 to that dealt with a similar situation where a value in a reference is
7 questioned as inaccurate?

8 MR. GIUNTA: Not off the top of my mind. Let me see if I can come
9 up with something before rebuttal. Because, it plays into the last one. So,
10 there's this last value, the .74, and as shown on Slide 66, their own expert
11 says a POSA doesn't know which one of these values is correct. Now, I just
12 want to point out that in the institution decision, Your Honors noted that for
13 most of Soukup's devices, regardless of which one of these values you look
14 at, it would still fall into the broader claim range. You didn't really say what
15 the new range was, but I want to explain why she didn't help them.

16 So, first, it certainly doesn't happen for the narrower claims, because
17 it's not true. But it can't save them from the broader claims for multiple
18 reasons. First, the two reasons Soukup fails that I talked about, first two
19 bullet points on Slide 51, that he doesn't have a TMR, so nobody's looking
20 at any values in his to give you a good TMR. That applies regardless of
21 which value you think is right, and the second one, that he said that for all
22 these devices non-tunneling dominates, which would destroy TMR. Both of
23 those apply, regardless of what value you think is right. But then the third
24 one is, this is not an anticipation ground, right? If they had an anticipation
25 on Soukup, and the claim required a value and there was some uncertainty
26 but both values fell within the claim, I could see you maybe saying, well,

1 Soukup, maybe he teaches something within the claim, even if I'm not sure.
2 But that's not what we have here.

3 So, they are relying on Soukup to give a target barrier height to a
4 POSA. And they are saying a POSA would have gleaned a target barrier
5 height from this and done whatever they could in Bowen and Nagahama to
6 make changes to get to this barrier height. And they chose .33. The reason
7 they chose it is because it meets all the claims. So, their entire case is based
8 on telling you a POSA would have had enough defects in the Bowen and
9 Nagahama to get to .33, and they say that the reason why they have a
10 reasonable expectation of success is because Soukup already did that. Well,
11 if they haven't proven that Soukup's .33 value is right -- first of all, it's not
12 the right motivation and it destroys their reasonable expectation of success,
13 because they haven't proven that anyone's actually, by adding, achieved a
14 barrier height of .33.

15 Okay. The last point is, just Slide 67, there's also the problem where
16 they're relying on incompatible teachings in Soukup. They take the
17 relationship between the barrier height values measured using one technique
18 to try to fall within the claim, and they take the other values to teach the
19 relationship between barrier heights, each reducing defects at lower barrier
20 height. As the Board found in the other case, they can't have it both ways,
21 right? They have to choose. They have to either say one of these technique
22 values would be credited or not, and they are picking and choosing pieces of
23 Soukup that they think help their case while ignoring things that hurt their
24 case, and that just violates basic 103 law.

25 So, unless Your Honors have questions, I'll reserve the rest of my
26 time. Thank you, Your Honors.

1 MS. ARNOLD: Would it be possible to have a five-minute break?

2 JUDGE ARBES: Yes. We can go off the record.

3 (Whereupon, the above-entitled matter went off the record at 3:21
4 p.m. and resumed at 3:37 p.m.)

5 JUDGE ARBES: Counsel for Petitioner, you have 23 minutes
6 remaining.

7 MS. ARNOLD: Thank you, Your Honor. Okay. Just, let's again
8 review what's not disputed. So again, there's no dispute that all the
9 limitations are met and that Soukup's values anticipate both claimed ranges.
10 There's no dispute that TMR is a valid motivation that one of skill in the art
11 would have had.

12 And Patent Owner is also not disputing, as confirmed by, finally, Dr.
13 Ross's testimony and all of the other evidence we have from Bokor and
14 Bowen and Soukup, that a person of ordinary skill in the art would have
15 understood there was a relationship between barrier height and TMR. So,
16 we kind of ended with Soukup, let's start there.

17 So, Counsel has dropped their analogous art argument, which is not
18 surprising if you saw their sur-reply. And, of course, that makes sense,
19 because they conceded in their Patent Owner response, at 59, that Soukup
20 "didn't rule out tunneling," and they also can't really draw a distinction for
21 why Soukup should be out, yet other art that used metallic electrodes, like
22 Simmons, should nonetheless be it.

23 So, anyway, let's talk, actually, about Soukup's data. So, if you will
24 follow along with me, I'm looking at Soukup, which is Exhibit 1028. And
25 so, the reason that we picked .33 electron volts is because Soukup picked
26 that data. In fact, if you look on the very first page of Soukup -- which, I

1 would like to point out, Soukup is published in a quite prestigious journal,
2 the Journal of Applied Physics, which is peer-reviewed, so I think under
3 house rules, no one should be questioning anything in this, at least according
4 to today's hearing.

5 But if you look, he talks about how he obtained a .33 electron volt
6 value for his sample, the sample that he obviously considered was one of the
7 most reliable. And one thing you need to take into account is, there's a lot
8 of discussion about Schottky and tunneling and what the current mechanism
9 is. That does not matter for barrier height, because as we talked about
10 earlier, and this is just simple quantum mechanics, you know, remember the
11 barrier height is simply the difference between the fermi energy and the
12 convection band. That's it. And so, for a particular barrier, and here
13 Soukup is working with MgO, it's going to be that barrier whether we're
14 talking about Schottky or tunneling or whatever.

15 JUDGE ARBES: Counsel, let's say that I have a device with a barrier
16 height of 0.33, and for whatever reason I can conclusively rule out tunneling.
17 Is that value still relevant?

18 MS. ARNOLD: Yes. It's still the barrier height.

19 JUDGE ARBES: Why?

20 MS. ARNOLD: Because that is -- what you're trying to measure is
21 like, the energy it's going to take for the electrons to get across that barrier.

22 JUDGE ARBES: No, I see why it's still a barrier height, but why is it
23 something a person of ordinary skill in the art would have looked to as part
24 of a motivation to modify Bowen, for example?

25 MS. ARNOLD: Because it doesn't depend on the particular current
26 mechanism. Like, barrier height is the barrier height. If you have this MgO

1 barrier, it's going to be the same barrier height no matter how you're getting
2 the current across it. Because it's really just the difference between the
3 fermi energy for that barrier, right, like that particular device that we're
4 talking about, and the bottom of the convection band. It is what it is,
5 regardless of how you're getting it across there.

6 JUDGE ARBES: Even if tunneling does not occur and I can
7 conclusively rule it out?

8 MS. ARNOLD: For a current, right? Like, there's obviously other
9 ways you can get electrons to move across, but if you're just talking about
10 getting electrons across, it doesn't matter if it's tunneling or Schottky or
11 whatever, it's just going to be that for that device. So, the .33, that's the
12 barrier for the device that Soukup built.

13 So, anyway, so the reason we picked .33 was because that was the
14 only device where he felt confident that he was getting reliable data, because
15 remember, and we can go into as much detail about this as you want, that
16 was the only device where for the Arrhenius, he got the device to plot as a
17 straight line. And he talks about that, and the experts went into this in a lot
18 of detail, which you don't have to, but, you know. With Figure 12, where he
19 tried to plot two of the other devices -- and I'm looking at Soukup, 32, 34,
20 and he said look, this data that I found in Figure 5, which is for that device
21 PYG 11, you know, that one is reliable, but I can't really trust the other ones
22 because they're not plotting straight. So, that is why we keep hearing about
23 .33. That is why it's in the abstract. That was the only one where he found
24 that he thought the data was reliable.

25 Now, let's talk about the other thing. So, Soukup had the same
26 devices, and he was calculating them two different ways. One was

1 through Arrhenius, the .33 which we talked a lot about, and then the other is
2 the zero intercept method, which we've heard a lot of negative things about.
3 But that's also valid data. So remember, Soukup had observed a relationship
4 where when he introduced oxygen vacancy defects, the barrier height went
5 down, right? And --

6 JUDGE ARBES: For one method, but not the other.

7 MS. ARNOLD: Right, for the zero intercept, not the Arrhenius. So,
8 he didn't actually trust the zero intercept data because he was worried about
9 the Richardson constant. So, if you look on Soukup Exhibit 1028 at 3231,
10 he says quite clearly, I calculated this, but I'm worried about the Richardson
11 constant. And he's getting values between .69 and .72. He says it might not
12 be quite accurate, so it seems like they might be a little bit off. And then he
13 says in the next sentence, however, as other people have pointed out, maybe
14 we're talking about 10%.

15 Okay. 10%, we are still in the .1 to .85 range. So, you know, kind of
16 a big leap, but what he did find reliable, even if maybe those numbers were
17 just a little bit off for those barriers, is he did find that relationship about
18 how I added vacancy defects and I saw the barrier height go down. And so
19 if you read through this and you get to his conclusion where he talks about
20 kind of what he took away from his experiment, some of which were more
21 successful than not, he says -- and I'm looking on page 3235, which is on
22 pdf page 8, if you go on the right hand column under the summary, third
23 paragraph, the third sentence. He says, "the conclusion drawn is that the
24 electron flow in these devices could very well be that the emission of
25 electrons over the potential barrier could be Schottky." So, we already
26 talked about that, but again, that doesn't matter. And then if you go to the

1 next page, on 3236, he says okay, so based on that, the barrier height was a
2 function of the amount of oxygen in there, that he made a more
3 stoichiometric thing, and so he noted his conclusion that -- oh, shoot.

4 JUDGE ARBES: I'm sorry, you're reading from page 3236?

5 MS. ARNOLD: Yeah, hold on, I'll just pull it up. So, his ultimately
6 conclusion is, if you read on 3236, he says in the second paragraph, he says
7 you raise the oxygen pressure which probably makes your film more
8 stoichiometric. So, he was decreasing the vacancy defects, and then the
9 barrier height went up, right? So that's like the undisputed takeaway from
10 this. So, if you reduce your vacancy defects, the barrier height goes up. If
11 you increase them, they go down, which obviously no one is disputing. But
12 he was validating there that what he thinks is happening, which is Schottky,
13 the zero intercept is showing that relationship, and he credits that, there on
14 that second paragraph left column in 3236.

15 So, that relationship, which by the way is also in the abstract, you
16 know, is exactly the relationship that he taught and that would have
17 motivated one of skill in the art to explore lower barrier heights to increase
18 TMR. Because he showed that if you put in oxygen vacancy defects, you
19 are absolutely going to change the barrier height.

20 JUDGE ARBES: Counsel, can I ask you the same question that I
21 asked Petitioner? Just as a general matter, when you have a number like
22 this, .33, but there is perhaps some indication in this reference, in the thesis,
23 that it is not accurate, how do we deal with that in assessing obviousness
24 here?

25 MS. ARNOLD: Well, again, we're looking at this from what one of
26 skill in the art would have thought, right? And this is his published journal

1 paper, and he -- I mean, he found the .33, and the other one as well, he found
2 the same relationship. The thesis doesn't really change anything. So, you
3 know, one of skill would have taken a couple things away. One is, wow,
4 there's a whole bunch of low barrier heights that Soukup obtained in MgO
5 when he put magnesium oxide in. And that's what the paper says, there's
6 this relationship between barrier height -- lower barrier height, when I put
7 more oxygen vacancy defects. Like, you know, they would take it at face
8 value. They would have no reason to question it, right? Also, it's in a peer
9 reviewed journal.

10 JUDGE ARBES: It doesn't -- it arguably helps you for that position,
11 but it doesn't help you tie it to TMR at all, right? Because he rules out
12 tunneling for most, or all of the devices except one, right?

13 MS. ARNOLD: Yeah, he's not sure what's going on, right? So, this,
14 the relationship between barrier height and TMR is something that is coming
15 from the theory. right, that comes after this paper. And it's from Butler,
16 right? And Bowen recognizes it too, and one of skill would have known
17 about this. But this, as we explained, like, Butler provides the motivation
18 and explains why things are different in MgO and why you can get these
19 amazing TMRs. And Soukup, years earlier, working on it, the exact same
20 barrier, an MgO barrier, showed the mechanism, hey, you can just put in
21 oxygen vacancy defects and you can change the barrier height. Here is a
22 knob you can turn. And people know how to do this.

23 I'm going to move on, unless you have any more questions about
24 Soukup. But I love Soukup, so I welcome more questions about Soukup.
25 Okay. So --

26 JUDGE HAMANN: Counsel?

1 MS. ARNOLD: Yes?

2 JUDGE HAMANN: This is Judge Hamann. Just one last moment on
3 Soukup. I'll be brief. And you said -- so I'm just trying to understand.

4 MS. ARNOLD: Yes.

5 JUDGE HAMANN: Obviously, Schottky emissions is not tunneling,
6 correct?

7 MS. ARNOLD: No. But it's still --

8 JUDGE HAMANN: So you could stop tunneling --

9 MS. ARNOLD: Right, it's still a current flow mechanism across the
10 barrier, and regardless of exactly how you're getting them across, it's the
11 same barrier.

12 JUDGE HAMANN: Okay. But it's not tunneling, right?

13 MS. ARNOLD: It's not tunneling, yes. Yes.

14 JUDGE HAMANN: And the claim is for an MTJ device, right?

15 MS. ARNOLD: The claim is for an MTJ device, but the barrier
16 height for a particular barrier is the barrier height, and it comes from the
17 actual equation, which no one is disagreeing with. It's on my Slide 11. It's
18 simply a measure of the energy difference between the fermi energy of the
19 electrode and the convection band of the barrier. That's it.

20 JUDGE HAMANN: I understand what a barrier height is by
21 definition, but I'm also just trying to understand how this impacts -- well,
22 how one of skill in the art would view that, because honestly, if there's no
23 tunneling, then, you know, the TMR I assume would be zero. I mean,
24 what's its value? I mean, its whole purpose, it measures, what tunneling,
25 diagonal resistance or something like that? Or ended it. I'm not sure what
26 value it is, but it's -- tunneling.

1 MS. ARNOLD: Soukup is before they realized that MgO had this
2 magic property with Butler. Tunneling could actually have been happening
3 and he just didn't really know. And in fact, he acknowledges, right? He's
4 like, there could be some tunneling here, I can't rule it out, right? But his
5 experiment is kind of ahead of theory, right? So, the key here is, he's
6 working with the same exact barrier looking at current flow, and he is
7 finding, put in oxygen vacancy defects, and whatever. One of ordinary skill
8 is not going to discount all of the -- and there's been a ton of work on MgO
9 for at least 50 years, and about vacancy defects and all that. Like, they all
10 know about that, and then Butler, really, like, made it interesting, right? So,
11 anyway. I wouldn't -- just because Soukup is ahead of Butler and doesn't
12 recognize what's happening, which is probably tunneling, and he says he
13 can't really make a definitive conclusion of the type of current flow, right?
14 Like, if you look at -- I'm looking at it right now. At the very bottom of
15 3236, he's kind of like, I'm not exactly sure, I'm trying to figure this out.
16 Okay. So, yes?

17 JUDGE HAMANN: Thank you.

18 MS. ARNOLD: Okay. So, Patent Owner argued that no one would
19 have put vacancy defects in a barrier because it would scatter electrons, and
20 that would also impact TMR because again, there's, you know, with these
21 barriers it's complicated. You mess with one thing, it changes other things.
22 But Bokor actually explained this at his Halloween deposition, which is
23 Exhibit 2086. It starts at 7913, but a lot of the good stuff is page 820, line 20
24 through 81-8. You know, he explained, yes, if I put oxygen vacancy defects
25 in the barrier, it's going to have an effect on TMR, but the question is, how
26 much? And will it raise my TMR less? What's going to happen here? The

1 fact that there's going to be trade-offs, which there always are trade-offs,
2 that does not defeat a motivation to combine.

3 JUDGE McSHANE: Counsel, I'm sorry, can you repeat the cite?

4 MS. ARNOLD: Yes, it's Dr. Bokor's 10/31/25 deposition, Exhibit
5 2086, and it starts on page 79, line 13, and definitely goes through page 81-
6 8, and maybe a little bit further. But he explains these trade-offs between
7 trying to lower the barrier height and maybe there's a little impact on TMR,
8 but, you know, trying to get, like that would not have deterred one of
9 ordinary skill in trying it. It's just another real world trade off.

10 JUDGE McSHANE: Thank you.

11 MS. ARNOLD: Yes. So, I'm looking at not Petitioner's slides, but
12 Patent Owner's Slide 22 that they talked about. They made a lot of the fact
13 that Dr. Ross did some calculations and came up with a 68% number. I
14 might be on the wrong slide. Anyway, her prediction about 68%, I mean,
15 that number in the abstract doesn't say anything. It's just a percentage.
16 Like, so, you know, changing a parameter by 68% is meaningless unless you
17 actually know what the parameter is, right? So again, this kind of goes into
18 Patent Owner's instance that there needs to be, like, a guarantee, an exact
19 number, which of course we have in Soukup we just need a reasonable
20 expectation of success.

21 Then, looking at Patent Owner's Slide 38, they talk about Yuasa's
22 Nature Materials and Dr. Yuasa himself, in his peer reviewed article saying
23 it was surprising to get a higher TMR effect in magnesium oxide. I mean,
24 it's surprising to him, Bokor predicted it -- I'm sorry, Butler predicted it a
25 few years ahead. But, this is not indicative of anything. This is Yuasa's
26 own article, it's his self-praise. It's not industry praise.

1 JUDGE ARBES: But it is consistent with the Slonczewski model at
2 the time. I understand your position of why that's not relevant, you believe,
3 but it is consistent with that.

4 MS. ARNOLD: Well, I mean yeah, the fact that magnesium oxide
5 had much higher TMR, that was so super surprising. But you know who
6 figured that? Butler. So, okay.

7 So, then there was the point that Patent Owner should be able to rely
8 on Slonczewski and his comments about aluminum oxide because there was
9 prior work with aluminum and CoFeB. There's a big difference here.
10 Obviously, like this is not an all-or-nothing consideration when you're
11 looking at aluminum oxide prior art and MgO. But what we have here that's
12 different is, Butler himself said that the simple models based on a
13 amorphous aluminum oxide where you do not have coherent tunneling or
14 symmetry matching do not apply. So, one of skill in the art who is trying to
15 follow this trail that Butler has set out is not going to be looking at
16 Slonczewski, because he's like, it's too simple, it doesn't work and it doesn't
17 explain what's happening. So, when we're looking at the barrier height and
18 the properties of getting those electrons across the barrier, of course one skill
19 in the art is going to discount that relationship and not take it as biblical
20 truth, because Butler is like, it doesn't explain what's happening here.

21 Okay. Then, I'm going backwards here, but if we look at their Slide
22 2, this is how Patent Owner started, and they pointed out that the claims are
23 a combination of a whole and you need to prove obviousness of a
24 combination. So, this is silly, I'm not even sure why I'm talking about it,
25 but of course we proved obviousness. All of these limitations, we showed
26 that all these other limitations are in Butler. They actually have disclaimed

1 all of these in their statutory disclaimer. They're not disputing that Butler
2 and Soukup disclose all this stuff.

3 JUDGE ARBES: I'm sorry, Counsel, in Butler?

4 MS. ARNOLD: I'm sorry. I'm sorry, Bowen. There's too many B's.
5 Yes, Bowen and Soukup. So, anyway, of course this is a valid obviousness.
6 I just want to clarify, there's a question that I believe Judge Arbes asked
7 earlier about are we arguing with the obviousness theory? And we're not
8 arguing obviousness to try. So, as we explained in the petition, we have a
9 motivation to explore lower barrier heights to increase TMR, as explained,
10 you know, obviously the motivation was out there once Butler published.
11 And Bowen teaches almost everything, Soukup shows it's possible through
12 the mechanism, and so the reasons is, again, Bowen noted he got a lower
13 barrier height, and he said gosh, that might be due to vacancy defects.
14 Which of course would direct someone who is interested in MgO to say hey,
15 what happens when I put vacancy defects in a magnesium oxide barrier,
16 right? And Soukup shows that mechanism and how it works and the
17 relationship. So, that is our obviousness theory.

18 JUDGE ARBES: Counsel, I think the reason we would like to ask
19 about that is, there were a number of instances in Dr. Bokor's deposition
20 testimony where he did mention that it's worth a try, there's a good reason to
21 try. You are not relying on the testimony?

22 MS. ARNOLD: I mean, yes, because it supports the motivation to
23 explore this. He is, you know, people want to achieve this TMR, and they
24 would have looked at this, because this is one of the parameters that impacts
25 the barrier. And so this is something that would have been motivating to go
26 and explore that.

1 JUDGE ARBES: What's the difference between that and an
2 obviousness to try?

3 MS. ARNOLD: Well, obviousness to try, right, is when there's just a
4 few kind of parameters, like a few specific, like, a discrete number of
5 parameters and you need to show that it's a pretty small thing, and so
6 somebody would have randomly been trying this. But we're not arguing
7 that, because it was already in the prior art that there was this relationship.
8 Soukup showed in the zero intercept data that if you introduce vacancy
9 defects, you're going to lower the barrier. Bowen noted that his lower
10 barrier might be due to that. Like, it wasn't just like let's randomly try
11 anything and you know, let's play with the temperature, play with this, play
12 with that. It was, people knew about this relationship. So, that is, to be
13 clear, our obviousness theory.

14 Okay. My last couple comments are, if you look carefully at Slide 26
15 and 32 you can kind of get an idea of what's happening with the briefing
16 here. Slide 26, and I'm talking about Patent Owner 26, you can tell, like,
17 Bokor answers, like he says, Butler does not explicitly mention barrier
18 height. Which is true, he says it's not there explicitly, but one of ordinary
19 skill would have found it. And so, his testimony is actually the opposite of
20 what they're saying. They're saying Bokor testified there is no relationship,
21 but his testimony is actually the opposite. It's even on the page 26, yet
22 they're treating it like he said the opposite. And it's actually even worse if
23 you look at Slide 32, which they showed.

24 JUDGE ARBES: Counsel, I believe your time has expired, but if
25 you'd like to finish that thought.

1 MS. ARNOLD: I'll just finish this one thought. So, if you look at
2 their cite to Exhibit 2086 at 145, one through 10. So, it looks like we have a
3 complete question and answer there, but they actually cut off. His answer
4 was way longer. And they seem to suggest here that Nagahama was really
5 perfect and whatever. I mean, that's BS, because everybody knows
6 Nagahama wasn't a perfect crystal, it was polycrystalline. But, the rest of
7 his discussion actually includes testimony about how Nagahama is
8 polycrystalline and wasn't a perfect crystal. So, if you're going to rely on
9 any of these slides, I would encourage you to check the receipts. Thank you.

10 JUDGE ARBES: Thank you, Counsel. We went a bit over, so we'll
11 give you one extra minute. You have 11 minutes.

12 MR. GIUNTA: Thank you, Your Honor. So, maybe I'll just try to go
13 in reverse order. This last thing about Nagahama not perfect. The issue is
14 not whether it's polycrystalline or crystalline, the issue is whether there are
15 defects, right? And Nagahama was not trying to introduce defects into the
16 MgO. Their expert admitted it. We have it on the slide. I'm not trying to
17 exclude anyone. If Your Honors want to take a look at the whole thing,
18 you're welcome to. It's undisputed that Nagahama was not trying to have
19 defects, and trying to avoid that.

20 The obvious to try thing, it seems clear to me that they know they
21 can't beat obvious to try as a case law so they're saying that's not what
22 we're doing. But I agree with the questions Your Honors have. They are
23 just saying, a POSA would have tried to do this thing, even though they had
24 no idea how it worked, because TMR is really important. There are a host of
25 things that impact TMR. Some of them are the choice of materials in the
26 electrode, the barrier, how it's prepared, whether it's a crystalline structure

1 in the electrode, again the material, the interface between them, whether
2 there's crystallization at the interface, whether there's defects, and
3 scattering, or there's oxidation. There's all kinds of things that would
4 impact TMR, and they have just latched onto this one and said, because
5 TMR's important, it's okay for us to say someone would try this thing even
6 though the only reason they gave failed.

7 So, Counsel says a whole bunch of times, things are undisputed,
8 things are undisputed. I mean, I trust that Your Honors will read our papers
9 and know what is actually disputed and what's not. She keeps saying that
10 it's clear that our limitations are met. It is not clear. We challenged whether
11 Soukup has a barrier height within the claim. We made that point.

12 JUDGE ARBES: Counsel, can you respond to Petitioner's point that
13 it doesn't matter if those are Schottky versus tunneling?

14 MR. GIUNTA: Yeah. It's refuted by their own expert, right? So,
15 Counsel just made this argument that it doesn't matter, but the reason why it
16 matters is because, we have it on the slide, both experts said if you lower the
17 barrier enough so that Schottky is the dominant current force, that is going to
18 destroy your TMR. That's why it matters. And it's just like Saito, all these
19 things we've seen. Soukup's data, what he's showing you, is consistent with
20 all these teachings in the art, that if the barrier height gets too low, non-
21 tunneling sources will dominate. And so it is, just, Soukup's entirely
22 consistent with everything. And Counsel can say it doesn't matter, their
23 expert didn't say it doesn't matter. He admitted that a POSA would have
24 avoided reducing the barrier height to a place where non-tunneling currents
25 are dominant.

1 Sticking with Soukup for a minute. She keeps saying Soukup has .33
2 right in the abstract, so we know .33 is right. Soukup also has the .714 value
3 in the abstract. She said Soukup has the relationship they like between
4 oxygen defects and barrier height in the abstract. Soukup also has the other
5 relationship in the abstract. Their own expert testified that a POSA
6 wouldn't have known which of these values is right. So, Counsel's attorney
7 argument that that's not true and everyone would have trusted the point, it's
8 not supported by the evidence.

9 JUDGE ARBES: Because of the two methods?

10 MR. GIUNTA: Yeah. Well, because Soukup taught the .33 and the
11 .74, right? And Dr. Bokor said a POSA wouldn't know which one. He said
12 Soukup didn't say which one is right, Soukup didn't know, and a POSA
13 wouldn't have either. So, Counsel is telling you no, Soukup said .33 was
14 right. There's no evidence of that. Both of those values are in the abstract,
15 and both of those relationships -- the sentence they cite in the abstract about
16 the defect barrier height relationship, it says it was one way according to
17 Arrhenius plot, and it was to the other. So, by saying that Soukup cites the
18 stuff they like in the abstract doesn't help them, because Soukup also cites
19 the other stuff that's inconsistent with it.

20 Slide 61, Your Honors. The slide, just when I said the expert disagrees
21 with her assertion about why Schottky matters. You can look at the
22 testimony of both experts on Slide 61. On the .33, she said Soukup said it
23 was reliable. She keeps saying that Soukup said it was reliable. She said for
24 this one device it was correct. None of these things. Soukup doesn't say
25 any of those things. It's just her characterization of it. She said something
26 about one of these values in Soukup even though it's wrong, it might only be

1 10% off so that's okay because it would still be within the claimed range.
2 That has the same problem I pointed out earlier, Your Honors, about
3 whether an unknown value meets the claim or not does not help them. This
4 is not an anticipation case where they're trying to show that Soukup meets
5 the claim. They need to show that there was some target barrier height that a
6 POSA was trying to get to, because then a POSA has to go do all kinds of
7 things in Bowen and Nagahama to get to this. And if they're admitting that
8 the value is wrong, then they're admitting that they did not prove their case
9 that a POSA would have believed that .33 was the right value and that that
10 was the target.

11 She keeps saying that Soukup did not rule out tunneling because
12 Soukup was before Butler. He didn't know it was -- it's not true. If you
13 take a look at Slide 60, it is undisputed that Soukup ruled out tunneling for
14 all those devices. Dr. Bokor did not refute Dr. Ross's testimony. And you
15 can see that Soukup in his table specifically says that that one last device
16 with a huge might be tunneling because it met the -- I forget where it is,
17 yeah, the Fowler-Nordheim equation. That is a tunneling question. And so
18 Soukup found that none of these other devices met the Fowler-Nordheim
19 equation, only this last one. So, her assertion that he didn't rule out
20 tunneling, again, it's not true. It is refuted by the undisputed evidence.

21 JUDGE ARBES: And the sentence you're pointing to for that, where
22 it ruled them out, that's the one on Slide 60?

23 MR. GIUNTA: On Slide 60 we have testimony from Dr. Ross, where
24 she explained it. Upper left. And then, yeah, and then the bottom from
25 Soukup, the I/V characteristics of these devices did not plot as a straight line.
26 Thus, the Fowler-Nordheim equation does not hold for these devices.

1 Fowler-Nordheim is this tunneling equation. You can see in his Table 1, the
2 last device that he says maybe tunneling, he says it because it meets the
3 Fowler-Nordheim equation. So, they're wrong about that.

4 She wants you to go look at Bokor's testimony about scattering and
5 trade-offs. I mean, the hand waving is astounding, right? It is undisputed
6 that people in the art knew that if you introduced defects, it would cause
7 scattering, and that would reduce TMR. But she says look, TMR is still
8 important, people are going to try it anyway, because who knows? It might
9 have some magically, something else might happen that offsets scattering
10 and the TMR might overcome -- TMR might increase, which would
11 overcome this. It's just based on nothing but hindsight.

12 On our Slide 68, we have Dr. Ross's 68% increase in resistance. She
13 says that doesn't say anything because it's just a percentage. I honestly
14 don't understand that. I mean, TMR is just a percentage, too, so does that
15 not say anything? What Dr. Ross did is, she did the math, she did the work,
16 and she calculated it and showed that the resistance area product would
17 increase by 70%. As we talked about, an entire purpose of Dr. Yuasa's
18 Nature hearing, what he was praised for, was trying to reduce the resistance
19 area so that you could make a device that you could actually put in a circuit.
20 So, her suggestion that a difference of 70% in the resistance area is just, it
21 doesn't say anything because it's just a percentage --

22 JUDGE ARBES: And that difference was to go down from .9 to .85?

23 MR. GIUNTA: That's right. That was the difference between what
24 Bowen was and if you tried to get with that. I mean, she dissed on the
25 Nature Material article again, because she said Dr. Yuasa did it and said it
26 was surprising. And again, I won't belabor, the article's been cited 4,000

1 times. Surely if they're right and everybody knew this would happen, they
2 could have found one piece of evidence showing contemporaneously that
3 people expected that at a low barrier height TMR would not go down in
4 MgO based on Butler. They don't have a single piece of evidence.

5 JUDGE HAMANN: This is Judge Hamann, and a few times you've
6 made reference to the number Counsel has, number of times your articles
7 have been cited, and I assume there's no way it overtly says in the record
8 what aspect of these articles are over-cited. Obviously, this is all in some
9 kernel of what was in those publications, I'd assume. So, it may be pertinent
10 as to what's being cited, but it doesn't seem like we can tell exactly why. Is
11 that fair? Or am I missing something?

12 MR. GIUNTA: Well, I would disagree with that, Your Honor. I
13 think it is in the record that the significant things that were in that Nature
14 Materials article, we have them in our Patent Owner response. We mapped
15 the claims to what's in the Nature mMaterials article. What was significant
16 about this invention in the 909 was the reduced resistivity. Still getting a
17 high TMR while adding reduced resistivity. That's what the Nature
18 Materials article talks about, and that set off a revolution where now people
19 could actually make a device that you could put in a circuit. And that's why
20 this article was cited 4,000 times. Not for anything else.

21 JUDGE HAMANN: And there's nothing in the article about
22 particular manufacturing of other things that would be outside the claim that
23 was also included there?

24 MR. GIUNTA: I mean, I'm sure there are things, you know, but if
25 you're going to suggest that because there's any level of detail that the
26 purpose, that the significance of the article was not the result that was

1 achieved, then I would disagree with that. But the big picture takeaway
2 about why this was important is, he demonstrated that you could get a high
3 TMR with reduced resistivity.

4 And while I'm at it, I'll just point out, they say, I think it's Exhibit
5 2022, they have it on their slide. I forget the number. But they tell you, let's
6 look at it. Exhibit 2022, their Slide 18. What they tell you is that this article
7 is praising Butler and Mathon for reduced resistivity and high TMR, not
8 Yuasa. Two responses to that. Butler and Mathon didn't build a device.
9 They had a theory, right? they don't talk about barrier height, they don't
10 talk about resistance. But, conversely, this Yuasa Nature Materials article
11 specifically talks about these things. So, what she wants you believe is that
12 these authors attributed to Butler and Mathon something they didn't do, and
13 they were not, even though this article cites Yuasa in the next sentence, they
14 weren't talking about Yuasa.

15 JUDGE HAMANN: Thank you, Counsel. I recognize the time. I
16 don't know if you're over it. And I think that generally responded to my
17 question, so let me stop you there, if I could.

18 MR. GIUNTA: Yeah. And then, she wants to discount the
19 Slonczewski model and Saito and all the rest of it. But I would just point
20 out again, they don't have a single piece of evidence going the other way.

21 JUDGE ARBES: Thank you, Counsel.

22 MR. GIUNTA: Thank you, Your Honors.

23 JUDGE ARBES: That concludes the hearing for today.

24 (Whereupon, the above-entitled matter went off the record at 4:15
25 p.m.)

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