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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES, INC.,
Petitioner
v.
GODO KAISHA IP BRIDGE 1,
Patent Owner.

IPR2024-01447 (Patent 8,405,134 B2)
IPR2024-01493 (Patent 10,680,167 B2)

Record of Oral Hearing
Held: January 23, 2026

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

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The above-entitled matter came on for hearing Friday, January 23, 2026, commencing at 9:00 a.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

9:00 a.m.

JUDGE McSHANE: Good morning. We are here to conduct hearings in case numbers IPR2024-01447 and IPR2024-01493. These are the Western Digital Technologies and Godo Kaisha IP Bridge 1.

Hold on one second. If we could have Judge Hamann show on the screen? Judge, can you hear me?

JUDGE HAMANN: I see myself, at least of what I can display.

JUDGE McSHANE: Okay. I can see you now. Thank you. Sorry for the interruption.

So, please note that these cases, that is, the -1447 and -1493 cases, will be heard in this combined hearing, but the cases remain separate.

I'm Judge McShane, and Judge Arbes and Judge Hamann are also here. So, could we have appearances, please? Who do we have from the Petitioner, please?

MR. WILSON: Douglas Wilson, on behalf of Petitioner. With me are Monica Arnold and Michelle Armond.

JUDGE McSHANE: Thank you, Mr. Wilson.

And who do we have for Patent Owner?

MR. WICHMAN: Adam Wichman for Patent Owner IP Bridge, and with me is my colleague, Richard Giunta.

JUDGE McSHANE: Okay. Thank you. And Mr. Wilson, actually, you have a LEAP practitioner who is going to be presenting some argument.

MR. WILSON: That's correct, Your Honor. Monica Arnold.

JUDGE McSHANE: Okay. Thank you. Okay. Very good. Briefly, here is some guidance. If at any time through the proceeding you encounter technical or other difficulties, let us know, or contact the team members who provided you with connection information. And let's hope that we don't have any technical problems this morning.

So, we have the entire record. The Judges have the entire record, including demonstratives. Please, though, when you're referring to any demonstratives, papers, exhibits, please do so clearly and explicitly. Call them out by slide number or page number. I know when you get on a roll, you may forget to do callouts on the slides, but it is very helpful when we're going back and reviewing the record to look at those slides.

The hearing will be conducted as set forth in the Revised Oral Hearing Order. Each side has been permitted 90 minutes of argument. And as I referred to, Petitioner has a LEAP advocate who is going to be presenting, so Petitioner will get an extra 15 minutes of argument for a total time of 105 minutes. Judge Arbes is in the hearing room there, and he will set the clock for you.

As you note there, you all -- that only goes up to 99 minutes, but we will make sure we account for the extra six minutes for Petitioner, as well. And I'm keeping an unofficial time clock here, but I think we'll let the courtroom clock be the official game clock, if we say that.

We're going to see what we do with breaks as we move along.

Petitioner is going to go first and may reserve rebuttal time. Patent Owner may present its arguments then and reserve surrebuttal time, with the

surrebuttal limited to issues that Petitioner raised in its rebuttal. Any questions from anyone?

(No audible response.)

JUDGE McSHANE: Okay. All right. With that, Petitioner, you have the floor. Please proceed when you're ready.

MR. WILSON: So, thank you, Your Honors. Douglas Wilson, on behalf of the Petitioner, and I will be referring to my demonstratives by slide number. I'm not going to display them since a couple of judges are not here. And so, I'll just refer to them, and I think you have copies. If some other arrangement is needed, let me know, but I think that will work.

I'm going to start by going through two big issues in both of these IPRs. I think the two biggest issues are whether or not Parkin discloses MgO(001) growing over amorphous cobalt iron boron and whether there's a reasonable likelihood of success in accomplishing that result. So, I think those two issues are -- will, by and large, resolve all of the other issues in these IPRs. For example, to the extent there's a claim for secondary indicia of non-obviousness, it hinges on cobalt iron boron MgO MTJs, which, of course, Parkin discloses, and so, it can't be the basis for showing non-obviousness.

So, I think you'll see that once we go through this, it's going to resolve, by and large, everything. If there is anything else that the Judges have questions about, please ask. I'm happy to answer questions about anything else that I don't directly address at any time.

So, I'm going to start on Slide 2, and Slide 2 is an excerpt from our '134 Petition. You will find similar argument in the '167 Petition, as is cited

at the bottom of this slide. And here's what we argue. We said: if Sunai's or Parkin's cobalt iron boron electrodes are used as described in Claims 1(e) and 2 in this Ground, one of skill would understand that the MgO could be polycrystalline or single crystal but would still have the same (001) orientation.

So we argued right in the petition, you're going to get MgO(001) if you grow it over a cobalt iron boron electrode. What do we cite for that? We cite Exhibit 1024, which is Dr. Bokor's declaration, as well as Parkin. And in particular, I want to focus on Parkin at 18:49-51 there because that is Figure 3A, which, as we will see, we asserted discloses MgO(001) growing over amorphous cobalt iron boron.

So, we turn to Slide 3. You can see, again, in the petitions where we argued, more than once, Parkin itself teaches that the top and bottom electrodes in Figure 3A may be inverted. That means that the storage layer would be below the tunnel barrier layer.

And if we turn to Slide 4, you'll see the same thing. This is Parkin's disclosure. Figure 3A on the left. Parkin's text on the right. You can see in the upper paragraph on the right, the highlighted portion, Parkin says: the MTJ device of Figure 3A may also be inverted, such that the reference ferromagnetic electrode is formed above the tunnel barrier and the storage layer is formed beneath the tunnel barrier.

And in the lower part of that, Parkin makes clear that the layer 175 may be comprised of 75 angstrom thick cobalt iron boron. So, not only does Parkin tell us it may be inverted, it tells us that the storage layer is formed beneath the tunnel barrier, and that the storage layer comprises cobalt iron

boron. If we look at Figure 3A on the left, you can see layer 175 in purple. That layer would be under the magnesium oxide tunnel barrier. All of this is in the petition. It's no surprise. It's very clear what we argue.

If we turn to Slide 5, you can see Dr. Ross doesn't disagree with any of this. In paragraph 94, she admits that Parkin's Figure 3A embodiment, the storage layer 175 is crystallized by the annealing. And on the right, if you look at her deposition testimony there, you can see where she's asked about the exact same passage of Parkin. And she goes on to say, after admitting, yes, that's what the language says, she's asked: So Parkin is saying that you could put the amorphous cobalt iron boron layer underneath the MgO layer, correct?

She says: he's saying -- he says the storage layer is formed beneath the tunnel barrier.

Question: Right. And the storage layer may be comprised of 75 angstroms cobalt iron boron, correct?

She answers: It may be. According to line 43, it may be comprised of cobalt iron boron.

This is Dr. Ross admitting what Parkin discloses plainly in Figure 3A, the inverted version of Figure 3A.

JUDGE McSHANE: Mr. Wilson, if I might interrupt. This is Judge McShane. First of all, I'm going to go off point a little bit, but and interrupt you and say -- and ask you if you want to reserve rebuttal time. We forgot about that.

MR. WILSON: Yes, 40 minutes of rebuttal time.

JUDGE McSHANE: Thank you. And also, here, I have a question on point here, so we'll get back to your point.

So I look at this cite on the left-hand side of your Figure 5, and that's from -- it's citing to column 18 of Parkin, correct?

MR. WILSON: Oh, that's where -- you're talking about Dr. Ross's citation. That's her declaration, yes.

JUDGE McSHANE: Right. Yeah, yeah, yeah, but that's the cite, and I think it's a quote. And I believe the -- I believe the quote is okay, but in any event, did the -- that portion of -- I think you might need a copy of Parkin, by the way, if you don't have one, or you can pull it up on your computer. But, so if you go to column 18 of Parkin, that appears to refer to -- and I think you said this -- this refers to Figure 3A, correct?

MR. WILSON: That's correct, Your Honor.

JUDGE McSHANE: Yeah. So, if you can just go over, scoot over to column 17, okay?

MR. WILSON: Sure.

JUDGE McSHANE: And look about, say, lines 20, say 26, or thereabouts, and there, they're talking about -- and this is with regard to Figure 3A that starts at line 11, but it's talking about how the magnesium oxide tunnel barrier is being formed, that 120 prime, or whatever. And there, it talks about -- and this is line 25 -- first depositing a thin layer of magnesium, and then going and following that with a deposition of magnesium in the presence of reactive oxygen, okay?

MR. WILSON: That's correct.

JUDGE McSHANE: And is that the -- is that -- I know the Patent Owner talks about templating. Is that effectively the templating that Patent Owner is talking about? I can let Patent Owner speak for themselves, too, but it looks like it's sort of a two-layer deposition of the magnesium. Is that correct?

MR. WILSON: No, that is not.

JUDGE McSHANE: No?

MR. WILSON: That's not the templating they're referring to. The templating they're referring to is epitaxy. That is, we have a crystalline layer of, let's say, cobalt and iron. It has the BCC structure. And when we grow magnesium oxide on top of that, you can do it this way, but you don't have to do it this way, the passage you're referring to at column 18; you could do it many other ways. But essentially, what you're doing is bonding the magnesium oxide molecules to molecules of the crystal layer that's already there, so that the magnesium oxide crystalline structure is patterned using the underlying crystalline layer. That's what they're referring to as templating. That is epitaxy.

JUDGE McSHANE: Right. Okay. So, then, this here at column 17 said it was -- it's a two-layer deposition, right?

MR. WILSON: It's a two-layer deposition. The point of this, though, ultimately, you're going to have oxygen throughout the layer. It may not be stoichiometric oxygen. It may not be a one-to-one magnesium to oxygen, but you're going to have oxygen throughout the layer when it's done.

Really, this is done magnesium first, then magnesium oxide to preclude oxidizing the electrode. If you oxidize the electrode, then TMR

goes way down. So you're trying to get oxygen up to that electrode but not expose the electrode to oxygen. It avoids oxidizing the electrode. This is Parkin's special way of laying down MgO, which is why he's referring to his application when he incorporates that reference.

JUDGE McSHANE: Right. But then the first layer that's abutting the electrode is going to be just magnesium, right?

MR. WILSON: It is. That's correct.

JUDGE McSHANE: Okay. Thank you.

MR. WILSON: But -- yeah, sure. But to be clear, that's not ultimately what ends up abutting the electrode. What ends up abutting the electrode is magnesium oxide. That is necessarily the case because you want it to be an insulator, not a conductor. Magnesium would be a metal conductor.

JUDGE McSHANE: Right. And where is there exactly evidence of that, per se?

MR. WILSON: Of?

JUDGE McSHANE: Of that formation, if you will.

MR. WILSON: So, it goes on to say, if you keep reading -- and I'm reading at lines 28.

JUDGE McSHANE: Oh, I see. I see.

MR. WILSON: It says: the thickness of the second layer, which is comprised of magnesium oxide, is typically in the range from 2 to 30 angstroms, depending on the desired resistance-area product, which can range up to more than 10 to the 9th ohm square microns. For the device of

Figure 3A, a magnesium layer 6 angstroms thick was used, followed by an MgO layer 22 angstroms thick formed by a reactive magnetron sputtering.

He goes on to say, during the deposition -- and I'm at line 35 -- of the MgO layer, the magnesium underlayer becomes oxidized so that the two layers form a single magnesium oxide tunnel barrier. It's right there.

JUDGE McSHANE: Yeah, I got it. Thank you.

MR. WILSON: Sure. Okay. So, back to Slide 5, we see that Dr. Ross admits that Parkin discloses this inverted arrangement of amorphous cobalt iron boron under magnesium oxide (001).

Now, if we turn to Slide 6, this is the Board's Institution Decision in the '134 IPR. And you can see the Board concluded: It appears that Parkin broadly states that its layers may be inverted, which would result in a configuration where Parkin's crystallized cobalt iron boron would be located on the substrate, as Petitioner asserts.

Now, they go on to say -- so the Board concludes that we're right in our petition when we say inverted Figure 3A has cobalt iron boron under the magnesium oxide layer. But they go on to say: It also appears that Parkin's Figure 11, which Patent Owner argues does not teach the claim limitations, represents an embodiment only, and we are uncertain as to whether its related discussion serves to limit Parkin's more general statement on the inversion of layers.

However, the Board goes on at the end of the paragraph to say: We invite the parties to present additional briefing on these issues.

So, Patent Owner, in its preliminary response, raises Figure 11, which is a separate embodiment of inverted Figure 3A, as is stated in Parkin. And

they say that Figure 11 doesn't have MgO directly in contact with an underlying cobalt iron boron layer, which is false, as you'll see, but that was their argument. So Figure 3A can't do that because Figure 11 doesn't do that. And the Board said, hey, we'd like additional briefing on this issue.

Now, turning to Slide 7, so what happens when we get to the Patent Owner's response? The Patent Owner is silent. Never mentions inverted Figure 3A. Never mentions Figure 11. So what they do instead is they gaslight the Board.

You can see here, from their Patent Owner response, they say: Parkin provides no support for Petitioner's assertion that a POSA would understand that the MgO would still have the same (001) orientation despite being formed on a cobalt iron boron layer, because that is not what Parkin did.

And we just saw that the Board found that's what Parkin did. Figure 11 also discloses what this example, but they refuse to address either one. They just pretend like they don't exist.

Well, once you've made an argument in your preliminary response, and you choose not to make it in your Patent Owner's response, that argument is late. So, when they come back now in their sur-reply and try to argue against inverted Figure 3A and Figure 11, those arguments are late. So --

JUDGE ARBES: Counsel, I believe Patent Owner would say that they were responding to your arguments regarding Figure 11 in the reply. Why is that not proper?

MR. WILSON: Because they made the argument regarding Figure 11 in their preliminary response. They knew the relevance of it. In fact, the

Board instructed them as to the relevance of it, as we just saw. And then, they just sat silently. That's called laying behind the law. That's called hiding your arguments until the sur-reply, when the other party doesn't get the chance to respond to it.

JUDGE ARBES: But the Patent Owner response is responding to the petition, and you did not cite Figure 11 in the petition, right?

MR. WILSON: We didn't. They did in the preliminary response. And then the Board asked for additional briefing on it. And then, in their Patent Owner response, they just say Parkin doesn't disclose this at all, without addressing either one, the inverted Figure 3A or Figure 11.

So, if we turn to Slide 8, we can see that, in our reply, we addressed both Figure 3, inverted Figure 3A, and Figure 11, as the Board requested, and we said: Parkin's Figure 11 confirms Figure 3A's inverted embodiment. It expressly discloses an MgO(100) layer over an amorphous cobalt iron boron layer.

And you can see -- this is from Parkin's disclosure -- that Figure 11 shows the storage and reference electrodes in Figures 3A to 3B's devices inverted. So Figure 11 is an inverted version of both Figures 3A and 3B.

If we look at Figure 11 on the left, you can see the purple cobalt iron boron electrode 510 underneath the tunnel barrier 540 and the pink cobalt iron boron electrode above the tunnel barrier. Now, what is shown there is that the purple cobalt iron boron electrode consists of two layers. You see layer 520 between the tunnel barrier and the storage electrode 515. The layer 520, Parkin expressly says, is optional. It may also be used, but it doesn't have to be used. And so, that means that Figure 11 also discloses a

magnesium oxide (001) tunnel barrier directly on top of a cobalt iron boron electrode.

Now, Parkin's disclosure --

JUDGE McSHANE: Excuse me, Counsel. On this one, and you may be getting to this point, so I apologize if I'm interrupting your train here. But if you go to column 23 of Parkin, right?

MR. WILSON: Sure.

JUDGE McSHANE: And it has a description, beginning at line 6, talked about Figure 11, which was previously at the beginning of column 22, I think. But then it goes on, and I'll read this, sort of at the bottom of 22, going into 23, talks about the development of the cobalt ferric boron layer and include -- that included boron, too, that it made of that. And then, at line 6, it seems to go into a description of the development, if you will, of the magnesium oxide tunnel barrier. Do you agree with that?

MR. WILSON: Yes.

JUDGE McSHANE: Okay. And then it goes on, and it's got a couple different ways. Here is a couple of different ways.

And I recognize that, you know, there's objections, by the way, to the exhibits that are cited at column 23, like line 6, the some applications recognize that, so there's a pending motion on that.

So, all I'd say, but it talks about, you know, these applications. Then it goes on to, again, magnesium formation layer. Then you're going to have another layer of magnesium in an argon oxygen plasma there. You're going to have one of those.

And then, it does appear that, further down, maybe at column -- at line, let's see, 21, there is a -- formed -- wait. An interface. I'm sorry. The interface layer 555 may be formed from the crystalline cobalt ferric alloy, followed by amorphous layer can -- okay. So there, that's the example where you had that optional crystalline, as you characterized it, an optional crystal alloy layer, right? Correct? So --

MR. WILSON: So that is an example. That is not the example that I referred to. These electrodes, this optional layer is actually above the tunnel barrier layer.

JUDGE McSHANE: Oh, okay.

MR. WILSON: So this optional layer 555, if you look back at -- you can see the figure there on Slide 8, my Slide 8. You can see 55 is this thin pink layer just above the tunnel barrier.

JUDGE McSHANE: Okay.

MR. WILSON: So this is a separate optional layer above the tunnel barrier.

JUDGE McSHANE: Okay. So, as you see it, when you're starting at, like, line 6, what are the options here if you have the amorphous phase of the cobalt ferric boron layer? What are the options here? What is this? In your view, what is Parkin describing as to options for the formation of that tunnel barrier?

MR. WILSON: Look, sure, Your Honor, if I could first take you to my Slide 9.

JUDGE McSHANE: Okay.

MR. WILSON: And I'll explain it to you. So, if you look at Slide 9, recall that Figure 11 is an inverted form of both Figures 3A and 3B. And Figure 3A, you will see there is no layer between the cobalt iron boron electrode and the magnesium oxide tunnel barrier. In Figure 3B, you will note the thin cobalt iron layer 170 between the storage layer 175 and the tunnel barrier 120 prime. And you will see it's in that red box, if you can see it.

So, what's the difference between these two? Why is that layer there? That layer, that cobalt iron layer is there because, as Parkin will teach you in many places, many times in which -- and actually, in Exhibit 2080, which they want to -- which they improperly filed, one of the things that Parkin reiterates over and over again is you need a crystalline structure on both sides of this tunnel barrier to get a high TMR. Now, you can do that two ways, as Parkin teaches in Figure 3A and 3B.

In Figure 3A, you can simply anneal it and crystallize a portion of the cobalt iron boron layer to get your thin crystalline layer immediately adjacent to the tunnel barrier. And Parkin talks about that. He said all you will need is a thin crystallized layer adjacent to that tunnel barrier, or alternatively, you can do what's in Figure 3B, which is explicitly add a crystalline cobalt iron layer on one side of the substrate. So you can do it either way.

And then, when we get to, as Your Honor pointed out, when we get to Figure 11, I would actually point Your Honor down to the bottom of column 22, and at line 62, you will see Parkin says, in Figure 11, a layer 515 of cobalt iron boron is deposited, which is 60 angstroms thick. He describes

the composition, a sputtering target. But then, at line 66, he says an interface layer 520 of a crystalline cobalt iron may also be used.

So he's saying you can do this either way. You can either crystallize a portion of the cobalt iron boron to get your crystalline structure on the underside of the tunnel barrier, or you can explicitly add cobalt iron as a crystalline structure on the lower side of the tunnel barrier. You can do it either way. That's what he's doing here. It is not about templating.

You don't need that cobalt iron layer to template. Yes, you can. You can use it for that. And Parkin describes that over in column 3, which you're going to see Patent Owner refer to over and over and over again. You can use a lower crystalline layer for templating for epitaxy, but as we will see, a person of ordinary skill in the art plainly, readily understood that was not necessary. And in fact, as we'll see, Parkin even teaches that's not necessary.

JUDGE ARBES: Counsel, can I ask about that sentence at the bottom of column 22?

MR. WILSON: Sure.

JUDGE ARBES: Isn't there another way to read that sentence? It appears that Patent Owner reads that as not saying that the layer itself is optional, but that this particular content for the layer, crystalline cobalt iron alloy, that that is, that's what the example is. It's not saying that the whole layer is optional. Why is that an unreasonable reading of that?

MR. WILSON: So I'm glad you asked, Your Honor. If we can jump forward to Slide 12, so as you will -- this is a quote from -- this is from Patent Owner's sur-reply. Okay. First sentence says exactly what Your Honor just stated: Parkin's disclosure that an interface layer 520 of a

crystalline cobalt iron alloy may be used. That's actually a slight misquote; it says may also be used. But we'll push that aside. It does not say interface layer 520 is optional. It says interface layer 520 may be cobalt iron. Okay.

And the reason I point here is because they have helpfully highlighted the sentence for us. And so, let's take a look at that sentence. An interface layer 520 of a crystalline cobalt iron alloy -- prepositional phrase: of a crystalline cobalt iron alloy -- may be used.

Now, what we know from basic grammar is the verb describes action of the subject, not the object of a preposition. So, if we -- they've helpfully set off the prepositional phrase here with bold and italics: of a crystalline CoFe alloy. So, what we know is may be used applies to interface layer 520. That's basic grammar. Interface layer 520 may be used. Of a crystalline cobalt iron alloy modifies the subject, right? So the verb applies to the subject, not the object of a preposition. It's a ridiculous argument. So --

JUDGE ARBES: Could we go back for a moment? I'd like to revisit Slide 9, if I can.

MR. WILSON: Sure.

JUDGE ARBES: Am I understanding your argument about Figures 3A and 3B that the layer that you have in red there, the cobalt iron layer 170, that is shown in Figure 3B but not in Figure 3A. So they're two different embodiments: one that has the thin layer, one that does not, right?

MR. WILSON: That's correct.

JUDGE ARBES: Okay. And does that, if you flipped Figure 3B, that layer 170 that you have in red there, that would -- would that correspond to layer 520 in Figure 11?

MR. WILSON: That is precisely correct, Your Honor.

JUDGE ARBES: Okay. So, what you're saying is, if you would flip Figure 3A, that does not have that layer that shows, that would be the same thing as Figure 11 without layer 520.

MR. WILSON: That's correct, Your Honor.

JUDGE ARBES: Okay.

MR. WILSON: Yep. And that's how we also know that layer 520 in Figure 11 is optional because Figure 11 is an inverted form of both Figures 3A and 3B.

JUDGE ARBES: Does Parkin describe layer 170 in red the same way that it describes layer 520? I believe it was an interface layer.

MR. WILSON: So --

JUDGE ARBES: I just want to make sure that this analogy is right.

MR. WILSON: Let me find it. So, Parkin describes it at column 19, line 29: Figure 3B shows a device 300 prime in which a thin interface layer 170 comprised of a crystalline cobalt iron alloy is first formed on the MgO tunnel barrier. So, yes, describes the as an interface layer.

All right. I'll now move to Slide 10 of my presentation. Okay. What we have on Slide 10 is Patent Owner's sur-reply, and this is their first attempt, and their only attempt, to refute inverted Figure 3A's disclosure. Right. It occurs in their sur-reply, which, as I mentioned earlier, is too late, but if we consider it, let's look at what it says. It says: Both experts refute Petitioner's misreading of Parkin's inverted Figure 3A.

And they first cite Dr. Bokor, claiming he admitted, in that sentence, Parkin is not describing the composition of the layers.

And they're talking about the sentence -- I'll read it. Again, it's Parkin. It says the MTJ device of Figure 3A may also be inverted such that the reference ferromagnetic electrode is formed above the tunnel barrier, and the storage layer is formed beneath the tunnel barrier.

And what Dr. Bokor says here is correct. In that sentence, Parkin is not describing the composition of the layers. The additional citations to his testimony are of similar content. They are totally irrelevant to what that discloses.

Next, you see Exhibit 1101 here, which is Dr. Ross's deposition transcript. And we just saw earlier, three pages before this, that she admitted that Parkin discloses this inverted embodiment. She admits that the storage layer 155 can be comprised of cobalt iron boron. She admits that it goes under the tunnel barrier. Here, they quote her as saying, Parkin merely says the device may be inverted; it doesn't give any further details. We know that is false from her earlier testimony. A page later, she says, we don't know which of the layers are actually flipped. She just testified three, four pages earlier that the storage layer goes under the tunnel barrier, so we know that's also false.

Finally, they say Dr. Bokor conceded he found no disclosure in Parkin of forming MgO(001) on amorphous cobalt iron boron, other than a different disclosure about Figure 11's interface layer 520 allegedly being optional.

If we turn to Slide 11, we can see that that is false. This is from his opening declaration, where he says: Parkin taught that the ferromagnetic electrodes shown in Figure 3A may be inverted so that the storage layer is formed beneath the tunnel barrier. Thus, one of skill would have understood

that Parkin's cobalt iron boron layer 175 may be used as an upper or lower electrode, or both.

So, sum total, that is the total attempt to rebut Figure 3's inverted storage layer under MgO(001). They have nothing. Parkin discloses MgO(001) above amorphous cobalt iron boron.

Now, we'll talk about Figure 11, which is the second example in Parkin. So, if you turn to Slide 12, they make three attempts. They have three arguments against Figure 11's disclosure of the same thing. The first one here is the one we just discussed, which is the structure of the sentence. They say it's not talking about the interface layer 520 being optional. It's talking about the content of that layer. That's absurd based on basic grammar.

So, if you turn to Slide 13, the second argument, which is addressed to Exhibits 2080 and 2081, so, as I mentioned earlier, those exhibits, and Your Honor, Judge McShane, mentioned earlier, those exhibits are subject to our motion to strike and should not be considered.

But if they are considered, I want to talk about two things. First, does it make sense that a reference that is incorporated by a reference into a patent could contradict the explicit disclosure in that patent? I think we would all agree that doesn't make sense. But number two, thankfully, we don't have to worry about that because Exhibits 2080 and 2081 do not contradict Parkin's explicit disclosure of inverted Figure 3A or MgO(001) over cobalt iron boron in Figure 11.

Now, I'm going to -- we did not get a chance, obviously, because they filed this with their sur-reply, we did not get a chance to submit any briefing

on Exhibit 2080 or 2081. So let me read to you a few passages from Exhibit 2080, and let's see whether it contradicts Parkin's disclosure or not.

I want to start at page 22. And this is original page 14. It's Patent Owner's number page 22, and I want to start at line 23 at the bottom. This is in the summary of the invention. And I'll give you a second to pull it up.

JUDGE HAMANN: Can you repeat that -- where you're referring to, Counsel?

MR. WILSON: It's page 22, line 23, in Exhibit 2080.

JUDGE HAMANN: Thank you. Thank you.

MR. WILSON: Okay. In the summary of the invention, Parkin says: In preferred methods, highly oriented (100) MgO barriers are formed without using single crystalline substrates or high deposition temperatures, thereby facilitating the manufacture of devices using standard deposition techniques on polycrystalline or amorphous films.

He goes on to say, post anneal treatments are preferred to improve the tunneling magnetoresistance, which can exceed 160 percent at room temperature.

Now, fast forward to page 47, line 13, and let's talk about those anneal treatments. Parkin says: Thermal annealing may also improve the crystallographic texture of the MgO layer 120 prime and the surrounding layers, so that the structure prior to annealing may not be substantially (100) oriented, but after thermal anneal treatments in the temperature range described above the crystallographic texture becomes substantially (100) oriented.

Now, what is Parkin saying? I can have an amorphous MgO layer, and after I anneal it, it will turn to (100). I don't have to lay it down by epitaxy. I can lay it down and generate an amorphous MgO layer, and if I anneal it, it is going to turn to (100). That's what Parkin discloses. There are two ways to make MgO layers. You can do it by epitaxy, but you can also do it by laying down an amorphous MgO layer and annealing it to crystallize.

So, if you consider Exhibit 2080, you have to consider the whole of the document, and Parkin has expressed teaching that there are two ways to make MgO. So, the fact that he discloses making it through epitaxy does not preclude making it -- growing MgO on an amorphous surface.

Now, let's jump ahead to Slide 15, because, after reading Parkin's disclosure of Figure 3A, inverted Figure 3A, Figure 11, and now Exhibit 2080, let's take a look at what the '134 and '167 patents have to say on this subject.

If we take a look at Slide 15, the '134 and '167 Patents have a total of two paragraphs regarding Figure 11, the cobalt iron boron embodiment. The first one is shown on Slide 15. It begins: Hereafter, an MTJ device according to a variation of the embodiments in the invention will be described with reference with the drawings.

Which embodiments? It doesn't say. Okay. What it does go on to describe is Figure 11. And you can see the highlighted language there, which refers to the single-crystal or poly-crystal MgO. This highlighted language here is the only description of the magnesium oxide layer in Figure 11. And you can see that there is no discussion of how it is made. There is

no surprising result described here. There is no aha moment of, guess what? It's surprising that we can grow MgO over an amorphous substrate. There's no description, even of how to do it at all. There is far more description in Parkin of how to do this than there is here. There is none here.

If we look at Slide 16, you will see the second paragraph. The second paragraph says, as the amorphous magnetic alloy, iron cobalt boron, may be used. Iron cobalt boron is the same thing as cobalt iron boron.

In the highlighted language, it says: Although an anneal process after the preparation of the MTJ device might cause the amorphous magnetic alloy in the electrode layers to be partially or entirely crystallized, this would not lead a significant deterioration of the MR ratio.

Now, what it's describing is annealing might cause the amorphous magnetic alloy in the electrode layers, nothing about magnesium oxide here. It says, to be partially or entirely crystallized, this would not lead to a significant deterioration of the MR ratio. It's going to hurt you, but it won't hurt you that badly, so it's okay.

Now, Parkin teaches the opposite. Parkin teaches you that you want to anneal to crystallize because you need that crystalline layer on both sides of the MgO. We all know that's true. Now, Parkin taught you far more about how to do this than these patents. This patent tells you absolutely nothing about how to grow this MgO over amorphous cobalt iron boron. It just says it's there. And this is, by the way, the '167 Patent, claims a method of doing this.

So, if this were some great discovery, why isn't it here? Why don't they explain how to do it? Parkin explained how to do it. Why don't they?

How can they demand more of the prior art, which, by the way, does disclose far more, how can they demand more of the prior art than their own patent provided? Now, you're going to hear them talk about Yuasa's various articles. They're irrelevant. This is the patent. This is what the patent provides.

Now, we turn to Slide 17. You're going to see the third argument against Figure 11. It says: multiple publications acknowledge Parkin's well-known work, yet attribute discovery of MgO(001) formation on amorphous cobalt iron boron to Yuasa. No one has ever interpreted Parkin the way Petitioner does, despite Parkin's work having been cited over 4,000 times.

What they're talking about is Parkin's Nature article, which does not describe what we just looked at in inverted Figure 3A and Figure 11, or in Exhibit 2080, for that matter. But it is plainly clear that Parkin disclosed growing MgO(001) over amorphous cobalt iron boron and how to do it, whereas the '134 and '167 Patents do not explain how to do it.

So, I want to pause right here for a second because, clearly, there is overwhelming evidence that Parkin discloses this. If Parkin disclosed doing this, as we said in our petition from the beginning, that is a reasonable likelihood of success. The prior art teaching to grow MgO(001) over amorphous cobalt iron boron is a reasonable likelihood of success. It is legally sufficient. We can stop right there.

But just in case the Board is troubled by the all of Patent Owner's rhetoric on reasonable likelihood of success, let's go through the evidence of reasonable likelihood of success, and let's talk about that as well. So we turn to slide --

JUDGE HAMANN: Counsel?

MR. WILSON: Sure.

JUDGE HAMANN: This is Judge Hamann. And I apologize if I missed the crux and fundamentals of your argument. But as to what is Petitioner's response as to the argument that this was, you know, a discovery that was attributed to Yuasa and not Parkin? You know, it's sort of the cited reference in the -- collectively in the field.

MR. WILSON: So, as I explained, what they're citing when they talk about Parkin's work being cited 4,000 times is not his patent. It's his Nature article from 2004. So his patent is not discussed in literature, right? Only his Nature article is. So they didn't look at what Parkin put in his patent, Exhibit 1062, which we're relying on. They only looked at his Nature article. So, yes, they missed the fact that Parkin disclosed this before Yuasa.

(Simultaneous speaking.)

JUDGE McSHANE: I'm sorry to interrupt, Judge. But I think you were referring to Parkin's patent, and the Nature article, those are not patent, and those are not Parkin, correct?

MR. WILSON: The Nature article is Parkin. Parkin has a --

JUDGE McSHANE: Oh, I'm sorry. The Nature article is Parkin. Okay. Thank you.

MR. WILSON: You will see Yuasa cites Parkin, and in fact, attributes a 220 percent TMR to Parkin via his Nature article in an MgO cobalt iron boron MTJ. But in that particular example in that Nature article, Parkin's cobalt iron boron layer was above the magnesium oxide tunnel

barrier layer. He did not describe growing it in the inverted fashion that he does in his patent.

JUDGE McSHANE: I got you. Thank you. I'm sorry to interrupt.

MR. WILSON: Sure.

JUDGE HAMANN: Just as to, I guess, the argument, Counsel, you just made, you know, that obviousness relation to Parkin and what was being looked at, what about Petitioner's response in the argument which I think is being made that, regardless of, you know, what Parkin, in whatever it was, which may or may not show, but that this was discovery that was attributed to Yuasa?

MR. WILSON: So I guess I'm not following, Your Honor. I think we have proved that Parkin got there first. Parkin's Exhibit 1062 describes these features. It describes this structure. It describes how to do it. This case is about the '134, '167 Patents, and the prior art that's asserted against it. It is not about Yuasa's publications, his later publications, which is what they're referring to here. They're referring to Yuasa's publications versus Parkin's publication in Nature. Totally irrelevant --

JUDGE HAMANN: I was -- I understand, Counsel. And maybe Patent Owner is not making the argument that I'm suggesting that they may have made now.

But regardless of Parkin, if you have a later publication, for example, that people point to saying, no, Yuasa discovered it, that may suggest that it wasn't known before. Obviously, Petitioner says Parkin, you know, came first. But I'm just trying to understand. You know, I think it's part of it, potentially, if you have, you know, other later publications that people in the

field, for example, point to as making the discovery. And that's what I'm trying to understand, the response.

I understand that Petitioner believes that Parkin was first and Parkin disclosed everything. I'm sort of more focused on the latter part. It doesn't really matter exactly what Parkin, you know, discloses or didn't. It's whether, you know, people in the field of endeavor say, hey, this is a discovery. Does that mean they didn't know about Parkin, or is it that they didn't say that? I'm trying to get to that perspective of, I think, what was part of Patent Owner's argument.

MR. WILSON: I think that means at least they didn't know about Parkin. That's why there's the legal rule, for example, that if you want to claim nexus for secondary indicia, it needs to be something that's not in the prior art, right? You can't claim nexus based on a claimed feature that is already disclosed in the prior art. Here, there is no question, but that Parkin disclosed growing MgO(001) over amorphous cobalt iron boron, no question.

Two examples: inverted Figure 3A, Figure 11. We've seen all the arguments against it. They are nonsense. That is established. They cannot come back with secondary indicia of non-obviousness, praise, whatever that is based on that structure, because Parkin disclosed it earlier. So, whether those people understood that, whether they were just making it up, whether they were misinformed, doesn't really matter. Legally, that evidence cannot show non-obviousness. Parkin disclosed the same structure.

JUDGE HAMANN: Thank you.

MR. WILSON: And to put a finer point on it, let's look back at Slide 14. In Slide 14, we can see this is Patent Owner's sur-reply. They say, Petitioner's assertion that the '134 Patent provides nothing on how to fabricate MgO(001) on an amorphous layer is false.

And there, they describe the same passages I just showed you, column 8 to 9, modifying an embodiment in which MgO is not epitaxially grown. Recall that it didn't say which embodiment was modified. It just said a variation of the embodiments. We don't know which embodiment it was modifying.

They go on to say: grown to use cobalt iron boron electrodes and an anneal process after preparation of the MTJ device, which yielded Figure 11's MTJ with MgO(001) and crystallized cobalt iron boron.

Recall that there was no description in that passage of how you got to MgO(001). It said annealing to crystallize the electrodes. Nothing about MgO. That is not disclosed in their patents.

So, an additional point, Your Honor, Judge Hamann, is that the patents are not commensurate with the later articles. The patents do not describe how to do this. And so, if a person of ordinary skill in the art was surprised, well, then the patents are not enabled. So I think the real answer is, everyone here thought a person of ordinary skill in the art knew how to do this. And we're going to see that in spades momentarily.

If we look down at the bottom of this page, you can see the cite to Exhibit 2023, page 2, praising Yuasa's novel idea that formed MgO on cobalt iron boron amorphous and showed that, upon annealing, cobalt iron boron and MgO can be crystallized to BCC structures. Who talked about

that? In what we've looked at, who talked about that? Parkin described that in detail. We just saw in Parkin where he teaches that before these patents. Do these patents, the '134 and the '167 Patents, describe that? They do not. That is not taught in either one of these patents.

So they're attributing an invention to Yuasa that he plainly did not invent on both counts. It's not in his patents, so he didn't disclose it there. And Parkin disclosed it first, in this level of detail, by the way. But let's --

JUDGE HAMANN: Counsel?

MR. WILSON: Sure.

JUDGE HAMANN: This is Judge Hamann. Just not to belabor this point, but the exhibit I believe was 2023 that we were just looking at that was cited for a praise, what's Petitioner's position as to whether there is any praise? And you know, is it, sort of, there is praise, but it's just something else than summary of -- that's not relevant to the patent in the claims, or is it that there's no praise, or what exact -- how would Petitioner could address that?

MR. WILSON: So it is, I think, clear from the record that they have multiple examples of someone praising Dr. Yuasa for something. None of it can be tied to the claimed inventions in the '134 and '167 Patents because these features and how to do this, how to grow MgO(001) on amorphous cobalt iron boron, is not described in these patents. And to the extent anyone thinks it is, Parkin was there first. Parkin describes in far more detail how to do this, precluding any nexus.

So, at least, the praise is not for the '134, '167 Patents, and if you think it is, Parkin got there first, legally precluding any connection to the claimed invention in the '134 and '167 Patents. So they are doubly wrong.

JUDGE HAMANN: Thank you.

MR. WILSON: But let's talk about the state of the art in 2004. I want to turn to Slide 18 and the reasonable likelihood of success.

So let me, let me say, Patent Owner comes out very strong that you had to epitaxy. There was no way to grow MgO(001). Apart from epitaxy, no one thought there was. On and on, they go. What they cite for that are two things: the first, Yuasa using the word surprisingly in Exhibit 2006, and I'll get there in a moment; the second is their asserted world-renowned crystal growing expert, Dr. Ross.

So I'm going to start with the world-renowned crystal growing expert, Dr. Ross. What does she rely on? We can see paragraph 159 of her declaration here, on Slide 18. She says: A POSA would not have been able to predict what crystal orientations would form (nucleate) on an amorphous surface in the thicknesses used for MTJ barriers (i.e., less than 10 nanometers) because it was known that initial crystal formation on amorphous substrates results in randomly oriented islands of crystals which may evolve into a preferred texture as the film grows thicker.

Can't get MgO(001) in less than 10 nanometers because it was known that initial crystal formation on amorphous substrates results in randomly oriented islands of crystals, okay? That's our world-renowned crystal growing expert. What does she cite for that?

She first cites Petrov, Exhibit 2065, which does not discuss magnesium oxide at all. It's completely irrelevant to the discussion. And by the way, her first cite there, S118, is to a portion of the reference that discusses elemental crystallization. Unsurprisingly, our crystal growing expert admitted that magnesium oxide, the compound, is not an elemental substance. Okay? So she cites not only a reference that doesn't discuss magnesium oxide, a plainly irrelevant portion of that reference. So we can skip that one.

Let's talk about Exhibit 2067, Aboelfotoh. This is the last of her evidence. Aboelfotoh is a 1973 IBM paper. At least it discusses magnesium oxide. But our world-renowned crystal growing expert was unable to find anything on magnesium oxide more recent than 1973. Now, was that because nobody was researching magnesium oxide since 1973? Of course not. She had many, many references sitting right in front of her to choose from, but she elected not to talk about them. She elected not to consider them. Why not? She's a world-renowned crystal growing expert. Why did she not consider these references? Well, we'll talk about it.

Slide 19, Renault describes Aboelfotoh, Exhibit 2067. It says: The growth may be initiated with an initial random orientation of small crystallites, as observed by Aboelfotoh. As the deposition rate is relatively high for those films, insufficient surface diffusion tends to form energetically unstable (111) planes of lower atomic density.

You don't get any significant crystallization because the deposition rate is relatively high. So, had she maybe done a little research, she might have known why Aboelfotoh got the results that it did in 1973.

But let's look at Slide 20. Let's talk about Nagahama, a reference that was a primary reference in this IPR. It describes growing MgO seed layers on amorphous substrates. Each of the layers 202 and 203 are magnesium oxide. 202 is amorphous. 203 begins to crystallize. Those two layers are 3 nanometers each, total of 6 nanometers. That's less than 10 nanometers.

Somebody was able to grow MgO(001) on an amorphous substrate. How is that possible? She said it wasn't possible. This reference is right in front of her. What's their explanation? Oh, this is a seed layer, they say. What's the difference between a seed layer and a tunnel barrier? Where it's placed in the MTJ structure. That's it. It's not surprising that MgO(001) is MgO(001). Whether you place it on a substrate or whether you put it between two electrodes, it's the same thing.

Their second argument against Nagahama is, oh, but wait; the lower layer here, 202, is amorphous. It's not until you get to the upper layer 203 that it becomes crystalline. And so, you have a partially crystallized MgO layer, and that won't work for a tunnel barrier.

But let's look at what Yuasa says. If we turn to Slide 21, Dr. Yuasa, in Exhibit 2013, says: the MgO layer grown on an amorphous cobalt iron boron had a highly oriented polycrystalline MgO(001) structure when the thickness of the MgO is greater than or equal to 5 monolayers.

It starts out amorphous, and then it becomes crystalline once you exceed 5 monolayers. Therefore, it says: the MR ratio is expected to decrease significantly when the thickness of the MgO is less than 5 monolayers because the crystalline MgO(001) barrier is essential to produce the giant TMR effect. Thus, the observed sharp drop in the MR ratio for

thickness of MgO less than one nanometer can be attributed to the formation of an amorphous MgO barrier layer rather than the deterioration of the crystalline orientation.

Nagahama discloses exactly what Yuasa teaches. It's exactly the same. It starts out amorphous. It grows crystalline. That's what Yuasa taught.

And if you look at Exhibit 1006 -- or I'm sorry -- 2006, the APL-2005 paper, which we'll look at momentarily, you're going to see that, there, Yuasa says that the crystallization begins right at the nucleation stage. He is incorrect. The reason he is incorrect is because he first annealed that MTJ before he did his analysis. And Dr. Ross concedes that at Exhibit 1101, page 93, lines 4 through 13. So --

JUDGE McSHANE: Counsel, I'm sorry to interrupt you. Just a real quick one. Can I just flip you back to Slide 20, which is Nagahama?

MR. WILSON: Sure.

JUDGE McSHANE: And did -- to your first part of this was to that top layer, what is that top layer? Do you know off the top of your head? It's two -- I think it's -- I have a bad copy, but it looks like 205.

MR. WILSON: I think it's going to be the bottom electrode, or --

JUDGE McSHANE: In the -- yeah, well, in the --

(Simultaneous speaking.)

MR. WILSON: -- portion of the bottom electrodes.

JUDGE McSHANE: Right. And does the reference capture us that layer? I'd imagine that.

MR. WILSON: I'm sure it does. Let me pull it up real quick.

JUDGE McSHANE: Okay. I do remember that they talked about this as being a very specific way to do this, to do this growth, if you will. Oh, yeah, it said, like, for instance, in paragraph 58, right there, it says only through these steps. It had kind of a specific way to do it.

MR. WILSON: Let's see. 205 designates a magnetoresistant element having a highly oriented even interface.

JUDGE McSHANE: Okay. Thank you.

MR. WILSON: Yeah. That's in paragraph 56.

JUDGE McSHANE: Thank you.

MR. WILSON: Sure. Okay. So let's jump forward to Slide 23. Now, this is Exhibit 2006, and this is Yuasa's APL-2005 paper, which they spend a lot of time touting. And there is, in the upper left-hand corner, you see: Surprisingly, the MgO layer grown on the amorphous cobalt iron boron layer showed a good crystalline structure with a (001) fiber texture.

Now, what does Dr. Yuasa cite to prove that this was surprising? Nothing. His self-serving statement cannot, cannot outweigh all the contrary evidence in the record that this was well-known. And in fact, if you read down in this paragraph to the highlighted language, he says: Note that MgO layer grown on amorphous silicon nitride substrates by ion beam assisted deposition is also (001) textured right at the inception of the deposition.

So he says that he knew that MgO could be grown in (001) texture right at the inception of the deposition on an amorphous substrate. He knew it.

And if we look, that citation is to Wang 1997, there on the right-hand side. And you can see them talking about the crystalline pattern of MgO at

about 20 angstroms. That's two nanometers. They say, which is the limiting diffraction thickness of the RHEED. Now, let me talk about the RHEED for a second. The RHEED analysis allows you to see the crystal structure as it grown.

When you look on the left at Dr. Yuasa, they annealed their MTJ, and then they check it to see what the structure was. So, when they say the texture -- MgO(001) texture developed from the initial stage of growth, i.e., the nucleation stage, they have no basis for that. And Dr. Ross conceded that, as I said, at Exhibit 1101, 93, 4 through 13.

But, back to Wang 1997, Wang is using RHEED, which allows you to see the crystallization as it's occurring. So they say, the pattern suggests that the MgO molecules form well-aligned small 3D crystallites right at the inception of the deposition, i.e., right at the nucleation stage. You can grow MgO(001) on an amorphous substrate.

Now, Patent Owner is going to come back and say, oh, but they're suing ion beam assisted deposition; you can't make an MTJ like that. Why does Yuasa cite? Why does Yuasa think it's right? He certainly thought it was relevant enough to describe it and cite it in his paper on MTJs. So it's just yet another example of how to do this.

If we turn to Slide 24, and we look at Dr. Yuasa's 2004 Nature Materials paper, Exhibit 2008, we see him say: Even textured iron/MgO/iron MTJs with (001) orientation, which can be prepared on any kinds of substrates by using a highly oriented MgO(001) seed layer.

And what does he refer to there at 21? Inaba, which is shown on the right. Inaba describes MgO seed layers, from zero to 20 nanometers,

deposited on glass substrates, which are amorphous. They even describe a 10-nanometer-thick MgO seed layer, which shows well-developed (100) texture, okay, grown on an amorphous substrate. So there are multiple ways to do this. A person of ordinary skill in the art understood how to do this.

But the best is the last one: Tonouchi. Turn to Slide 25. Now, Exhibit 1036, so at each of these stages, recall this is Yuasa citing these references in his own papers. Our world-renowned crystal growing expert, Dr. Ross, refused to look at any of those in forming her opinion. She focused on a single reference from 1973 about MgO.

She talks about Wulff, shown here on Slide 25. And you can see what Wulff says in Exhibit 1036, on the left: Apart from epitaxy, MgO grows with strong preferential (100) orientation regardless of the substrate selection. He cites Tonouchi for that, which is shown on the right.

When I asked Dr. Ross why she refused to look at Tonouchi, cited in the reference that she actually discusses and mischaracterizes, she said because it wasn't Wulff's experiment. Now, would a person of ordinary skill in the art ignore Tonouchi because it wasn't Wulff's experiment? I don't think so.

Let's look at Tonouchi on the right. In the upper right-hand corner, you can see that Wulff almost directly quotes from Tonouchi. Tonouchi says: Apart from the epitaxy, MgO is known to grow with strong preferential (100) orientation regardless of the substrate selection.

So let me pause right there for a second. Let's just analyze that sentence. Remember that the pattern growth using a crystalline underlayer is epitaxy. Tonouchi says, apart from epitaxy -- that is, apart from using a

pattern -- MgO is known to grow with strong preferential (100) orientation regardless of the substrate selection.

All we needed to show was a reasonable likelihood of success. Now, ask yourself when you look at the sum total of the evidence, when you look at the '134 and '167 Patents and their lack of description of how to grow MgO on an amorphous substrate, ask yourself, given the voluminous evidence here, is it more likely that a person of ordinary skill in the art, and the fact that Yuasa thought, after all the references he cited, that a person of ordinary skill in the art understood how to do this, and it was no surprise at all? I think that's plainly the case.

So, with that, Your Honors, I think that's it for my opening presentation. If there are no further questions, I'll turn it over to my colleague, Monica Arnold, who's going to talk about the motions to strike and motions to exclude.

JUDGE McSHANE: Thank you, Counsel.

MR. WILSON: Thank you.

MS. ARNOLD: Good morning, Your Honors. Monica Arnold for Petitioner. Just for my clarification, did you want to hear all our arguments for all the motions right now, including the ones that we are opposing, or did you want to do this in a different way?

JUDGE McSHANE: I think all the arguments would be great. Thank you.

MS. ARNOLD: Okay.

JUDGE McSHANE: I know it's a little out of order, but that's how it ends up.

MS. ARNOLD: Yeah. No, that's fine. I just wanted to confirm before I started talking. Okay.

Well, I'll start with Western Digital's motion first, and then I'll discuss IP Bridge's motions.

Western Digital's motions to strike should be granted.

JUDGE HAMANN: Counsel?

MS. ARNOLD: Yes.

JUDGE HAMANN: Counsel, this is Judge Hamann. I apologize to interrupting right off the bat. If you could refrain, at this point in the course of the proceeding, I don't know who the parties are, so using petitioner and patent owner is preferable. It just gives me -- otherwise, it gives me that pause trying to figure out who you're talking about.

MS. ARNOLD: Sure. Yes, that's fine. Yeah.

JUDGE HAMANN: Thank you.

MS. ARNOLD: So, Petitioner's motions to strike should be granted. Patent Owner improperly filed Exhibits 2080 and 2081, which is certified, without authorization that it knew it needed. This enough to grant our motion. Filing them with this motion to strike does not wash away that it was never authorized to file them in the first place.

Patent Owner forfeited its opportunity to rely on these exhibits by not filing them with its Patent Owner's response. Patent Owner's late submission of these exhibits would highly prejudice Petitioner, violate its APA rights because Petitioner no longer has the opportunity to respond to the merits of these -- of this evidence. And I'm happy to take any questions about our motion.

JUDGE HAMANN: This is Judge Hamann. I just have a couple questions, and it's sort of, it's, I think, how the parties are characterizing some of this. You know, Exhibits 2080 and 2081, I believe, were filed the same day as the motion to strike, but also as the deposition transcript and the sur-reply, if I remember the record correctly.

And so, assuming that's correct, first off, I'm not sure if you know off hand if that's correct, but it seems like, to the extent that, you know, one of the arguments being made is that, you know, these are part and parcel of the deposition transcript. And certainly, the filing of a deposition transcript is not uncommon at the stage it was filed. So, to the extent that argument holds water, what is Petitioner's response to that?

MS. ARNOLD: So, Patent Owner relied on this, on these exhibits, for certain merit arguments that should have been argued in its Patent Owner's response. So it wasn't proper rebuttal. It should have been filed earlier. That it -- it was originally filed, yes, with the deposition, then its motion to strike, and then, finally, its sur-reply. But it knew it needed authorization because it asked Petitioner for authorization before filing it.

But then, it got in -- but then it was ultimately attached with its motion to strike, and its argument that it's not new because it cites to it in its sur-reply and had already been filed into the record doesn't matter because it was never given authorization to file it in the first place. All of its reliance to the merits of Exhibits 2080 and 2081 should have been included in its Patent Owner's response.

A sur-reply is just a rebuttal, and most of the time, typically, the only things that are allowed to be filed as exhibits are the deposition transcript.

But that doesn't mean any exhibit that was discussed during the deposition is fair game; otherwise, anything would be allowed to be filed late in the game, and Petitioner hasn't had an opportunity to respond to the merits to any of them.

JUDGE HAMANN: And I don't recall; did the Petitioner seek an opportunity, other than its motion to strike, to respond to the sur-reply, this aspect of limiting these exhibits in the deposition transcript?

MS. ARNOLD: No. We just moved to strike. We requested authorization to move to strike these exhibits. We requested it. Our first email was after it was filed with its motion to strike, and then, when, a week later, the sur-reply was filed, and then we followed up again and requested again authorization to file a motion to strike, which was then granted.

JUDGE HAMANN: And then I won't belabor this too much longer, but I'm just trying to understand. To the extent, we -- I'm not saying we reach any determination, but to the extent we view Exhibits 2080 and 2081 as part and parcel to the deposition transcript, which in and of itself, in normal course, may be filed at the appropriate time, and you know, Petitioner certainly has raised prejudice arguments, what would be a way for a Panel to address those pretty hard cure of prejudice that any prejudiced petition may face? And if you think there's -- if nothing comes to mind, you don't need to raise it now, but reserve it and talk about it.

MS. ARNOLD: I believe the way to cure prejudice would be allow Petitioner to address the merits of the evidence.

JUDGE HAMANN: Okay. Thank you.

MS. ARNOLD: And I --

JUDGE McSHANE: Counsel?

MS. ARNOLD: Yes.

JUDGE McSHANE: I'm sorry.

MS. ARNOLD: No, go ahead.

JUDGE McSHANE: No, no. Finish your thought, please.

MS. ARNOLD: You know, I think, this tribunal's case, *Satco Products v. Seoul Semiconductor*, is on point. It explained that, you know, it struck exhibits that were filed with its sur-reply, finding that it was not proper rebuttal evidence, as it was not a deposition transcript itself. And with a sur-reply, only exhibits of a deposition transcript are typically allowed to be filed without authorization.

I mean, the thing, the point note back, if exhibits were allowed to get in in a sur-reply or after the petitioner's reply, just because they were discussed in a deposition, then that would be used all the time to get in new evidence. The time to have brought this up was in the Patent Owner's response, as Mr. Wilson had discussed related to the merits of Parkin and the timing of when certain disclosures about Parkin were discussed along the time course of this case.

Patent Owner raised Figure 11, Parkin's Figure 11, in its preliminary response. It cited the disclosures in Parkin that included Parkin's incorporation by reference of Exhibits 2080 and 2081. If they were that important then, they could have raised them then. They could have raised them in the Patent Owner's response. It's not proper to slip them in in a deposition transcript at the end of this case, in a sur-reply, and not give Petitioner the opportunity to respond to the merits.

Judge McShane, you had -- and sorry, Judge Hamann, if that doesn't answer your question.

JUDGE HAMANN: Yeah, I was going to ask a question now, but Judge McShane, you can go ahead with your question.

JUDGE McSHANE: You go ahead, Judge. Thank you.

JUDGE HAMANN: And I don't want to belabor it, and I apologize if I am, but I'm just trying to understand what the flow of everything here, because I do think there are legitimate concerns as to prejudice, but also, I think, you know, when arguments are warranted.

You know, I heard that the preliminary response, you know, they knew about it. I think there's no doubt they know about Figure 11, obviously, but I don't think there's an obligation then to -- the embodiment in the preliminary response that's sort of gone by the time the denial comes. And for whatever reason, Patent Owner chose not to, you know, to deal with Figure 11, let's say. And then, if it comes up in the reply, you know, Petitioner chose, at that point, I mean, with regard to whether it should be talked about or whether it relates to the response, but it just seems like the reason the timing of this somewhat relates to the reply itself.

And you know, I -- and I'm just trying to understand, you know, why Patent Owner shouldn't be allowed, in a sense, to address your reply arguments, as what their, obviously, in their sur-reply. And this is more away from the motion to strike, but you know, the motion to strike and I think the sur-reply and the subject matters are intertwined.

MS. ARNOLD: Okay. So Patent Owner raises Parkin's Figure 11 in its preliminary response, and the Board invites the parties for further

briefing. We all saw that slide. I don't recall which slide number it is right now. Then the first opportunity for Patent Owner to respond is then its Patent Owner's response, and it's silent to Parkin's inverted Figure 3A and Figure 11.

Petitioner's first opportunity to respond to the Board's invitation was its reply, so we did. So we briefed on Parkin's Figure 11 and responded and explained our position about what that discloses. We're allowed to do that because we are allowed to, as Petitioner, address anything that was in the Institution Decision.

But *Parus v. Google*, the Federal Circuit's *Parus v. Google*, says that if the Patent Owner raises something in a preliminary response and then is silent in its Patent Owner's response, it's waived that argument.

So it waived these arguments that it thought were important as to Parkin's Figure 11 by not raising them in the Patent Owner's response. But we are still entitled to be able to respond to what it said in its preliminary response and whatever we think is important that came out of the institution decision on reply. Those are the rules.

JUDGE HAMANN: Then why wouldn't that open the door for Patent Owner, in the sur-reply, to respond to the reply?

MS. ARNOLD: It was supposed to respond in the Patent Owner's response, not the sur-reply.

JUDGE HAMANN: Okay. Thank you.

MS. ARNOLD: Thank you, Judge Hamann.

JUDGE McSHANE: And no further questions from me.

MS. ARNOLD: Okay.

JUDGE McSHANE: Thank you. You answered everything well, so --

MS. ARNOLD: Okay. So that is Petitioner's motion to strike. Actually, Your Honors, I'd like to reserve the rest of our time right now. I need to hand it over to Patent Owner -- sorry -- if there are no further questions.

JUDGE McSHANE: Okay. That's your prerogative. Okay. Now, I see on the official game clock that we're at about, let's give it 22 minutes, and you get an additional 6 minutes. So I feel like I'm in the -- I'm watching an NBA game. So we're at 28 minutes for rebuttal.

And actually, let me ask you, folks. It's 10:22 on my clock. So perhaps we should take, let's say, a brief break and be back, say, at 10:35. Does that work for everybody?

MR. WILSON: Sure.

MR. WICHMAN: Yes, Your Honor.

JUDGE McSHANE: Okay. Thank you. So we'll see you at 10:35.

(Whereupon, the above-entitled matter went off the record at 10:23 a.m. and resumed at 10:33 a.m.)

JUDGE McSHANE: We are back to hear Patent Owner's arguments in the combined hearing for IPR2024-01447 and -01493. So, Patent Owner, you may proceed. And do you wish to reserve surrebuttal time?

MR. WICHMAN: Yes, Your Honor. Patent Owner would reserve 15 minutes for surrebuttal.

JUDGE McSHANE: Thank you.

MR. WICHMAN: Okay. Thank you, Your Honor. So, let me begin. Unfortunately, we have to make some objections here. In the Petitioner's presentation, when they argue about Figure 3B in Parkin -- this is with connection with Slide 9 -- that appeared in an opposition paper to a motion. That's not a part of any merits briefing. That was never an argument made in a POR, and there was never an argument made in a reply; this analogy layer 170 being formed above MgO barrier in Figure 3B.

But let's talk about their arguments here about Exhibit 2080. So, you heard a lot of argument from Petitioner's Counsel about what this '835 application shows, arguing that it shows what they said. Well, that's new argument. There's no expert support for that.

And let's talk about who is laying behind the law here. Dr. Bokor admitted at deposition that he reviewed these applications before forming any of his opinions, which mean he knew about them before he provided declaration to support the petition, and he knew about them before he provided declaration to support the reply.

There's -- it's undisputed that Petitioner knew about these applications. They are incorporated by reference in the Parkin Patent, the '896 Patent. And the Petitioner did not file these exhibits when, as it was required to by statute, to serve the prior art references that it was relying upon. It did not identify these materials as considered in any of Dr. Bokor's declaration. So they concealed his review of these applications. And they did not produce these applications as mandatory discovery, because they took -- they showed -- they provide evidence that's contrary to a petition -- a position that was taken for the first time in their reply briefs.

JUDGE HAMANN: Counsel?

MR. WICHMAN: Yes.

JUDGE HAMANN: This is Judge Hamann. I'm just trying to understand what some of your argument is saying they should have filed Exhibits 2080 and 2081 as a statute as part of the art; is that correct?

MR. WICHMAN: Under the Statute 320 -- 312(a). So, three, they're required to file the complete reference that they're relying upon as their ground of invalidity. And so, when they filed Parkin, the Parkin Patent includes these applications, which are incorporated by reference. Otherwise, if they take the position that they were not needed to be filed, well, then they're there anyway. That's our position.

JUDGE HAMANN: So is Patent Owner suggesting that any kind of reference, you know, cites to or incorporates by reference another document, all of those need to be filed under our statute?

MR. WICHMAN: Or no. They need to be filed when they become relevant. And they became relevant. If they were going to make this argument about Figure 11 and how the MgO barriers form, that makes it relevant, and they should have filed regardless, regardless. As soon as they made this argument on reply, they were required to produce these mandatory discovery because it contradicts their argument.

Moreover, they did not redirect Dr. Bokor at deposition on any of this argument that they're making now. And since they knew about it since they filed the petition, they can hardly claim prejudice.

Now the attorney seems to be testifying in place of their expert as to what this application shows. And in fact, they argued. It just, Counsel for

Western Digital, Petitioner, just told you that the '835 application teaches forming MgO on amorphous coated seed. They cited Exhibit 2080, pages 22 to 23, as saying that, thereby, this facilitates manufacture of devices using the standard deposition techniques on amorphous films.

Well, I'd like you to look at what Parkin says at column --

JUDGE HAMANN: Counsel?

MR. WICHMAN: Yes.

JUDGE HAMANN: This is Judge Hamann. And before we get into any of the substance of some of the references, I'm just really trying to understand the posture of how these documents came into the record. And some of the other, you know, arguments you just made -- you know, talking about prejudice, I think you said there was no prejudice. You know, these Exhibits 2080 and 2081, I believe, were filed after the reply, as I understand it. So I don't understand what vehicle Patent Owner suggests Petitioner would have had to address these documents after they were filed.

MR. WICHMAN: Dr. Bokor admits he reviewed these, even before the petition was filed. Petitioner knew about these applications and what was in them long before they filed a reply. They just chose not to address them. So, and then they consider --

JUDGE HAMANN: But they -- they didn't -- I'm sorry. Go ahead. I didn't mean to cut you off, sir.

MR. WICHMAN: Well, Your Honor, they knew about it. They -- it's in dispute. Dr. Bokor admits he reviewed these applications. He knew what was in them when he formed his opinions. And yet, they concealed his review by not identifying it as a material that was considered in forming his

opinions. And they did not produce it as under mandatory disclosure rules because it discloses information adverse to the position that they later took in the reply of their new argument about Figure 11.

JUDGE McSHANE: Counsel, on that one --

(Simultaneous speaking.)

JUDGE McSHANE: I'm sorry. I interrupted again, Judge. Go ahead.

JUDGE HAMANN: No, please. Go ahead.

JUDGE McSHANE: Yeah. On that issue, I read the deposition of Dr. Bokor, and he indicated -- he did not indicated a thorough review, per se.

And I will add -- and I don't want to steal Petitioner's thunder on this, but will add that filing additional exhibits, I believe you filed them with the motion and then followed up in and filed them with the sur-reply. That is highly irregular. It is. So that's my -- it's more a comment. It's not a question.

MR. WICHMAN: Thank you, Your Honor. But I would like to point out the merits of Petitioner's argument about this exhibit that's not supported by expert testimony.

In Parkin, at column 17, lines 11 to -- well, lines 11 and 12, he tells us substrate 111 is formed from an amorphous layer of silicon dioxide. That's the amorphous film that this application is referring to. It's saying the device could be formed on an amorphous film. That's that substrate, silicon dioxide. And if you look at Figure 3, either flavor, you'll see that the substrate 111 at the bottom of everything. The layers are built on that substrate. It's the wafer, the workings that you use to build the bus.

So I'd like to -- we have another objection. There's a reference in the slides to Exhibit 2013, so this is Dr. Yuasa's second Applied Physics Letter paper from 2005. Again, this is a paper that is only cited in opposition to a motion to exclude. In other words, they cite it for the proposition that Dr. Bokor's testimony is reliable. Well, what you just heard, though, is he's making -- Petitioner is making merits arguments now from this exhibit that was never cited in a petition. It was never cited in a POR. It is not the subject -- not supported by any expert testimony. So we object to that.

And moreover, it's an error twice over because they keep talking about a reasonable expectation of success, but they're not telling you what the expectation has to be of. The reasonable expectation of success has to be -- it also has to be shown at the time of invention, and they're citing to a paper that was -- that's a postdated reference that was published after the administration.

JUDGE ARBES: Counsel, what slide were you referring to for that argument?

MR. WICHMAN: Slide 21 refers to Exhibit 2023.

JUDGE ARBES: Okay.

MR. WICHMAN: So, now they're pointing to postdated evidence for to make out the prima facie case, when it wasn't cited in the petition. It wasn't cited in the POR. And it's not the relevant facts.

JUDGE HAMANN: Counsel?

MR. WICHMAN: Yes.

JUDGE HAMANN: Counsel, this is Judge Hamann. Again, I'm just trying to understand this for the framework of where we're at. These are

objections to slides, I think. And you've obviously made some objections to --

(Simultaneous speaking.)

MR. WICHMAN: No, Your Honor. I'm objecting to the argument that was made.

JUDGE HAMANN: Right.

MR. WICHMAN: And the argument is made; this was rooted in their discussion of that slide.

JUDGE HAMANN: Okay. And so, you have no objections to the slide is what you're saying.

MR. WICHMAN: Well, it's we have -- we did not file objections to the slide, so I think that's appropriate. The slide is not evidence, so we're objecting.

JUDGE HAMANN: Understood, but I'm just -- like, you know, there is time, again, we have a series. I'm just trying to understand what posture we're in, so I can comprehend it appropriately. That was my question. Thank you.

MR. WICHMAN: Thank you your honor. Petitioner is talking about reasonable expectation of success. The expectation that has to be shown is that the POSA, at the time of invention, would have reasonably expected that MgO(001) would have formed at the interface with an amorphous CoFeB electrode, because that is the way that they mapped every combination. Every combination maps the MgO formation limitation in the '167 Patent and the '134 patent to being formed directly on the lower

electrode that they have replaced the iron material with the amorphous CoFeB material.

So, when they're talking about an expectation of forming above or on but at a distance away from the interface, that's not relevant to what they need to show to make out the prima facie case.

Let me pause there. Are there any questions about that distinction? Did I make it?

(No audible response.)

MR. WICHMAN: Okay. And then I'll just make one more point about Petitioner's argument. The Petitioner argued that the patents never explain how to form amorphous CoFeB on the lower electrode, but they seem to be ignoring that the '167 Patent is a method patent, and it's right there in the claims. It's right there in Claim 1 how to do this.

So, with that, let me turn to something a little more fundamental. Let's talk about --

JUDGE HAMANN: Counsel?

MR. WICHMAN: Yes.

JUDGE HAMANN: This is Judge Hamann. And I'm sorry. I promise you I won't ask questions the entirety of your argument. I apologize, but I'm just trying to understand the posture. So, obviously, I think you're suggesting that it's in the claims of the patent, but not the spec and the description of that method, or I'm confused by what that argument means.

MR. WICHMAN: What the Petitioner seems to be doing is making a written description argument. They even said they were making an

enablement argument, but those arguments are not relevant to what is at issue in this proceeding.

JUDGE HAMANN: Okay. Thank you. I understand that.

MR. WICHMAN: Okay. So, if I could go back to talk about sort of the patent that made up the facts of the case, Dr. Yuasa was the first person to recognize that if he formed -- he could obtain MgO(001), a barrier of -- if he deposited amorphous CoFeB. He deposited magnesium oxide on it, covered it with amorphous CoFeB, and then annealed that material and discovered that, as a result, he saw a magneto barrier that was MgO(001) sandwiched between crystallized CoFeB electrodes. And this was completely new. And it was new.

To understand why this is new, let's go back to 2004, the date of invention. So, in 2004, it was believed that to get a high TMR, you needed a crystalline MgO(001) barrier sandwiched between two crystalline (001) ferromagnetic electrodes, and that was based on theoretical work in from 2001 by Butler and Mossad. But the first problem in implementing this was how do we get that MgO(001) barrier. And the prior art solution to this was a template.

Judge McShane, you asked about templating in Petitioner's argument. In templating, each device has a specific crystallographic layer. Each layer has a specific crystallographic texture. And that layer causes the next layer on top of it to form at a matching crystallographic texture. If you start with a crystalline (001) underlayer, you build another layer on top of it, takes on the same crystal structure, and you keep going until you have now made an MgO(001) barrier. And an example of this is Bowen.

So, Bowen used template. The entire device is a single crystal, and he built it layer by layer. Every layer has the same crystallographic structure as the layer below it. He starts with a crystal (001) underlayer. He forms the crystal iron (001) lower electrode, and that electrode is crucial to forming his single-crystal MgO(001) barrier on top of it. So that's templating.

And this is painstaking stuff, because Bowen, he used exotic techniques. He used special equipment. He used high-temperature depositions, because you have to get each layer just right because each layer is going to control the crystallographic texture of the layer formed above.

And in fact, Bowen's coauthors went to so much trouble that they invented an entirely new way to make that crystalline underlayer. They called it a buffer layer and in order to template the electrode to template the MgO barrier. And that was Martin Boubeta's work. And that is Exhibit 1084 in the '167 case.

So Bowen built his MTJ atom by atom, layer by layer, with his painstaking approach because that was how you achieved an MgO(001) barrier.

So, all right. Let's pause for a second and talk about what's staring us right in the face here. The Petitioner wants you to believe that it was known that MgO(001) would form on amorphous CoFeB. And to prove this, they cite a bunch of this new evidence that they just talked about some of it. All of that new evidence was published before Bowen's paper was published in 2001. For example, Wulff was filed, was published in '95, Yoon in 1999, Wang in 1997, Inaba in 2000, Tonouchi 1987, Renault 1999. Not one of those papers studied MgO crystallization on amorphous CoFeB.

So the best evidence of what a POSA would have expected to have at the time is Bowen, right? In fact, look at who Bowen's coauthors were. There's Boubeta; he invented this new way of making a buffer layer. The third author is Albert Fert. Albert Fert, six years after Bowen published this paper in 2001, Albert Fert was awarded the Nobel prize in physics for the co-discovery of the giant magnetoresistance effect. So, if anyone would have known that magnesium oxide (001) would form if you just put it down on amorphous CoFeB or an MgO MTJ, that list probably includes the guy who went on to win a Nobel prize for his work in this field.

So, now, if the Petitioner is right and Bowen knew that he could get MgO(001) by just forming it on amorphous CoFeB, then Bowen would never have gone to all this trouble to invent a new buffer layer, to use this painstaking templating principle, with exotic equipment, to get their MgO(001) barrier. But Bowen did do that. He did go to all this trouble to template the barrier. And there's a simple explanation for that. And that is because Bowen did not know that MgO(001) would just form on amorphous CoFeB.

And this is not hypothetical because we show you in the objective evidence that as soon as Dr. Yuasa taught the world how to do this, everybody shifted to his approach, and the industry adopted Dr. Yuasa's approach.

So, one moment, please. If we could go on to Nagahama, Nagahama is another example of templating, and this is not in dispute. And in fact, I think, Judge McShane, you asked about Nagahama as well.

In their embodiment, Nagahama, following paragraph 62, describes a process where this, there's this double underlayer that's formed. On top of it, paragraph 62, step 6, he deposits the iron. Step 7, he anneals. Step 8, he deposits the magnesium oxide on the now the crystal, a highly oriented crystalline lower electrode, which Judge McShane, you asked about Figure 12 in Nagahama. This is layer 205.

Now, in their petition, they argue that the MgO deposition embodiment is at paragraph 73. And if you look at paragraph 73 in Nagahama, it describes a highly -- a (001) highly oriented lower ferromagnetic electrode, and that's layer 205, which is only achieved because it's templated on the surface of the underlayer, the double underlayer that Nagahama provides. And then that electrode templates the MgO barrier, the (001) highly oriented MgO barrier.

And in fact, just like in Bowen, Nagahama went out of his way to invent a new way to provide this underlayer surface, this crystalline surface to start the templating off. That's the double underlayer. Because the top surface of that double underlayer, its highly oriented (001) crystalline, that templates the electrode, which templates the barrier. So Nagahama also used templating.

So, again, if Petitioner is right and everybody knew that you didn't need to use templating, the Nagahama would never have gone to all this trouble and never would have bothered to put all of this work into inventing the double underlayer technique to make his MTJs.

Parkin, Parkin also uses templating. Here, if I could refer you to the slides, starting at Slide 7. For Figure 3, Parkin describes templating to form

the MgO barrier 120 prime in Figure 3. And here, at column 13, he says the crystallographic texture of the layers is controlled by a suitable choice of underlayers. That's templating.

Slide 8, here, Parkin, again talking about the MgO barrier 120 prime in Figure 3A, says it's made by the method in the '835 application. In the '835 application, Parkin tells us what that method is at column 3, lines 24 to 41, and it's templating. He forms the highly oriented crystalline MgO tunnel barrier by forming it on a BCC CoFe (100) alloy. And again, I'm sure you remember, when Parkin uses this (100) notation, everybody agrees that's interchangeable in these cubic materials with the (001) orientation in the claims.

Slide 9 --

(Simultaneous speaking.)

JUDGE McSHANE: Counsel, on this, on this disclosure from column 13, how we do know that this use of the textured material, how do we know that this applies to all the embodiments in Parkin?

MR. WICHMAN: Well, I don't know how to answer that it applies to all the embodiments, but it specifically is referring to the layers that are shown in Figure 3A. And so, this description at column 13, lines 2 through 25, is a description with how the MgO barrier is formed in this embodiment, Figure 3A. And even if you disagree with that, we just showed you, on Slide 8, that Parkin is still describing templating to form that MgO barrier 120 prime in Figure 3A.

(Simultaneous speaking.)

JUDGE HAMANN: This is Judge Hamann. I'm sorry. Go ahead.

JUDGE McSHANE: No, no. Go ahead, Judge. Thanks.

JUDGE HAMANN: Obviously, there's -- and I know there's a dispute whether about as to Figure 11, but is this aspect, and I think that's what the Petitioner is suggesting, is this aspect of templating, maybe, to the extent that it's in Parkin, doesn't necessarily relate to Figure 11. And what is Patent Owner's position to that argument, if any?

MR. WICHMAN: On Slide 9, we show you what Parkin says about Figure 11. And this is the only disclosure in Parkin that specifically says this is how he made the MgO barrier 540 in Figure 11. This -- okay. And the reference is at, on the top right of the slide, column 23, lines 6 to 11, tunnel barrier 540 is formed according to the methods in the '835 application. Left side, column 3, this is what the '835 application says. And it says, he forms a high crystalline MgO barrier on the one, the BCC CoFe (100) electrode. That's templating.

JUDGE HAMANN: Thank you.

MR. WICHMAN: Okay. So, now, let's go to -- if you go to Dr. Yuasa, okay. Let's talk about where Dr. Yuasa went. Dr. Yuasa went in a different direction because Dr. Yuasa's invention does not use templating to form the MgO barrier. There's no templating of the lower CoFeB electrode in an underlayer, and there's no templating of the MgO barrier from the amorphous CoFeB layer because it's amorphous; you can't template anything.

So, if you go to Slide 10, these are the claims on the left. On the right-hand side, this is from Dr. Yuasa's postdated APL-2005 paper. And it's undisputed that this paper describes everything that meets the claims: Claim

1 of the '167 Patent and Claim 1 of the '134 Patent. And we're talking about the texture. Look at the bottom right. Do you see the white horizontal striations? That's the texture. That's the (001) texture in the MgO barrier.

And the other thing to point out is that, if you look at the Figure 1A part, the invention, the three layers, the CoFeB/MgO/CoFeB, they don't exist in the abstract. They sit on top of all these other layers, which are part of the MTJ. And I'm going to show you in a minute that that is crucial to why Dr. Yuasa's invention is so important. And surprisingly, they obtain this MgO structure, texture, when they deposit on the amorphous CoFeB.

So, if you turn to Slide 11, I think it's important to realize that the Petitioner's own expert, Dr. Bokor, agreed that this was a surprising result. He testified, when you have an amorphous layer and you grow crystalline on it, there is no templating, so it is surprising that you get MgO to grow on an amorphous layer. This is exactly what Dr. Yuasa was describing. He formed MgO(001) on amorphous CoFeB. It's surprising Dr. Yuasa. It's surprising Dr. Bokor more than 21 -- or 11 years later.

So, if you turn to Slide 12, Dr. Yuasa agrees that -- I'm sorry. Dr. Bokor, Petitioner's expert, agrees that Dr. Yuasa's invention enabled mass production of MgO MTJs. This is the invention that's described in the postdated APL-2005, Exhibit 2006. And it's no surprise that papers would cite it more than 1200 times because this is the way the industry went. So, of course, the papers describing what the industry is doing, they're going to cite Dr. Yuasa's paper. This is the paper that describes the invention that enables the mass production of MgO MTJs.

Slide 14. Dr. Yuasa's invention solved a fundamental manufacturing problem at the time. The conventional templating approach to get MgO(001) was incompatible with existing manufacturing processes because the underlayers -- and these are the layers on the right-hand side of column 15 that are bracketed and labeled threefold -- these are layers that set the magnetic properties of the lower electrode.

Those layers had a lattice mismatch with the MgO(001) that everybody wanted for the barrier. They used an FCC (100)-oriented surface. The lattice mismatch meant you could not use templating. You could not template anything on top of those (111) layers and get to an MgO(001) barrier. That was a problem. No lattice match. No templating.

Now, let me point out, this Exhibit 1057, at pages 46 to 47 that we show you here, this is describing Dr. Yuasa's invention. So, that reference 33 is Dr. Yuasa's APL-2005 paper. It's a postdated paper that describes the invention within these patents. The lower -- so Dr. Yuasa's invention, now, solves this lattice mismatch problem.

And if you, we put the -- look at the red, the red dotted box around the lower electrode, that's what solves the problem, because when he puts down the lower electrode CoFeB as amorphous as the positive, then it does not matter what the lattice orientation of the layers below it are. So this breaks the chain. You no longer -- because you no longer are using templating, you can now, using Dr. Yuasa's invention, you can still get MgO(001) because after you anneal this, the amorphous CoFeB electrodes are going to crystallize in the right orientation, and you will have achieved the MgO(001) barrier.

Let me pause there. Are there questions about why Dr. Yuasa's invention here solves the manufacturing problem of lattice mismatch?

JUDGE HAMANN: This is Judge Hamann. And, yeah, I think the question I have, for example, Slide 12 or what not. You know, the testimony, and I'm trying to understand because we do have this paper as opposed to the patent. And the question talks about a process.

And I'm not certain if we're comparing apples to apples, so to speak. Because, you know, I don't know exactly what aspect of the process that's being questioned about, or the paper fully because obviously the claim, it isn't detailed as to, you know, the process steps, more than this delayering. And that's what I'm -- you know, I don't know if there's an apple-to-apple comparison when you talk about the process of this paper and I'm trying to follow that.

MR. WICHMAN: Okay, Your Honor. If you go back to Slide 12, I mean, sorry, Slide 10, right in the middle when we point out that it's undisputed that this paper, this post-dated paper describes the method meeting the '167 Patent and the MTJ meeting the '134 Patent, Claim 1.

All the sites are in the POR and the surreply. And in the POR in each case we lay out exactly where each limitation is described in this paper. And the process in Claim 1 of the '167 Patent is described in that paper, and it's the only process described. And in the surreply
it is a one-to-one comparison.

JUDGE HAMANN: Okay, so Patent Owner's position, there's nothing in this paper as to processing steps or anything else that goes beyond the patent. Is that correct?

MR. WICHMAN: No, that's not what we're saying. On the right-hand side there are layers that are not the subject of the claim, the antiferromagnetic layer, the synthetic antiferro -- these are the layers below the CoFeB. The relevant process steps that are being referenced in -- that we're showing you the quotes at Slide 12 is what you were talking about. What enabled mass production was Dr. Yuasa's invention.

The claimed invention using the amorphous CoFeB, achieving MgO 001 above it with amorphous CoFeB, annealing and getting the right crystallization of the CoFeB. And that is what we're showing you in Slide 14. On the right, the reason that that solves the lattice mismatch problem is because you are able to deposit the lower electrode as amorphous.

JUDGE HAMANN: Yeah. My question, I guess, gets to the figure on Slide 12 the testimony from Dr. Bokor. You know, some of the questioning the process, and the enabled mass production, the questions aren't tethered to necessarily just the aspects of the claim or in the challenged patents necessarily in my mind, and so I'm trying to understand what weight to put to that.

You know, obviously I recognize that your other slide's talking about the paper and what aspects of that that are relevant. But it doesn't necessarily mean that that's tethered to the questions. And that was meant when Dr. Bokor, for example, understood processing means in this context. That's why I'm trying to be -- to get to. Are there other questions that sort of lay this out in the deposition transcript that I can look back to?

MR. WICHMAN: Yes. I mean all of it -- this section -- yes. We didn't quote all of it here. But if you look at the cited passages in the

deposition, this 14022 to 14114 -- well, even preceding that, you will see that it is laid out in detail. Apologies, we should have --

JUDGE HAMANN: Thank you.

MR. WICHMAN: -- quoted the full colloquy.

Okay, regardless, on Slide 14, on the bottom-left, you'll see that this is -- this 2017 textbook is telling us exactly why Dr. Yuasa's invention solved this manufacturing problem, the subject of the question you just asked about. It's because of the lattice mismatch it doesn't matter. You're able to break that when you abandon this templating approach. And you're only able to do that because you also get MgO 001 with this new approach.

JUDGE MCSHANE: Counsel, I have a quick question, if I can drive you back to Slide 10. And then in the right-hand corner you have the -- upper right-hand, you have the surprisingly quote, right, and that's from the paper, right?

MR. WICHMAN: It is.

JUDGE MCSHANE: But if you go to the paper, and I think Petitioner talked about this, and frankly it's something that has me scratching my head. What it says is surprisingly, quote, which is, you know, which is interesting. But then it says -- I think Petitioner described that as self-serving, which, whatever -- I'm not sure what it is.

But in any event, if you go to a couple of sentences below, it does have a note that -- and this is the author who noted this, note that the magnesium oxide layer, grown on the amorphous in its silicon -- what is that? Nitrate, or something like that, some nitrogen form -- substrate by ion beam assisted deposition, is also 001 textured right at the inception of

deposition. Well, I don't understand that note. Do you have any insights on what that note means?

MR. WICHMAN: Okay. So the silicon nitrate, I think we -- okay, so first, it's not CoFeB. So I think everybody agrees, there's nothing here that demonstrates that it was known that this would happen on amorphous CoFeB. I think what he's saying in this paper is he's trying to say well, maybe this result, you can't -- this result is possibly consistent with what we've seen in other material systems.

If we're going to talk about abusing grammar, it's an abuse of grammar to say that a footnote that refers to work in other material systems contradicts the express language of the sentence, surprisingly, two sentences earlier.

I think this is what people try to do in journal articles. They try to tie what they have found to what might have been known in other fields, other work. He's saying, okay, we found that our result here, now we've expanded the results that were known to include what happens with CoFeB.

JUDGE MCSHANE: All right, thank you. I recognize, by the way, it's speculation on all our parts, to some degree, right.

MR. WICHMAN: Well, there's something else to consider. This is Applied Physics Letters, this is a prestigious journal. These journals are peer-reviewed, aggressively. The editor accepted it for publication. If he didn't think that surprisingly statement was right, he would have demanded a correction, an edit. If the reviewers objected to that surprising statement, if they thought it was known how to do this, they would have demanded a correction or a revision of the paper. The paper's

been cited 1268 times as of June. And they did not find a single reference citing this paper that ever disputes that this was a surprising result.

So it's not just speculation about what the sentences mean. There's objective evidence that corroborates or confirms this was a surprising result.

JUDGE MCSHANE: Thank you.

MR. WICHMAN: Okay. Sorry, I lost my place in my notes. A moment, please.

All right, I just wanted to point out something of note. The Dieny text from 2017 on Slide 50, in the institution decision on the '167 Patent, Your Honor, you mistakenly, you said that this passage that we just showed you, Page 47, supports the contention that MgO could be run on CoFeB.

I think the Board misapprehended that this is not prior art. This discussion at Page 47 is describing Dr. Yuasa's work. It's in the invention --

JUDGE HAMANN: Right, Counsel, I recognize that. It wasn't meant to go to motivation or reasonableness beforehand. I think it was a post, showing that it worked out, and to be frank, I think it muddied it. So thank you for clarifying that. I recognize that.

MR. WICHMAN: Okay, thank you, Your Honor. So what we want to point out is, if we turn to Slide 16, the Petitioner's own employees, Western Digital's own employees, immediately recognized that Dr. Yuasa's invention solved this fundamental manufacturing problem. And so this is Chando Park. And it's contemporaneous with the invention.

The development of the tunnel junctions by Anelva, citing Dr. Yuasa's paper, provides a practical solution to overcome the practical difficulty of forming the correct texture without a single crystal substrate.

Dr. Bokor agreed that had -- the prior art techniques vastly limited commercial allocations of MTJs grown in the prior art fashion, and in the surreply, we point this out.

Slide 17, so now in 2018, so this is 14 years after the invention, another petitioner employee, Zheng Gao, again praises the significance of Dr. Yuasa's invention. It was fully integrated film directly produced from sensor deposition sputtering tool. Because of the technique, that you put down amorphous CoFeB, you put down MgO, you put down amorphous CoFeB, and then post anneal.

That is exactly what's claimed. That is certainly what's claimed in Claim 1 of the '167 Patent. That is Claim 1 of the '134 Patent. And Dr. Bokor agrees that this was a significant contribution, Dr. Yuasa's work. Slide 18, even the Petitioner's competitors praised Dr. Yuasa's invention. The results are of significant technology importance for the magnetic recording head industry. Dr. Bokor agrees.

Slide 19, so here it is, the authors here of these works, they all recognize what Parkin did. Parkin is as famous as Dr. Yuasa. And yet the CoFeB, MgO/CoFeB MTJs, that invention is attributed to Dr. Yuasa. Everybody in the industry knew and knows Dr. Yuasa is the person who invented these new MTJs.

And if you turn to Slide 20, not only did the industry wholesale adopt Dr. Yuasa's invention after he taught the world how to do it, but all the majority of the future improvements in performance in MTJs all came about using Dr. Yuasa's approach. So in this hockey stick chart here, the first, the triangles are the amorphous CoFeB MgO CoFeB MTJs.

The first one is Dr. Yuasa, and it's a citation. It's the paper, but it's the paper describing the claimed invention. And if you follow that line up, the performance line up to the right in time, people are using Dr. Yuasa's approach. So again, it's no surprise that Dr. Yuasa's paper has been cited more than 1,200 times, because everybody is using his approach, and they're citing his paper that taught that approach.

JUDGE MCSHANE: Counsel, you mentioned -- and I'll go back and look at it, but you mentioned that the article, the Parkin article there, that that is based on the patent, the Parkin Patent. Is that what you said?

MR. WICHMAN: No, Your Honor. I didn't say based on the Parkin Patent. What -- I'm sorry, can you ask the question again, Your Honor?

JUDGE MCSHANE: Yes. I'm asking about that Parkin paper that shows what you call the hockey stick graph, right. It's the diamond right below the --

MR. WICHMAN: Right, the --

JUDGE MCSHANE: -- APL paper. I mean, that's a Parkin paper, right?

MR. WICHMAN: These are papers --

(Simultaneous speaking.)

MR. WICHMAN: -- that's Parkin's Nature Materials paper.

JUDGE MCSHANE: It's a Nature -- right, it's a Nature article, right. And I don't know off the top of my head, do we have that full article in the record here?

MR. WICHMAN: I will have to check, Your Honor. Off the top of my head, I don't know.

JUDGE MCSHANE: I don't know, but you can let me know on surrebuttal. Thank you.

MR. WICHMAN: Okay.

JUDGE MCSHANE: But do you know, I mean, right off the top of your head, and I know you may not have looked at it, so I appreciate that. But do you know if the Parkin paper does cite to exclusive portions of the patent, or the like?

MR. WICHMAN: I do not have that information.

JUDGE MCSHANE: Okay, thank you.

MR. WICHMAN: If we turn to Slide 21, so Dr. Yuasa also won some awards for his inventions. We show you just three of them here. But the original method of growing a crystalline layer on an amorphous layer, it's indisputably a claimed invention. He made the industrial applications of MgOs possible because of his inventions. And he's contributed significantly to the practical application of MgO MTJ devices.

Dr. Yuasa, by solving that fundamental manufacturing problem of the lattice mismatch with the underlayers, Dr. Yuasa, his invention unleashed commercial applications. Now people could make these things. Now they could be used. And that's exactly what has happened.

Maybe I'll pause here. Does the Board have any questions at this point?

No, okay. If we could turn to, actually we could --

JUDGE HAMANN: This is Judge Hamann, just real quick on this slide we were just looking at, I believe it was 18.

MR. WICHMAN: Twenty-one.

(Simultaneous speaking.)

MR. WICHMAN: Twenty-one.

JUDGE HAMANN: Twenty-one. I think I was still focused on 18 because there's an aspect talking about the praise. There's an aspect of high TMRs, and I'm just trying to make certain that some of the -- I'm trying to understand where the praise is focused, whether it's focused on this aspect of using MgO in a way that the patent suggests, or if it's focused on doing so and obtaining, you know, greater TMR type of thing, and the ability to mass-produce. And that's my question, it's unclear to me, although it very well may be as Patent Owner suggests.

MR. WITHMAN: All right, Your Honor. The reference to practical applications is Dr. Yuasa's invention. So, I mean, he didn't just need to -- just a hero (phonetic) TMR doesn't -- I mean, that might be good in the lab, but that's not going to work in the real world. What Dr. Yuasa showed was how to actually make a commercially manufacturable device that also has high TMR; in other words, that's going to have practical use. I mean, just having one or the other wouldn't cut it.

JUDGE HAMANN: Okay. I understand. I'm just trying to relate that again to the claim, because the claim doesn't -- at least some of the claims, there's no TMR value for example, or anything else.

MR. WICHMAN: Oh, yes.

(Simultaneous speaking.)

MR. WICHMAN: Sorry, go ahead.

JUDGE HAMANN: So I'm just trying to make certain that praise, again, may very well be as Patent Owners suggests, is focused on the aspect

that's relevant to the claim as opposed to that and something additional, you know, like having a TMR above something or whatever that may have been additional work beyond the patent. That's I guess the crux of my thought.

MR. WICHMAN: Well, again, Your Honor, if the device is not manufacturable, it doesn't matter what the TMR is. The inventions are how to get a manufacturable device.

JUDGE HAMANN: Okay. Again, I'm focused on the claims, but I understand. Thank you.

MR. WICHMAN: Okay, thank you, Your Honor.

At the beginning of his argument, the Petitioner said that these issues with Parkin's inverted Figure 3 and Parkin Figure 11 would solve all of the problems with their petitions, and that's simply not true. We pointed out that these petitions are facially defective for several reasons. They never even talked about the problems with the '167 Patent.

And I just briefly want to go through this with you, pointing out quickly some of the problems on their face. You never even reach this reasonable expectation of success issue. And actually what I'd like to do is, well, the first one, I'll just remind you. If you could turn to Slide 25, we point out that in the petition, the '134 Patent, the Petitioners mount their ground, their combination with Nagahama to un-modify Nagahama's MgO barrier.

In other words, what they have done is replace Nagahama's lower electrode. They've taken the iron, changed the material to amorphous CoFeB. But then, when they're required to mount the petition that says the MgO is going to have a zero to zero texture, they just cite to Nagahama

unmodified. And that's facially defective, because what they need to do is show the contemplated workings of the combination as a prerequisite to a prima facie obviousness case.

And they're pointing to Nagahama in a context that's not relevant to what they have done in the combination. Because Nagahama's MgO 001 layer is templated, we went through this, it's templated by that 001 layer below it. And once they've made the modification in the combination to remove the crystalline iron layer underneath, there's no longer anything to template the MgO 001 there. So with this combination, the petition fails on its face.

Remember, if we go to Slide 26, their own expert admits this. When you have an amorphous material there's no template of the layer above it. If you go to Slide 28, now this is something Petitioners talked about on the theory that they had properly alleged a reasonable expectation of success.

In Slide 29, Ground 1 in the '134 Patent case is going to fail for reasons that are almost identical to why Ground 2 fails, because they did the exact same thing. They map the MgO limitation to the unmodified Bowen. But Bowen, we talked about this. I mean, it was this exquisitely detailed, painstaking, epitaxial process to achieve that single-crystal MgO 001 layer.

But in the combination, what they do is they replace that crystal iron 001 electrode with amorphous CoFeB. But then in the petition they simply say, well, because Bowen taught single-crystal MgO 001, therefore the limitation is met. Well, it doesn't work in the combination. The combination has modified Bowen in a way that they can no longer point back to Bowen by itself and say that that's enough.

And what they do, what they add that's different for Ground 1 is this language about after the change a POSA would understand that the MgO could be polycrystalline and would still have the same orientation. And they site four pieces of evidence in the record. So this is the only way that they can say that they have made this allegation of a reasonable expectation of success.

And none of the cited evidence has anything to do with forming MgO on amorphous CoFeB. And we lay that, if you turn to Slide 30, this is just a summary from the surreply in the '134 case, on the right we lay all this out, why the evidence fails, what they cited. So, I mean, we can go through that one by one. You know, first they cite the patent. Well, as a matter of law, you can't rely on the patent for a teaching -- for their combination. Inappropriate to use a template provided by the inventor to render the inventor's contribution obvious. That's *Orexo*.

Slide 32, they cite their expert. And we added highlighting to the petition and what their expert says. And he's just parroting the petition. So under *Xerox*, nothing the expert says is adding anything that is entitled to any weight.

Third, Parkin, so Slide 33, they refer to this Parkin 18:49-51. They actually talked about it quite a bit. As Petitioner admitted, Parkin, at column 18 here is talking about the MgO barrier in Figure 3a. And that MgO barrier in Figure 3A, one, it was already crystalline, because it was templated by the crystalline CoFe 001 layer 119 below it.

So nothing about this cite to Parkin saying that the MgO

001 has anything to do with forming the MgO 001 on amorphous CoFeB. And again, at Slide 34, we point out that it's undisputed. For Figure 3A, Parkin says he formed the MgO barrier 120 prime using the template, at column 13 and again -- and we showed you again at column 3, lines 24 to 41.

So now we go to Slide 35. They cite this Parkin at lines, at column 9:58 to column 10, line 2. That language is shown on the right. And this actually undercuts -- this contradicts their argument because this passage is describing the template. This single crystalline substrate is chosen compatible with the growth of the metal layer oriented in the 100 growth direction and the subsequent growth of MgO. This is template, nothing in this describes forming MgO on amorphous CoFeB.

So after we pointed this out, their failures in the POR, they come back in the reply, and they go back in a completely different direction. That's not permitted under the Trial Practice Guide, and we show you the relevant language on Slide 36.

So before I move on, does the Board have questions about these facial defects in the petition on the '134 Patent?

Okay, if we could turn to, let's turn to Slide 37, let's turn to the '167 Patent, because this has two defects that are fatal to the petition on the '167 Patent. And if you could turn to Slide 42, we lay this out.

So in the petition they allege that they used the process in Bowen to make an MTJ. All they do is replace -- the process in Bowen says you have to anneal the lower electrode after you deposit it before you form

1 MgO on it. And in the institution decision, you recognized this, and you
2 cite it, page 15 of the institution decision.
3 The only modification that the petition makes to Bowen's
4 manufacturing process regarding the lower electrode is they change the
5 material from iron to CoFeB. And their expert admits it wouldn't work. We
6 asked them what would happen if you do what this petition alleges, and he
7 had absolutely no idea.
8 So that's fatal. That's fatal to this ground of -- it's fatal to actually
9 both grounds of the petition, because Nagahama, we showed you in the POR
10 that Nagahama's manufacturing process uses the same process steps as
11 Bowen in this regard. They deposit the iron, they anneal it, then they deposit
12 the MgO.
13 So before I move on, does the Board have questions about this defect
14 in the '167 petition?
15 Okay. So their expert admits the process won't work. He also says a
16 POSA would not have used it. So there's no reason to -- the POSA has no
17 reason to combine references in a way that won't work. And a POSA has no
18 expectation of success in using a process that they know they wouldn't use.
19 If we turn to -- one moment. Let me just make one more point on
20 Slide 43. In their reply, they don't dispute any of this. They argue that the
21 petition's modified the annealing step in Bowen and Nagahama, but that's
22 simply not true. And when they make this argument, they can't point to a
23 single spot in the petition for the '167 Patent where this modification is
24 made. And their own expert admits, admitted at deposition, that he never

1 considered modifying Bowen's step of annealing that lower electrode before
2 depositing amorphous CoFeB on it.
3 If we could turn to, another reason the petition fails is, if you could
4 turn to Slide 48. These are method claims. And we showed you that the
5 operative manufacturing principle in Bowen and Nagahama is template, is
6 specific templating that MgO variant. And in fact, that manufacturing
7 principle was the holdup. That was the fundamental problem that Dr.
8 Yuasa's invention solved.
9 So Bowen and Nagahama, they specifically used this conventional
10 prior art production for the templates to build up layers to promote the
11 formation of the MgO barrier. And Dr. Yuasa went in a completely different
12 direction. Dr. Yuasa abandons template, right, because he deposits that
13 lower electrode amorphous -- it's amorphous in its deposited state.
14 The MgO 001 barrier is not templated by that lower CoFeB barrier or
15 electrode, because it's amorphous. And the amorphous surface can't
16 template anything. The combinations change this basic principle in Bowen
17 and in Nagahama. Because when they replace the crystalline iron lower
18 electrode in Bowen and in Nagahama with amorphous CoFeB, there's no
19 longer anything there to template the MgO 001 barrier.
20 So on Slide 48, this is the law. And the combination, there's no
21 motivation to combine a reference that changes the basic principle of the
22 base reference's operation. And that applies as much to the steps of method
23 claims as to device claims. So the combinations fail for this additional
24 reason.

And I want to point out, on Slide 49, it is undisputed. They never dispute in their reply that the petitions have changed the basic manufacturing principle in Bowen and Nagahama. What we get in the reply is simply misdirection.

So first they want to argue about the principle of operation of the device. The '167 Patent claims are method claims, they're not device claims. The relevant principle of operation is the principle of manufacturing. And they have not disputed that the combination changes that principle in Bowen and Nagahama.

Second, there will --

JUDGE ARBES: Counsel, does that same argument apply to the other patent then, that is not a method of manufacturing claim? Are we only talking about --

MR. WICHMAN: This is the '167 Patent.

JUDGE ARBES: Okay, we're only talking about that one now.

MR. WICHMAN: Yes. The problem in the '134 case is a step earlier, that the combinations are incompatible.

JUDGE ARBES: So the argument you're making about basic principle of operation, that only applies to the '167 Patent?

MR. WICHMAN: This argument is made, yes, sir.

The other misdirection that we get from the Petitioner's reply is they want to talk about Parkin. Well, the combinations don't modify Parkin, they modify Bowen and they modify Nagahama. So talking about Parkin's principle, or what Parkin's device did is misdirection. Moreover, the

argument about Parkin's performance is misdirection, because whether or not Parkin's device, his MTJ works, says nothing about how he made it.

And regardless, we showed you that Parkin forms the barrier by template. He templates to form that MgO barrier in Figure 3, and he templates to form that MgO barrier in Figure 11. So even if you want to consider how the combinations fit Parkin, they also change Parkin's basic manufacturing principle.

So there's no dispute. The combinations change the basic manufacturing principle in Bowen and Nagahama, that eliminates any motivation to combine, and that's fatal to each ground in the '167 Patent. So let me pause here. Are there any questions?

JUDGE MCDHANE: Counsel -- yes, Counsel, on this one how do we know that, for Figure 11, there is templating? So that's a variation of a question I asked earlier.

MR. WICHMAN: We know that, if you go back to Slide 9, on the right, column 23 of Parkin, line 6 to 11 tells us. The MgO barrier 540, that's in Figure 11, is formed using the methods incorporated in application 835. That's on the left.

Parkin, at column 3, lines 24 to 41, tells us what that method is in the 835 application and it's template. So that's how we know, Your Honor.

JUDGE MCSHANE: Okay.

MR. WICHMAN: We also know because we --

JUDGE MCSHANE: I'm sorry. Again, I'm going to note that there is objection to those exhibits, but go on. I'm sorry.

MR. WICHMAN: This is the patent. On Slide 9, on the left, this is the Parkin 896 patent, Column 3 --

JUDGE MCSHANE: Oh, I'm sorry, yes.

(Simultaneous speaking.)

MR. WICHMAN: -- 41. So, I mean, we can also say, if you actually look at what the applications say in the exhibits, Exhibit 2080 in the 835 application, they are explicit that the process for forming the MgO barrier is templating. They even use the word templating, so -- I mean, on those counts. That's how we know. So --

JUDGE MCSHANE: Thank you.

MR. WICHMAN: -- are there any other questions about this facial defect in the '167 Patent?

Okay. I'd like to turn -- there were a number of, I mean, mostly argument concerning this inverted Figure 3A in Parkin and Parkin's Figure 11. So let's turn to those and we can discuss those. So just a moment, please.

So the first thing to point out on Slide 56, let's point out what the bait and switch is. When the petitions talked about the inverted embodiment in Figure 3A, they were mapping the electrode limitation in the claims in each patent, it's Limitation 1e in the '134 Patent, and it's 1a in the '167 Patent.

And the POPR in the '134 case, but not in the '167 case, the POPR responded to arguments about the electrode limitation. But when they come back in reply, the Petitioners are now citing that embodiment for a different limitation. They're citing it for forming magnesium oxide 001. And that's a different limitation from which was cited in the petition.

And even when Your Honors invited briefing on this issue, it was briefing on the issue of how that inverted embodiment applied to the electrode, the lower electrode limitation, not the MgO barrier limitation. And in fact, in the institution decision for the '134 Patent, Your Honors recognized that the POPR said nothing about the MgO barrier limitation in the '134 Patent case at Limitation 1d. So that is the bait and switch that's going on here with the Petitioner.

What this means is that the petition never showed a reasonable expectation of success in either case, that MgO 001 would form, at the interface, with a lower amorphous CoFeB layer. That's why this is a new argument in the reply.

Slide 59, the Trial Practice -- this is why we filed a motion to strike the new argument and the new evidence used to support the new argument. The Trial Practice Guide requires striking these new arguments. The reply can only respond to arguments in the preceding brief, and they can't go off in a new direction.

The only proper reply for them to the POR, when we pointed out these defects in the petition, would have been to point to the petition and say this is where the argument was made. But when they point to the petition, they point to argument about a different limitation. That's the point. So these new arguments should be struck. They should not be considered.

And that's true in both cases. If you do consider these arguments, they fail. So let's start Slide 63. The only prior art reference that the replies allege to forming MgO 001 on CoFeB is Parkin. On Slide 63, the

Petitioner's expert admits he had no other examples of this proposition. The petition doesn't cite a single prior art reference. Setting aside Parkin, there is nothing in the petition that cites an example of this in the prior art.

And as we showed you, Bowen, Nagahama, Parkin, they all use the prior art templating principle to make that MgO barrier. The objective evidence refutes that Parkin taught forming MgO barriers on amorphous CoFeB, and it's summarized here in the papers on Slide 65. We showed you this slide before.

The examiner, Slide 68, the examiner allowed these claims over Parkin. So the examiner seemed to disagree with the position the Petitioner's taking now. Parkin was cited and considered in prosecution. The only response from the Petitioner --

JUDGE HAMANN: Counsel --

MR. WICHMAN: Yes?

JUDGE HAMANN: -- Counsel, I just want to make certain why you're bringing up the examiner. So this exact issue was in front of the examiner, and the examiner disagreed with the Petitioner?

MR. WICHMAN: No, I'm pointing out that he considered this reference and found the claims allowable. I'm not pointing to colloquy in the prosecution.

JUDGE HAMANN: Okay, thanks.

MR. WICHMAN: Okay. The reply's only response now is to allege that Parkin, quote, already disclosed what was claimed. But that response doesn't refute this evidence, because we showed, in the surreply, that Parkin does not describe forming MgO 001 on amorphous CoFeB. It's not in

Figure 3A, it's not in Figure 11, so we can take those one at a time. Inverted Figure 3A.

So this is the discussion of Parkin at column 17, lines 7 to 10, that the device may be inverted. All right.

This is new argument in the reply briefs. And I will show you, in the petition, if you go to Slide 70 -- I'm sorry, yes, Slide 70, this is where the argument is made in the petition, you can see it's for this lower electrode limitation where they cite Figure 3A. And they cite this language in Parkin, column 17, lines 7 to 10. So it's in connection with a different limitation. It's not about MgO formation, like we pointed out.

The same thing is true on Slide 72, I'm sorry, 71. It's the same issue with the allegations for the '167 Patent. They're referring to this Limitation 1a that's forming the lower electrode. That says nothing about forming the MgO barrier.

So they're pointing to arguments about a different limitation, saying that was an argument about forming the MgO. That doesn't work. They also are relying on combinations now, like we've said, that form MgO 001 directly on CoFeB and without any layer between them. So now they can't argue that, well, just because the CoFeB is somewhere below the MgO that that means they're showing a reasonable expectation of success. That's the wrong argument.

All right, at Slide 73, so let's talk about the evidence here. What they want you to -- what the Petitioner wants you to believe -- actually, I'm sorry Your Honors, Slide 72. What the Petitioner wants you to believe is that the statement about inverting the electrodes means more than just the position of

the electrodes relative to barrier. They require you to believe that when you invert the electrodes you do it without changing any composition of those electrodes, any of the layers in those electrodes.

The electrodes here are defined by their purpose, the storage electrode, the reference electrode. That says nothing about the layers that comprise those electrodes. And in fact, we'll see later in Figure 11, when the storage electrode is taken from above the MgO barrier to below it, an interface Layer 520 is added to that electrode. So that's exactly what happens in the inversion. The composition of the electrode changes.

The statement about inverting the electrodes is simply about the position of the electrodes relative to the barrier. It says nothing about the composition of the electrodes or how the MgO barrier is formed on top of it. And the experts do agree on, you know, contrary to what Petitioner says, this is exactly what the experts agree on. This statement that they cite at column 7, lines 7 to 10, about inverting the electrodes does not say anything about the composition of those layers after they are inverted.

Dr. Ross agrees, and this is language that they don't tell you about from her deposition. When asked about this inverting, she said she pointed out Parkin just says the structure may be inverted. Parkin doesn't say which of the layers are taken when the position of the electrodes are inverted. We don't know anything about the composition of the electrodes. We don't know how the MgO would grow, and that's undisputed.

So pointing to the proposition that Parkin says you can invert the electrodes in Figure 3A, absolutely does not get them to the proposition that Parkin taught forming magnesium oxide 001 on amorphous CoFeB.

Because Parkin shows us, as we'll see in Figure 11, that when the electrodes are inverted, an interface layer, a crystalline 001 interface layer is inserted. And that is fully consistent with how Parkin tells us the MgO barriers are formed. The only description Parkin provides of forming the MgO barriers is the prior art convention of templating approach.

Let me pause here. Does the Board have any questions before I move on?

JUDGE HAMANN: Yes, this is Judge Hamann. If you could just expand, obviously there's -- as to that interface layer, was it 520? I can't remember the number you referenced in Figure 11. I believe there's a dispute as to whether that's optional.

MR. WICHMAN: That's --

JUDGE HAMANN: Is that fair?

MR. WICHMAN: That is the dispute. And in fact --

(Simultaneous speaking.)

MR. WICHMAN: -- that's the entire dispute. Because their expert admits -- let me show you. If you turn to Slide 78, this is their expert, this is the testimony from Dr. Bokor. If layer 520 is not optional, then you agree Figure 11 does not describe forming MgO 001 on CoFeB.

Yes, I agree. So that's the entire dispute.

JUDGE HAMANN: Okay, so the question --

MR. WICHMAN: Yes, is it optional?

JUDGE HAMANN: So then the dispute is whether Parkin teaches whether that's optional or not, I suppose.

MR. WICHMAN: That's right, Your Honor, that's exactly right. So let's turn to that.

JUDGE HAMANN: Thank you.

MR. WICHMAN: So I think the first thing to point out about this is that in the '167 -- okay, in the replies, this is how the argument comes in, right? The petitions never talk about Figure 11. They certainly never talk about layer 520 in Figure 11 being an option, because they never talk about Figure 11 at all.

This only comes in in the reply papers, and the allegations in the reply papers are different. In the '167 Patent, they never actually allege that layer 520 is optional. Those words are not in the reply, in the '167 Patent. That argument is only made in the reply for the '134 Patent.

Let me pause. Is that distinction -- any questions about that distinction?

Okay, so then that admission from Dr. Bokor is fatal to this argument about Figure 11 in the '167 Patent because they never made the argument that this was optional, and Bokor admits it's not optional. And there's no teaching of magnesium oxide on amorphous CoFeB.

And you can see, right, we have -- let me find a blown-up copy of the figure. Well, you can see it here on Slide 80. This is Figure 11. The Patent Owner's annotation is on the left. The Patent Owner's annotation is actually accurate, sorry, on Slide 80, the bottom right in the middle there, look at the comparison here.

The Patent Owner's annotation from the surreply is correct, because Parkin describes layer 520 as CoFe 001. On the right, they ignore it. They

just say that's the CoFe layer. So again, this is layer 520. That interface layer 520 is injected to template the formation of the MgO barrier, exactly how Parkin describes forming the MgO barrier.

So, you wanted me to expand on this. Let me just -- okay, let's go back to the '134 Patent. Because we're not alleging that layer 520 is optional in the '167 case, that argument is done.

Okay, if you go back to Slide 77. The language on the right is what matters here. So this is column 22. It should be line 66 to 67, interface layer 520 of a crystalline CoFe alloy may also be used. They actually said that that explicitly states that the layer is optional, but clearly it doesn't. The plain language is different.

Dr. Bokor admitted that the POSA could -- I think, Judge Hamann, you pointed this out in the Petitioner's argument. Dr. Bokor admits that that statement means another alloy, other than CoFe, could be used for layer 520. And he says that right here on Slide 79, on the right hand side. This is the testimony. I think a POSA would understand that an interface layer of crystalline cobalt alloy or something else may also be used.

So their expert admits that a POSA could read this statement as saying another alloy could be used as opposed to saying that the layer itself is optional. And that is consistent with how Parkin describes other CoFe layers. We show you that on the left. At column 13, lines 10 to 13 he describes layer 118 may be formed from iron or CoFe. Layer 119 may be formed from cobalt iron. This language at Parkin, column 22, line 66 to 67, is a statement about the composition of the alloy used in layer 520.

JUDGE ARBES: Counsel, what is your best evidence to say that some sort of interface layer would have been necessary for when that becomes the storage electrode? What's your best evidence to say that it's needed in order for it to work?

MR. WICHMAN: If you turn to Parkin, column three, line 40 to 41, this is the only description anywhere in Parkin about the method of forming MgO barrier 540 in Figure 11.

JUDGE McSHANE: Could you repeat that cite again? I'm sorry.

MR. WICHMAN: It's Parkin column three, lines 24 to 41 and if you want to go -- you can see it here on Slide 9, if you want to go back to that. Like we've described several times, this is describing the template, right? You have to from the MgO tunnel barrier on a 1 crystalline, 001 confirming that electrode, that's template. There is no other description in Parkin, the '896 patent, of how to form the MgO barrier, 540 in Figure 11, other than this. There's certainly no -- not on the templating method, of forming MgO barrier 540 described anywhere in the patent. Petitioner is just making as a whole cloth. It's untethered from the language of Parkin.

The other evidence for this is that it's not just this language in the '896 patent at column three, but if you look at the incorporated applications, if you go to Slide 82, this is the language, page 35, lines 10 to 18. By preparing a 100 oriented BCC template layer of iron, the MgO deposited on top of this layer also grows 100 oriented. It could not be clearer that Parkin is talking about forming his MgO barrier by the convention prior art template method. I'm sorry, I'm losing power in my computer.

JUDGE McSHANE: Counsel, you're running into rebuttal time with this. I mean you can use your time as you wish, but I thought I'd bring it up.

MR. WICHMAN: Okay. This is Figure 11. To sum up where we are, first, particularly about this new subject and motion to strike should not considered. It has no basis in the petition. It's improper. If you consider it, it fails for the reasons we've just discussed. They have not identified anything that provides any evidence that a POSA would have had a reasonable expectation that MgO (001) would form at the interface of amorphous CoFeB lower electrode, the way that they have alleged for each combination in each position. In fact, we never even reached this argument for the '167 patent because in the '167 patent papers in their reply, they never alleged that layer 520 is optional and their expert admits that if layer 520 is not optional, that Parkin does not teach forming MgO (001) amorphously.

I think we've addressed -- let's talk about Nagahama quickly and then I'll reserve the remainder of my time for rebuttal. Let's talk about the Seed layer arguments. The problem with the Seed layer arguments, we point it out, and if you turn to Slide 106, it's that a Seed layer is not a barrier and if you try to use a Seed layer as a barrier, the device wouldn't work. It wouldn't meet the claims because the lower electrode would never crystallize. They ignore this whole issue in their papers. This is true of all the sequences. This is true of Nagahama, it's also true of Tonouchi. Their expert also admits the seed layer is not on it, well, that's absolutely right and, in fact, that's the whole point. The seed layer is a structure that gets the templating started because the top surface of the seed layer is crystalline 001

and then you thereon form the correct crystallographic texture for the lower electrode stays in place. Before I move on, is there a question on this one? Okay.

I want to talk about Wulff. If you could go to Slide 109.

JUDGE ARBES: Counsel, if I could ask one more question about this. Is it your position that a person of ordinary skill in the art would have disregarded these references that talk about a seed layer now and would not have considered that?

MR. WICHMAN: It's not evidence that's relevant to anything that they have to show. Again, the reasonable expectation of evidence they have to show is that the barrier, the magnesium oxide is going to form a 001 with that texture at the interface with the CoFeB, that's what you need to get this to work. In fact, if you go back to Slide 10 on the bottom right, in the APL paper, they show you the texture goes from interface to interface. The reason that you need that is because it's that crystographic texture and the magnesium oxide that causes the CoFeB to crystalize in the right section. So, yes, Your Honor, the seed layer is simply not relevant because that amorphous material that starts the seed layer off isn't going to work for the barrier layer of the claim the way that they have.

In fact, what the seed layer proves is that magnesium oxide would not form 001 on any surface which is what their expert seizing on this language, straight language from Tonouchi, to assert would be true as the basis of asserting this opinion that magnesium oxide 001 can form any substrate.

Judge Arbes, do you have any other questions you'd like me to answer? Okay.

On Slide 109, they make this remarkable statement that Wulff expressly taught MGO grows with a preferential orientation regardless of the substrate selection. All right, Wulff didn't teach that. Wulff, in this language on the right that they're pointing to, is doing a literature review, that's why there are footnotes in here. He describes the result of Tonouchi's paper and then he says the authors report, I mean it could not be clearer that this is not his work. He's saying this is what Tonouchi, this is a statement that we're taking from Tonouchi.

Then, if you look at what Tonouchi has to say on Slide 110, we summarize it. From the sur-reply, Tonouchi does not teach that MgO 001 would form at the interface with any substrate. Tonouchi is saying -- if all they're saying is that Tonouchi teaches MgO 001 might form eventually at some distance from the interface, but that's not relevant to the case. That's not the expectation they have to show. If they are saying literally that Tonouchi is asserting or establishing MgO 001 would form at the interface with any substrate, well, that's not true either because there are substrates in Tonouchi where MgO 001 did not form at the interface.

So, they're mispresenting Tonouchi's case. And, in fact, when Dr. Bokor seizes on this to spin out his opinion in paragraph six of his reply declaration, that opinion -- that's why his opinion is unsupported by the evidence he cites. Remember, his admissions -- he's no expert, he's not a crystal grower. It's very complicated. It's very complex. He did not understand the factors that the art says are relevant to how MgO crystal structures grow. He did not understand what Aboelfotoh meant by interfacial free energy or surface free energy, which determine that crystal's

structure. All he did was look at what other people said about MgO forming on the materials that were not CoFeB. And Tonouchi is an example of that.

So, I think, Your Honors --

JUDGE HAMANN: Counsel?

MR. WICHMAN: Yes, Your Honor

JUDGE HAMANN: This is Judge Hamann and I actually had a question about the motion to exclude that actually, I think, dovetails with something you just said if I heard you correctly. This goes to the testimony that is cited there, no expert is a crystal grower. I'm not aware of any definition of ordinary skill that sets forward being an expert crystal grower. Patent Owner, I think, advanced that, didn't it?

MR. WICHMAN: No, Your Honor, that's not part of the POSA definition, but just because he qualifies as a POSA does not qualify him to give testimony in this area where he admits he is not an expert and we cited the cases for that in the motion.

JUDGE HAMANN: I understand your position, I'm just trying to also understand what scope is meant to mean if you say he's not a crystal grower expert, to me the focus of that could be ambiguous. Anyways, thank you.

MR. WICHMAN: Yes, Your Honor. All right, I'll reserve my four minutes and 50 seconds for surrebuttal. Thank you.

JUDGE McSHANE: Okay, thank you very much. We'll reserve your time and we would like to hear from Petitioner. You have 28 minutes for rebuttal.

MR. WILSON: Thank you, Your Honors. My goal is not to use anywhere near the 28 minutes. Let me start by referring back to Exhibit 2080, which counsel objected to, rather interestingly objected to us discussing or citing passages from essentially saying unless the board violates the APA by not permitting us to respond to Exhibit 2080, then they have an objective, which is kind of ridiculous.

Aside from that obviously incorrect statement, if we go back to Exhibit 2080 at page 47 where Parkin describes thermal annealing and he also improved the crystallographic texture of the MgO layer 125 and the surrounding layers, so that the structure prior to annealing may not be substantially 100 oriented, but after thermal anneal treatment described above, the crystallographic texture becomes substantially 100 oriented. Only letting you get this MgO layer that is substantially amorphous as it's laid down is if you are not templating. That's how you get it. I said that in the opening argument, counsel did not respond to this passage in Exhibit 2080. It clearly teaches an alternate method forming MgO and annealing it to crystallize and all of our petitions, '134, '167, refer to annealing. They all refer to annealing the MTJ, not just the lower electrode of Bowen as counsel misrepresents.

If we look at the '134 petition, page 38, one of skill would have been motivated to anneal Bowen's MTJ with cobalt iron boron to obtain a crystal and ferromagnetic seed layer. It's right there in the petition. If we look at the '167 petition, page --

JUDGE ARBES: Counsel, I guess the issue then is that in other places of your petition that Patent Owner has pointed to, you also refer to Bowen's manufacturing method.

MR. WILSON: We do, Your Honor, but then we substitute that out. We say the lower electrode is going to be cobalt iron boron taken from Parkin or Sunai and we refer to Parkin repeatedly throughout that process to talk about exactly how that gets done.

JUDGE ARBES: I guess what's already going missing perhaps in Patent Owner's view is a description of this is Bowen's method of manufacturing, this is what we're changing and here's the new method of manufacturing.

MR. WILSON: Let me point Your Honor to that. Okay, so let's look at, for example, the '167, which was their focal point, at page 30. It says in the middle of the page under Claim 1D, annealing ferromagnetic electrodes, an MgO barrier layer was known and it cites Parkin right there. If we go to the next page, page 31, it says one of skill reading Bowen and Sunai would have been motivated to anneal the cobalt iron boron layers and MgO barrier layer to increase TMR and crystallize the cobalt iron boron layers. It's right there. I mean it literally is right there on the page. So, to say we didn't assert that or how the process had changed is ridiculous.

JUDGE ARBES: So, in your view, that's describing a change to Bowen's manufacturing process. We're not going to use templating any more, we're going to use this process instead?

MR. WILSON: So, substituting the cobalt iron boron layer as suggested and as frankly explicitly taught in Parkin is a teaching that we're

not going to use templating because it's amorphous. Parkin said you can substitute for either or both electrodes this cobalt iron, this amorphous cobalt iron boron. In Figure 3a, there is no template. It plainly teaches that. In Figure 11, 520 is optional because it's an incorporation of both Figures 3a and 3b, so that layer, that extra layer cobalt iron layer, 520, is optional.

JUDGE ARBES: I'm sorry, can you explain how Figure 3a is not templating in your view? Can you explain that again?

MR. WILSON: When it's inverted, it is not templating.

JUDGE ARBES: What -- okay.

MR. WILSON: Yeah, when it's inverted the cobalt iron boron as Parkin expressly teaches is under the tunnel barrier. It can't be templated. Let me point out something else from Parkin. Counsel was asked where does Parkin say exactly how the MgO is formed in Figure 11 and they said the only place that any of this is described is in column three. Let me actually point Your Honors to column 15, line 26. I'm going to one up counsel. They said we're going to -- let's advance the technology to Bowen. I'm going to advance the technology and the art all the way to Parkin.

Here's what Parkin says, theoretical predictions of high TMR and MTJs form from the iron were based on perfectly anatomically ordered structures in which there was no disorder within the iron and MgO layers and no disorder of the iron MgO interface. Even small amounts of disorder should, in principle, invalidate the conclusions of these simple-minded theoretical predictions, since the high TMR values are related to the spin dependent tunneling and wave functions of a particular symmetry from the iron layer through the MgO tunnel barrier. Exotic techniques, such as

1 molecular beam epitaxy and deposition at elevated temperatures on single
2 crystal and substrates are not useful for the mass manufacturing of cheap
3 devices for MRAM and other applications, particularly since manufactured
4 devices are typically grown on template layers, which are either amorphous
5 or polycrystalline.
6 Okay, he goes on. The structures and the associated methods of
7 comparing them described herein are entirely compatible with mass
8 manufacturing of these devices on a wide variety of templates which are not
9 required to have any particular crystal structure or orientation. If you jump
10 to the bottom of that paragraph, line 57, he says even small amounts of
11 disorder are likely to significantly reduce the TMR values predicted by
12 theory, so it is very surprising that high TMR is observed in the devices and
13 structures prepared using the methods described in the current invention.
14 When they tell you, you've got to have a tunnel barrier that is
15 crystalline from end to end and their patent doesn't describe that, their
16 claims don't require it, but they're telling you it's got to be that way in the
17 prior art, Parkin says no, it doesn't. It's surprising that we got such high
18 TMR despite disorder here and there, right? You don't have to this perfect
19 crystalline structure that's what Parkin says. When you invert Figure 3a or
20 you use the inverted form of Figure 3a in Figure 11, you don't have to have
21 this perfect crystalline structure. You don't need this template that's what
22 Parkin teaches.
23 Now, let's jump to Exhibit 1099, which is Tonouchi. You heard
24 Patent Owner earlier talk about it, there's no way a peer review journal
25 would have let Yuasa use the word surprising unless it was absolutely true,

unless they were all convinced it was really surprising. Let's take a look at the Journal of Applied Physics article, which is Tonouchi. Let's look at the abstract. It says at the bottom sentence of the abstract, our study indicated that the MBN epitaxy mechanism can be explained by its growth on a 100 naturally oriented five angstrom MgO layer. Five angstrom layer, that's a half a nano unit. That's 100 oriented.

If we turn to the second page, it's 962, upper right hand column you see, apart from the epitaxy, MgO's known to grow strong preferential 100 orientation regardless of the substrate selection. Now, how could they say that in a peer review journal unless it was correct according to Patent Owner. Now, Judge McShane, you asked earlier about the Parkin nature materials article and that is Exhibit 2060. It is in the record. If you take a look at Figure 3, you will see the particular high TMR is achieved based on a cobalt iron boron layer on top of an MgO layer, as I explained earlier in the opening. That's Parkin's paper that is cited in that hockey stick graph, but there is no description. There's no citation in Exhibit 2062 in Parkin's patent. There's no citation to forming MgO over cobalt iron boron.

JUDGE HAMANN: Counsel, this is Judge Hamann. I have two questions if I can go ahead and ask them now or wait.

MR. WILSON: Nope, go ahead.

JUDGE HAMANN: The first is what is Petitioner's response to Patent Owner's argument and I'll try to phrase it correctly that Petitioner basically cites and relies on some of Parkin's figures, such as 3a, sort of in the wrong limitation for the arguments it's making now as to the MgO layer.

MR. WILSON: I'm sorry, Your Honor. Are you saying they say we argued Parkin's inverted Figure 3a in response to the wrong limitation? Is that the argument?

JUDGE HAMANN: Yeah, I think actually let me try to frame it, maybe be more precise. I believe one of the arguments that's made is to extent that there is a discussion in the petition asked some of the figures in Parkin may be linked to other elements or limitations than what's being argued right now as to the MgO layer.

MR. WILSON: Okay, sure, Your Honor. Let's take a look at the '134 petition, for example, page 32 and this is Claim 1d. It's the tunnel barrier layer, magnesium oxide tunnel barrier layer. The passage that I started my presentation with about MgO 001 would still mean 001, even if you substitute out the electrode is at the bottom of page 33 running over to page 34. It is literally made in Claim 1d.

JUDGE ARBES: And for the other petition?

MR. WILSON: Let's see, in the '167, jump to page 28. If we look at Claim 1b, which is the magnesium oxide layer, and you can see it starts on page 28 of the '167 petition and you jump over to page 29. Two lines from the top it says, as explained for Claim 1a, one of skill would have been motivated to replace Bowen's lower iron electrode with a cobalt iron layer supra Claim 1a. Claim 1a is where we discuss, as you can see, inverted Figure 3a and all of that and it cross references to 1a, so the argument that we didn't discuss it in the right limitation is, of course, nonsense.

JUDGE ARBES: But, Counsel, I think Patent Owner might say that the citation at least to an inverted form of Figure 3a does not appear until

later in the petition on page 40 and that is pertaining to a different limitation. I guess the question is why is it proper for us to consider the inverted Figure 3a in connection with your limitation?

MR. WILSON: Okay, so I guess I'm missing something because if I look at page 26 of the petition, we can see the discussion of Parkin here, Figure 3a. If I turn over to page 27 --

JUDGE ARBES: I'm sorry, Counsel, I was talking about the petition for the '134 patent.

MR. WILSON: Oh, my apologies. For the '134 patent, you're actually going to see this discussion occur in multiple places, but let's see, so you're saying when we talk about the inverted Figure 3a --

JUDGE ARBES: That's on page 40.

MR. WILSON: It's on page 40.

JUDGE ARBES: And that pertains to limitation 1e.

MR. WILSON: Yeah, and so if we look down at the bottom of page 33, which is again the passage that I quoted in my opening slide, it says if Sunai's or Parkin's cobalt iron boron layers are used as described in Claims 1e and 2 in this ground, one of skill would understand that the MgO could be a polycrystalline or a single crystal, but would still have the same 001 organization. It's cross referenced right there to Claim 1e.

JUDGE ARBES: Okay, thank you.

JUDGE HAMANN: Counsel, this is Judge Hamann again. The second question I had is similar, the intention with the petition again. I think this was on the 1493 case.

MR. WILSON: Okay.

JUDGE HAMANN: The Patent Owner's argument that Petitioner -- an argument in this particular case, that the '520 and with Figure 11 was optional.

MR. WILSON: I'm so glad you asked, Your Honor. I would have probably skipped it, but take a look at our reply brief in the '167. It is paper 24. If you look at page seven of our reply brief, where we --

JUDGE HAMANN: Just give me a moment to get there, sir.

MR. WILSON: Oh, sure.

JUDGE HAMANN: I'm there.

MR. WILSON: Okay. You can see the discussion begins first with paragraph as IPB admits in the accompanying '134 IPR, Parkin's Figure 11 confirms Figure 3a's inverted embodiment expressly discloses an MgO 100 layer over an amorphous cobalt iron boron layer. There are a couple of cites under there. The Exhibit 1062 cite is obviously Parkin. If you look at that deposition cite there, Exhibit 2018, 134 to 138, that describes this structure in Figure 11 and why layer 520 is optional. That passage specifically describes layer 520 being optional.

JUDGE HAMANN: Thank you.

JUDGE ARBES: Counsel, just to make sure I'm clear. On page 7 of the reply, what you have colored in purple there and designated it as CONB electrode 510, that's not entirely accurate, right? I mean 520 is the interface layer and that's different, right?

MR. WILSON: That's correct.

JUDGE ARBES: That layer is included? Okay.

MR. WILSON: Yes, 520 is the cobalt iron layer, the interface layer, that's correct. Let me sum up this way, if there are any questions, I'm happy to answer them, but --

JUDGE ARBES: One last question, Counsel. Can you respond to Patent Owner's argument about the seed layers?

MR. WILSON: The seed layers?

JUDGE ARBES: And that they are pertaining to the seed layers is not relevant.

MR. WILSON: So, again, I'm sort of baffled by that because the seed layers are MgO 001 and there are two arguments as to why they're not relevant. The first argument being that, well, they start out amorphous and then they become crystalloid, so does Yuasa's tunnel barrier, so that's not a distinction. In fact, mind you, I'm talking about Exhibit 2013, his paper, none of this is in the patent, right. None of this detail is in the patent. They don't say that that layer is entirely crystalized MgO 001, not in the claims. Nothing here requires that layer to be entirely crystalized and as we see from Exhibit 2013, Yuasa's layer is not entirely crystalized when it's laid down. If it ends up crystalized, it's from the annealing. As I already showed you, we said the entire MTJ would be annealed, so that is irrelevant, it's totally irrelevant. It's a distinction about a difference.

The other argument is that this seed layer is somehow conceptually different from a tunnel barrier; it's not. The only difference is where it's placed in the structure. I said that in my opening argument. I didn't hear counsel respond to it at all because it's true. MgO 001 is MgO 001. A seed layer is most definitely relevant and the fact that you can grow a seed layer,

an MgO 001 seed layer, on anything at a minimum thickness of less than 10 nanometers is certainly relevant to whether you could grow it on an amorphous cobalt iron boron electrode.

So, just to sum up before I hand this over to my co-counsel here, I don't think you heard anything that pokes any holes in Parkin's closure of inverted Figure 3a, MgO 001 over cobalt iron boron or Figure 11 for that matter, but we don't even need Figure 11, it's extra. It's a second disclosure of the same thing. Parkin is teaching what they claim Yuasa intended and there is no response. The fact that the examiner didn't find this in Parkin, that's not evidence that it's not true. What about the language of the patent? What about what the patent actually says? There's no response to that.

With that, I'll turn it over, Your Honors, to my co-counsel. Sorry, I'm informed that we will concede the rest of our time. Thank you, Your Honor.

JUDGE McSHANE: Thank you very much. We're going to hear from Patent Owner and we'll give you five minutes. How about that? We'll be generous.

MR. WICHMAN: Thank you, Your Honor. Let me make a few points. First, on Parkin, Petitioner just cited column 15, lines 25 to the end. That does not teach forming MgO 001 on amorphous material. That says that the MgO 001 can be polycrystalline instead of perfect crystalline and that's recognized as a distinction. In fact, if you go to Slide 20, that's the circle, it's not the triangle for the CoFeB amorphous MgO.

The idea that they talk about the seed layers, if you go to Slide 104, Dr. Bokor admits that the claims cite a barrier explicitly in the '134 patent

and it's an MTJ with barrier layers at 001, like Bokor admits the barrier layer has to be crystalized at the interface and that's at Slide 104.

As for the reply argument at page seven, where Petitioner points to the deposition exhibit transcript, Exhibit 2018, they are not permitted to incorporate argument by reference from their expert's deposition. The argument that layer 520 is optional is not present in the '167 case. I want to go to back the admissions about the POSA would not have used the methods alleged, if you look at Slide 45 on the right, that's the follow on question where Bokor admits POSA would not have understood what had happened if the alleged process had been followed.

Let me point out that if the Petitioner says that they changed the annealing step by saying you could do another anneal, doing another anneal does not change the fact that you already annealed the lower electrode and their expert even admits this in his deposition, Exhibit 2018, page 167, lines 23 to 24. He would have expected Bowen does another to anneal the top iron cobalt layer. So, doing multiple anneals doesn't change the fact that you have annealed the lower electrode and that is the process that's articulated from Bowen.

Let's come back to the point about Figure 11, layer 520. Their whole case comes down to this idea that Figure 11, layer 520, that interface layer of cobalt iron 001 is optional because that's important. On Slide 9, there is no dispute that the only description of how that MgO barrier 540 is formed in Figure 11 is by template. That's the '835 application.

JUDGE ARBES: Counsel, can you respond to the Petitioner's argument about column 15?

MR. WICHMAN: Yes, I believe I just did. In column 15, what's being described here is not forming MgO on amorphous material, it's about forming polycrystalline MgO, meaning that the layer beneath it is polycrystalline as opposed to a perfect crystal. That was important because in the theory papers everything was a perfect crystal and there was a question of do we have to go to this effort to get a perfect crystal barrier? Can we do something simpler and get a polycrystalline and that's what Parkin is talking about here in column 15 and that's what he's recognized for in the field.

Let me point this out, if it's true in their case that Parkin actually taught forming MgO 001 on amorphous CoFeB, then he would have said that in any of his papers. They could not identify a single one of Parkin's publications, and he has many, where he describes using or inventing this technique. They just don't point to anything. He would have been recognized in the field as having invented this result.

Finally, there simply is no alternative manufacturing method for the MgO barrier that's disclosed in the text of Parkin itself. To the contrary, we will show you that the application itself explicitly says the various work products into it.

I believe I'm out of time. Let me just say, thanks for your attention.

JUDGE McSHANE: Any additional questions from my colleagues?

Okay, well, hearing nothing, the case is submitted and taken under advisement. We thank the attorneys for their arguments. I have to say, honestly, your mastery of the record and the technology is very impressive, frankly.

With that, we are going to go off the record.

(Whereupon, the above-entitled matter went off the record at 12:29 p.m.)

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