Trials@uspto.gov
571-272-7822

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG DISPLAY CO., LTD.,
Petitioner,

v.

PICTIVA DISPLAYS INTERNATIONAL LTD.,
Patent Owner.

IPR2024-01093 (Patent 8,723,164)
IPR2024-01094 (Patent 8,558,223)
IPR2024-01095 (Patent 11,828,425)

Record of Oral Hearing
Held: October 24, 2025

Before GRACE KARAFFA OBERMANN, GARTH D. BAER, and JASON M. REPKO, *Administrative Patent Judges*.

APPEARANCES:

ON BEHALF OF THE PETITIONER:

SCOTT WEIDENFELLER, ESQ.
HYUN BYUN, ESQ.
ALEXA HANSEN, ESQ.
JARED FRISCH, ESQ.
KEE YOUNG LEE, ESQ.
Convington & Burling LLP
850 10th Street NW
Washington, DC 20001
(202) 662-6000
sweidenfeller@cov.com
hbyun@cov.com
ahansen@cov.com
jfrisch@cov.com
kylee@cov.com

ON BEHALF OF THE PATENT OWNER:

HONG (ANNITA) ZHONG, ESQ.
JONATHAN LINDSAY, ESQ.
Irell & Manella LLP
1800 Avenue of the Stars
Suite 900
Los Angeles, CA 90067
(310) 277-1010
hzhong@irell.com
jlindsay@irell.com

The above-entitled matter came on for hearing Friday, October 24, 2025, commencing at 11:00 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

11:01 a.m.

JUDGE OBERMANN: Good morning, everyone, and welcome to the PTAB. This is a consolidated final hearing in IPR2024-01093, involving Patent Number 8,723,164; IPR2024-01094, involving Patent 8,558,223; and IPR2024-01095, involving Patent 11,828,425.

I'm Judge Grace Obermann, and with me today on the panel are Judges Garth Baer and Jason Repko. I wanted to remind everyone that although this hearing is consolidated, the cases are not. They're not joined or consolidated. So during arguments I ask that Counsel please make clear for the record which case they are discussing at any time. And please take care not to cite evidence from one case in a different case. We want to keep the records distinct on the record. So I'm going to have to depend on Counsel to please do that.

The hearing is open to the public, and we have a public line. So please refrain from disclosing confidential information. If you need to refer the panel to something that's confidential please just identify the material by exhibit or paper number and page number and we can pull it up, but please don't disclose it.

If you accidentally disclose anything confidential though, please speak up as soon as you realize it, and we'll have the court reporter mark those pages.

Okay. Let's start with introduction of Counsel. Who do we have for Petitioner today?

MR. WEIDENFELLER: Good morning, Your Honor. It's Scott Weidenfeller on behalf of Petitioner.

JUDGE OBERMANN: Thank you. Mr. Weidenfeller, will you be providing all of the arguments today?

MR. WEIDENFELLER: I will not. My colleague, Hyun Byun will be presenting argument on the '164 Patent, and my colleague Alexa Hansen on the '223 Patent.

JUDGE OBERMANN: Okay.

MR. WEIDENFELLER: And my two other colleagues, Jared Frisch and Kee Young Lee. Mr. Frisch and Mr. Lee are LEAP practitioners who will be presenting on the '425 Patent. And with the Board's permission, we would like to proceed patent by patent if that would be acceptable to the Board.

JUDGE OBERMANN: That's fine with the Board. Whatever works best for you. And we understand that you have 15 minutes of total extra time for your two LEAP practitioners.

MR. WEIDENFELLER: Yes. Thank you.

JUDGE OBERMANN: Okay. Thank you so much.

Who do we have for Patent Owner today?

MS. ZHONG: Annita Zhong on behalf of Patent Owner, and together with me is Jonathan Lindsay. And Jonathan will be -- Mr. Lindsay will be arguing the first one, the '164, IPR2024-01093 and I'll handle the other two.

JUDGE OBERMANN: Thank you very much.

Let's see. Our total hearing time today is four hours and fifteen minutes. So we want it to be at your disposal, but we were thinking that it might make sense to take a lunch break, depending on how long Petitioner's opening is. But we can discuss that as we get closer to a reasonable time to break.

But my thinking was we take either 45 minutes or an hour, whatever works best for you for lunch and then after we come back from lunch, we will continue with some arguments, and then possibly take a 10 or 15 minute break before the end since it's so long. But if at any time any of you needs a break, please just speak up. We can take breaks as necessary and we want to make sure that, you know, everyone's comfortable with the timing.

Okay. The public line has not started yet. We're having a little bit of a technical difficulty there. So let me just check with my people and see what's going on there, if we need to hold on for a minute. Okay. I think we're okay. All right.

Okay. I did not see any demonstratives for the 1095 case. Is that correct?

MS. ZHONG: There should have been demonstratives filed.

JUDGE OBERMANN: When were they filed? Were they filed with the others?

MS. ZHONG: Yes. On the 22nd.

JUDGE OBERMANN: Okay. Do you see them?

PARTICIPANT: Just a minute.

JUDGE OBERMANN: Okay. We're going to check on that.

While we're checking on that, are there any other preliminary matters that either Counsel would like to discuss before we get started? Mr. Weidenfeller.

MR. WEIDENFELLER: If Your Honors would like hard copies, we have hard copies of all the slides.

JUDGE OBERMANN: I don't need a hard copy. Does anyone up here?

JUDGE BAER: I would like one please.

JUDGE OBERMANN: Okay.

MS. ZHONG: Does Your Honor have the 1095 at least?

JUDGE OBERMANN: Well, we have them here. So if we don't have them on our screen, we'll follow along.

MS. ZHONG: Thank you.

JUDGE OBERMANN: Judge Baer may want one.

JUDGE BAER: Thank you.

JUDGE OBERMANN: Thank you.

Okay. Mr. Weidenfeller, how much time do you want for your opening?

MR. WEIDENFELLER: We would like to take 30 minutes for each patent for each opening.

JUDGE OBERMANN: So an hour and a half?

MR. WEIDENFELLER: Yes.

JUDGE OBERMANN: Do you want a break in between or how do you want it to work? Do you want to go back and forth, have Counsel discussed it? Or do you want to do all three and then have Patent Owner do all three?

MR. WEIDENFELLER: We have not discussed it. Whatever works best for the Board.

JUDGE OBERMANN: Okay. Patent Owner's Counsel, do you have a preference?

MS. ZHONG: We would like to do it by patent by patent.

JUDGE OBERMANN: So go back and forth.

MS. ZHONG: Yes. Because all three, we don't think they are related.

JUDGE OBERMANN: No, they're not.

MS. ZHONG: It's going to get really confusing.

MR. WEIDENFELLER: That makes a lot of sense.

JUDGE OBERMANN: So you want 30 minutes per patent for your opening.

And then how much would you like for your response to each Patent?

MS. ZHONG: I think it's going to vary patent by patent.

JUDGE OBERMANN: All right.

MS. ZHONG: Currently we are thinking 30 minutes for the '164 and maybe 25 each for the '223 and '425 but the allocation may change.

JUDGE OBERMANN: Okay. That's fine.

Is that okay with your Mr. Weidenfeller?

MR. WEIDENFELLER: Yes, Judge.

JUDGE OBERMANN: Thank you. Because it will make sense, I think maybe let's do 30 minutes and 30 minutes on the first patent and then we can talk about taking a lunch break.

MR. WEIDENFELLER: Certainly.

JUDGE OBERMANN: I'm going to put 30 minutes on the clock for you Mr. Weidenfeller, and we'll start the clock when you begin to speak.

MR. WEIDENFELLER: Thank you, Your Honors and Hyun Byun will be presenting on behalf of the Petitioner for the '164 Patent.

JUDGE OBERMANN: Thank you very much.

MR. WEIDENFELLER: Thank you.

JUDGE OBERMANN: I'm sorry. Are you one of the LEAP practitioners?

MR. BYUN: Yes, I am.

JUDGE OBERMANN: Do you want any extra time, or is the 30 minutes going to be 30 minutes right now? Thirty minutes.

MR. WEIDENFELLER: Thirty minutes.

JUDGE OBERMANN: Okay. Thank you so much.

MR. BYUN: May it please the Board, I am Hyun Byun from Covington & Burling representing Petitioner, Samsung Display's arguments in IPR2024-01093 regarding U.S. Patent Number 8,723,164.

The '164 Patent is directed to an OLED device which allegedly improves charge carrier transport and charge carrier balance in OLEDs. Slide 3 shows the alleged invention. Shown on the left-hand side is the background of the invention. It describes a typical OLED device whose emission layer is composed of one matrix material and an emitter material. Electrons and holes meet in the emission layer to form excitons leading to light emission. The background of the invention notes that it is important to balance the ratio of electrons and holes in order to obtain a high efficiency.

Shown on the right-hand side is an excerpt from the summary of the invention section. As shown in highlight, the alleged solution to the problem is to add two additional matrix materials. That is, in order to facilitate hole and electron transport.

Turning to Slide 7, one of the main issues of dispute is the meaning of the term, matrix material. This issue implicates all grounds.

Turning to Slide 8, Petitioner does not believe any specialized construction is necessary. Turning to Slide 9, Patent Owner seeks to limit the term matrix material to exclude dopants and dispersed agglomerations.

In its institution decision, the Board has analyzed this use in detail already and correctly rejected Patent Owner's arguments. Since the

institution decision nothing has changed that would warrant the Board to change its mind. Further development has only confirmed that the Board's decision is correct.

Turning to Slide 10, after the institution decision, Judge Gilstrap issued a claim construction order in a parallel District Court proceeding confirming that the Board's decision is correct. In the District Court litigation Patent Owner argued that the term matrix material should be construed as a material that forms a continuous phase. And you can see Patent Owner's proposed construction in the left column.

In this proceeding Patent Owner makes a similar argument that a matrix material forms a continuous phase while dopants do not, and therefore dopants cannot be matrix materials. But Judge Gilstrap rejected Patent Owner's proposed construction, and instead adopted Samsung's proposed construction which confirms that it is a matrix as a whole that forms a continuous phase, but not each individual matrix material by itself.

Turning to Slide 11. The specification supports the Board's and Judge Gilstrap's interpretation of the term matrix material. Without imposing any limitation, the specification tells us that a matrix is made of three matrix materials.

As shown in highlight on the right-hand side, the second matrix material can be a hole transport material, and a third matrix material can be an electron transport material. This is consistent with the stated object of the invention which is to provide an electronic device with an improved charge carrier transport.

Turning to Slide 12, as Petitioner's expert Dr. Holmes explains, the term dopant merely refers to a component that has been added to a film or

functional layer. Turning to Slide 13, the specification describes an electron transport material, which the summary of the invention describes as the third matrix material, as a dopant. As shown in highlight, an electron transport material, BCP, is doped to form a matrix along with other materials, NPB and UGH4, also discussed in this paragraph.

Turning to Slide 14, when we discussed this passage with Patent Owner's expert, Dr. Sims, he agreed that BCP is certainly a matrix material in this case. And you can see his admission in the upper left-hand corner of this slide. As shown on the lower left-hand corner of the slide he also agreed that the '164 Patent describes BCP as a dopant.

Now as shown on the right-hand side, Dr. Sims on redirect tried to change his testimony. So on redirect Patent Owner's Counsel asked Dr. Sims, so why do you consider that -- that's BCP -- to be a matrix material? Dr. Sims said, I think that when we were discussing this, my mind just fixed on the other aspects of the '164 Patents. So the table, the example table of mCP, TCTA, TBPi, they are more or less evaporated to a -- sort of in an even proportion of one another. So that's where -- that's what I was thinking at the time, that you had a sort of similar percentage of each of those within the -- within the matrix in that case.

So that formed a, you know, a continuous or a more or less continuous phase of those materials, and that -- in this case, it actually does not state any kind of evaporation rates or any kind of compositional ratios of these various materials.

So that was a -- the reasoning why I thought it was a matrix material, which is erroneous.

Turning to Slide 15, the attempt to change his testimony came only after Patent Owner's expert discussed the substance of his testimony with Counsel for one and a half hours. The Board should give little weight to Dr. Sims' attempt to change his testimony.

We'll discuss the disclosure of matrix material in Choulis next. Turning to Slide 17, Patent Owner argues that Choulis' hole and electron transport materials are not matrix materials because they are dopants. But as we just discussed, the '164 specification confirms that dopants can be matrix materials.

Turning to Slide 18. Choulis' device is very similar to the device disclosed in the summary of the invention. Shown on the left-hand side is annotated Figure 4 from Choulis. It depicts a light emitting layer 305 --

JUDGE BAER: Counsel, could we go back to this claim construction issue, if we could? I understand your position about whether it needs to be continuous. Can you help me with the term matrix? So what does matrix add? And I know your answer is not continuous. But what does it add, such that something would qualify as a material, but it wouldn't qualify as a matrix material?

So what I'm asking is how do we give the term matrix some value so it's not just a nugatory, meaningless word, it's consistent with your construction?

MR. BYUN: Our position is that a specific expressed construction of the term matrix material is unnecessary. We can rely on plain and ordinary meaning. And Patent Owner takes --

JUDGE BAER: But I don't think those two things are the same. I mean, just because it's plain and ordinary meaning, I don't think that's the

same as no construction. And I understand perhaps, maybe not needing to specify a specific claim construction where these are the exact bounds of it. But can you give me an example of any material that would qualify as a material, but wouldn't be a matrix material? How do we give that any meaning or any weight such that we're not reading that out of the claim?

MR. BYUN: Absolutely. We need to refer to the specification which tells us that you mix different materials to form a matrix. So instead of having just -- going back to the background of the invention -- the typical OLED device, the '164 Patent tells us has an emission layer that's composed of a matrix material and an emitter material. So that's the baseline.

On top of that, the solution, the summary of the invention tells us, to the perceived problem of electron and hole transport is to add two additional materials to the mix in order to help with hole and electron transport.

So a material that is added or mixed to form a matrix, according to the specification would be a matrix material. So this becomes more clear when you consider an example in the spec which describes the manufacture of a matrix material, as an example. It describes a joint evaporation of four different materials at the same time to form a matrix. So when you're mixing a material at the same time all together in order to form a matrix that, the specification tells us, is a matrix material.

So that is the basis of Samsung's proposed construction in the District Court litigation which is --

JUDGE OBERMANN: I'm sorry.

MR. BYUN: Yes.

JUDGE OBERMANN: Before you move on. Maybe I can approach this in a different way. Are you able to provide a plain and ordinary meaning for the term matrix material that does not include the word matrix?

MR. BYUN: No, Your Honor. Because the term matrix material is so inextricably linked to the term matrix, where matrix material --

JUDGE OBERMANN: How about the word -- how about the term matrix? Can you give me a plain and ordinary meaning of the term matrix as it appears in Claim 1?

MR. BYUN: Matrix material, the matrix is, we believe, a continuous phase of the mixture of matrix materials.

JUDGE OBERMANN: Without using the word matrix. We need to be able to understand what the word matrix means. And you can't just say it means matrix.

MR. BYUN: Matrix is a continuous phase which forms the film or an organic layer. And this is based in the specification which tells us that there is an organic layer or film that contains a matrix and which in turn is composed of three different matrix materials.

JUDGE OBERMANN: Okay. You used the word matrix twice there. And I'm concerned for the same reason Judge Baer may be concerned, that you're asserting a plain and ordinary meaning, but you're unwilling to give us a definition that doesn't use the word matrix.

MR. BYUN: You're asking for the definition of the word --

JUDGE OBERMANN: We're trying to get to the scope of the word matrix, obviously. And we'd like to get there in a way that is fair to both parties. And one party is saying that dopants can't be part of the matrix, and you're saying that they can be. And you're basing it -- is it a functional

situation? Like what, is there any kind of material that could be added that would not be part of the matrix?

MR. BYUN: As long as, well a matrix material is in the context of the '164 Patent is a base material that makes up a film.

JUDGE OBERMANN: Okay. That's good.

MR. BYUN: Yeah. And as long as you have a material that composes a film that is a matrix material.

JUDGE OBERMANN: Okay.

MR. BYUN: According to the specification.

JUDGE OBERMANN: In other words, does it have to -- I'm looking at this claim, and there's certain relationships between the LUMO and the HOMO. So is this really a functional aspect? Is this a functional element of the claim when we say matrix material?

In other words, is it a matrix material that functions appropriately within the other words of the claim? I'm just trying to get a sense of it, what is the scope?

MR. BYUN: The functional aspect is part of it. I would say that the term matrix material is broader than that. That it is, again, a material that forms a film.

JUDGE OBERMANN: Okay.

MR. BYUN: But in addition, Claim 1, as Your Honor notes, imposes additional limitations about specific LUMO and HOMO levels of the underlying materials.

JUDGE OBERMANN: Okay. I think that's very helpful. Thank you, Counsel.

JUDGE REPKO: And I have an additional question for that. So essentially you're saying it's defined by its use. The matrix material is defined by how the material is used, you can't look at the material and say this is a matrix material. A material that forms for example, a continuous phase. Is that correct?

MR. BYUN: That is correct, Your Honor. You cannot look at an element in isolation away from the context in which it's being used and tell that it's a matrix material. It's based on the use of the particular material to form an organic layer.

JUDGE REPKO: Okay. Thank you.

MR. BYUN: Going back to the disclosure in Choulis. So we were discussing the annotated Figure 4 from Choulis which depicts a light emitting layer 305 which contains not only a material PVK shown in blue, but also a hole transport material, TPD, shown in red, an electron transport material, PBD, shown in green.

This is analogous to the disclosure of the device described in the summary of the invention shown on the right-hand side which describes a device with not only a first matrix material, but in addition a second matrix material which can be a hole transport material, and a third matrix material, which can be an electron transport material.

Turning to Slide 19, elsewhere, Patent Owner equates the second and third matrix materials to hole and electron transport materials. Turning to Slide 20, although we are prepared to address Choulis' disclosure of the raised dependent claims, Patent Owner's main demonstratives do not address these dependent claims. We'll rest on the briefs for these issues unless the Board has any questions about them.

Skipping over to Slide 32, we'll address the combination of Choulis and Yong for Claim 9. Turning to Slide 33, as shown on the right-hand corner, Claim 9 requires that the concentration of the emitter material in the emission layer has a gradient.

Now there is no dispute that the combination reference Yong discloses the claimed gradient of the emitter material. So, a gradient by the way refers to how the emitter material is spread throughout the matrix. It means that the emitter material should not be uniformly distributed, but that the distribution is graded. There is also no dispute that Yong teaches the benefits of the gradient in the concentration of the emitter material.

Turning to Slide 34, Patent Owner argues that Choulis and Yong cannot be combined because Choulis discloses applying its matrix material, PVK, via solution processing while Yong discloses using evaporation to create gradients.

Now keep in mind, Claim 9 requires gradients for an emitter material, not a matrix material. And Claim 9 also requires gradients, not a method of forming one. Nevertheless, as we discussed in the petition, a POSITA would have known how to evaporate the matrix material PVK.

Turning to Slide 35, it was known that PVK could be successfully deposited through evaporation. Shown on the left-hand side is an excerpt from an article by Djobo which discloses PVK deposited by evaporation for light emitting diodes.

Patent Owner argues that evaporating PVK would not work due to decomposition, but Dr. Holmes explains in his declaration, Exhibit 1044, paragraph 47, that evaporating PVK allows the evaporated PVK layer to transport charge and emit light. And when asked about this during his

deposition, Dr. Holmes explained that, vaporizing a polymer like PVK permits the realization of the film that still has properties that resemble that of PVK. This is in Exhibit 2033, page 27.

Patent Owner also argues that evaporating PVK may not work with a phosphorescent device as opposed to a fluorescent one. When asked about this during his deposition though, Dr. Holmes explained that it would have been obvious to a person skilled in the art to look at the results of Djobo and apply PVK using vapor processing in a phosphorescent LED. This testimony can be found in Exhibit 2033, page 153.

Turning to Slide 36, although a POSITA knew how to form gradients by evaporating PVK, a POSITA also knew how to form a gradient via solution processing. As Dr. Holmes explains, and that's shown in highlight on the left-hand side of the slide, OLEDs relying on solution-processed layers with a gradient in the emitter composition were well known. For example, work by Chang and co-workers in 2001 utilized an emissive layer consisting of PVK, just as is done in Choulis, which is graded composition profile.

Patent Owner argues that this is an improper argument introduced in reply. Patent Owner is incorrect. As we've seen, Claim 9 only requires a gradient, and does not require the method with which the gradient is formed. The petition has shown that a POSITA would have found it obvious to incorporate Yong's teaching of gradient and implement it in Choulis' device.

One way to do that is via evaporation as we just discussed. But when Patent Owner responded that evaporation would not work, Petitioner replied that evaporation does work, and that it is not the only way to form gradients, solution processing can be used too.

JUDGE REPKO: So if there is an evaporation there, does it matter if there's, the material has the same HOMO and LUMO levels as PVK? Does that matter?

MR. BYUN: Yes, it matters because Claim 9 depends upon Claim 1, and Claim 1 as the Board has noted requires certain LUMO and HOMO levels and those requirements should be met, too.

JUDGE REPKO: So what evidence do you have that they would have the same HOMO and LUMO levels?

MR. BYUN: We have Dr. Holmes' testimony in his deposition. This is in Exhibit 2033 which is his deposition transcript. On page 27 where Dr. Holmes explained that after evaporating PVK you would, and I'll quote, still -- Dr. Holmes explains that after evaporating PVK you would, quote, still have properties that resemble that of PVK. So yes, after you evaporate PVK you would have some deposition -- or some decomposition, but you would still have a material that has properties that resemble PVK, the original PVK, meaning that the remaining material would maintain similar HOMO and LUMO levels, and therefore meet Claim 1 requirements regarding the relative HOMO and LUMO levels of these materials.

JUGE REPKO: Was it described anywhere in any of the evidence that we have on record apart from that testimony?

MR. BYUN: We have further evidence in Exhibit 1044, which is Dr. Holmes' declaration, paragraph 47 where he discusses evaporating PVK, and explains that the evaporated PVK -- evaporating PVK allows, quote, the evaporated PVK layer to transport charge and emit light. And providing the context that evaporating PVK would have been obvious with a reasonable expectation of success, and still meeting the requirements of Claim 1.

JUDGE OBERMANN: I have a question there, and I may be off base. But my understanding is that Choulis does not have a charge carrier gradient. Is that correct? Yong does.

MR. BYUN: That is not correct, Your Honor, respectfully.

JUDGE OBERMANN: Okay. Tell me why. Because my thing is here, you're relying on extrinsic evidence as far as I can tell, to combine these references in a manner that results in particular LUMO and HOMO layers. Where is that suggestion? And couldn't you, through evaporation, end up with layers that don't meet those limitations? Or am I wrong there?

MR. BYUN: Are you asking about the concentration distribution of electrons in Choulis? Or LUMO and HOMO levels --

JUDGE OBERMANN: We're changing Choulis. And my understanding from reading the briefs is that Choulis does not have a charge carrier gradient. We're relying on Yong to say that well, you would have evaporated the PVK to deposit it, and by doing that you would end up with layers that meet the Claim 1 requirements regarding LUMO and HOMO. And I'm worried that that is based on conclusory expert testimony.

And what I'd really like to know is where in Choulis and Yong is the suggestion, if required, to end up with evaporation layers that meet those LUMO and HOMO requirements of Claim 1. In other words, you know, just by evaporating it are you going to get the necessary result which is the relationship of the LUMO and HOMO layers? Or do we need a suggestion that's in the objective proof, not just a declaration or a cross testimony to get there?

MR. BYUN: Respectfully, allow me to make one correction to what you said.

JUDGE OBERMANN: Sure. Please.

MR. BYUN: So it is not correct that, I believe when you stated that Choulis --

JUDGE OBERMANN: By itself.

MR. BYUN: Yeah, Choulis by itself --

JUDGE OBERMANN: Has no charge carrier gradient.

MR. BYUN: -- has no charge carrier gradient, meaning electron gradient. That we respectfully disagree. Choulis' device does have charge carrier gradient, or electron gradient. That is not what we are using Yong for.

Going back go Claim 9, which is shown on the upper right-hand corner of Slide 33. Claim 9 requires the concentration of the emitter material, not the concentration gradient of the charge carrier or electrons.

JUDGE OBERMANN: Okay.

MR. BYUN: So when we consider, go back to Choulis, Choulis is talking about mixing all of these materials evenly. So in Choulis, the emitter material within the matrix is evenly mixed.

JUDGE OBERMANN: Oh, okay.

MR. BYUN: So that is what is lacking in Choulis that we are incorporating from Yong, and that our position is it would have been obvious for a person to take a look at it and say oh, you know, Yong teaches -- well, let me take a step back.

What Yong teaches is the simple observation that when you have a layer, and when you want to push electrons through, you end up with gradient in the electrons. And the reason for that is simple, because you want to push these electrons so that when you start from the layer, you

know, there will be a lot of it, but as you go through the layer, then you end up with less of it. So there is a gradient being formed with regards to electrons.

JUDGE OBERMANN: That's Yong.

MR. BYUN: That's in OLED in general, all of them.

JUDGE OBERMANN: Okay. Maybe I said it wrong. Maybe the thing that concerned me is that Coulis doesn't have an emitter gradient. Is that correct?

MR. BYUN: Choulis does not have --

JUDGE OBERMANN: Emission layer has a gradient.

MR. BYUN: Choulis does not have an emitter gradient, that's correct Your Honor.

JUDGE OBERMANN: Okay. And so why would one turn to Yong and say we should put Yong in Choulis?

MR. BYUN: That is because of Yong's express teaching. And what Yong teaches is the following. Yong makes the general observation that in OLEDs in general, you have this issue of an even distribution of electrons, right. So this is the gradient that we were talking about where you have a lot of it in the beginning and less of it later.

Yong makes an observation, oh gee, wouldn't it be better and more efficient if you placed the emitter materials where the electrons are. So instead of evenly distributing the emitter materials, you want to put more emitter material where there are more electrons, and less of an emitter material where there are less electrons. So --

JUDGE OBERMANN: I think I understand, and you're running out of time.

MR. BYUN: Okay.

JUDGE OBERMANN: But I want to have it clear. So simply by evaporating the PVK, according to Yong you're necessarily going to get that result in the modified apparatus of Choulis?

MR. BYUN: No, that result is -- okay. We need to separate the gradient that is being taught by Yong, the idea is -- the teaching -- we're not bodily incorporating the physical embodiment of Yong into Choulis. Rather, we're just taking the teaching, it's best to place the emitter materials where the electrons are. That's Yong's teaching.

JUDGE OBERMANN: Okay.

MR. BYUN: And a person of ordinary skill in the art would have known how to do it, whether it be by evaporation which is a method that Yong happened to have used.

JUDGE OBERMANN: I see.

MR. BYUN: But a POSITA would have known -- that's not a big deal, that's not even recorded by the claim. I think that's --

JUDGE OBERMANN: That's true. Okay. I think I understand you. So in other words, reading Yong they would want this result.

MR. BYUN: Exactly.

JUDGE OBERMANN: So they don't need to get it necessarily. They just, they already have the reason to do it from Yong.

MR. BYUN: Absolutely.

JUDGE OBERMANN: Okay. Thank you. I'm sorry.

MR. BYUN: I think my time --

JUDGE OBERMANN: Would you like to have a little freebie for your -- to sort of close up? Was there anything else you really wanted to say?

MR. BYUN: No, given the time --

JUDGE OBERMANN: Okay.

MR. BYUN: And also, I think with the long schedule today that will be my opening presentation.

JUDGE OBERMANN: Thank you so much. That was very nice. We really appreciate your level of preparedness, and we're really happy to see you argue today. Thank you.

MR. BYUN: Thank you very much.

JUDGE OBERMANN: Before you get started, go ahead and get sorted. I just want to let Counsel know that I am going to rely on you all to not exceed your time beyond what extra we give you because going back and forth, I'm not going to be able to keep track of whether you've gone beyond the amount of total time. So just keep each other honest and tell me how much time you're going to be taking and I'll put it on the clock.

How much time would you like for this part of your presentation?

MR. LINDSAY: I'll aim for 30 minutes.

JUDGE OBERMANN: Thirty minutes.

MR. LINDSAY: Yeah.

JUDGE OBERMANN: I'll start the clock when you begin speaking.

MR. LINDSAY: Thank you, Your Honors. May it please the Board. I'm going to try to touch on three topics. Obviously the construction of matrix material, also this concept that if you have disclosure of a transport material then that somehow is also express disclosure of a matrix material,

for purposes of anticipation. And then also Claim 9, and of course any questions that Your Honors may have in addition to those.

So the construction issue for matrix material is quite different than it was at institution. There it dealt more with the concept of concentration requirements, and what a person of ordinary skill in the art might know about that. But really, based on the manner of the challenge, basically anticipation based on having references that disclose only dopants or dispersed agglomerations satisfying the term matrix materials, and the weight of the evidence, the intrinsic evidence, the extrinsic evidence.

Really the issue is more discrete we think for the Board, and that it only need decide the issue before it which is, does the term matrix material include dopants and dispersed agglomerations? That's the first prong.

There's actually a second part to this issue now, which came up from the Petitioner's reply, because they've actually now advanced a new construction. Even though they say ostensibly no specialized construction's necessary, we see in their reply, we see Dr. Holmes embracing the construction from the District Courts. We'd like to address that as well, Your Honors.

So we know the specification is the single best guide. And we also know from Phillips that the specification can define a term, not just explicitly but by implication. And I'll try to be better about the slide numbers. Slide 12 now.

We know that if a Patentee uses the term consistently throughout the specification in a manner that is consistent with only one meaning, that that's a definition by implication, okay. And that's exactly what we have here, Your Honors.

On Slide 13 we have the '164 Patent universally distinguishing between matrix materials on the one hand, and dopants on the other. And these are two examples from column 7 where it's talking about matrix materials and/or doping substances.

JUDGE OBERMANN: Why wouldn't the word or suggest that they are alike, the same thing?

MR. LINDSAY: So I view that as a disjunctive, that they're different. But also if we go back to the Bell Atlanta case, that was actually exactly what they dealt with there. There was a term, rate and mode. And it was often talked about in terms of mode or rate. And the claims described different modes.

So the question was, if we have a transmission rate change does that satisfy a different mode. It was very similar actually. And so there, the Federal Circuit said no, that these are clearly meant to be distinct, distinguishing the two. You have a dog or a cat. You have a rate or a mode. And here, our view is that you have a matrix material or you have a dopant.

JUDGE REPKO: So it says doping substances, right?

MR. LINDSAY: Right.

JUDGE REPKO: You have the matrix material and substances.

MR. LINDSAY: Right. So if you allow me, just -- we have some testimony from Dr. Holmes on that point. That's a very good question.

JUDGE REPKO: I'd like to know about it now. I just want to make sure that we address it right now.

MR. LINDSAY: Sure. So when you use the verb, when you use the context of doping or doped, the subject of that is going to be considered a dopant. That's something that Dr. Holmes testified to. I'll just jump ahead

to Slide 15 where he was asked about this. Because there's different conjugations of it, sometimes he talked about something that's doped, sometimes you're going to engage in an act of doping.

The subject of that is a dopant, and that's what Dr. Holmes confirmed during his testimony.

JUDGE REPKO: Right. So then you have this verb, you have to dope, doping. And then so it seems like if you have a substance, that's different from the material that's being acted upon by that verb. Is that correct?

MR. LINDSAY: So I think in this case, I'll go back to the example. It's a noun, right. So we're talking about it in the context of a noun here, it's a doping substance.

JUDGE REPKO: To dope, right? You dope with a doping substance, right? And then the material is different than a substance. So if it said a matrix material and, I don't know, a doping material, you might think that maybe they're trying to set up some sort of contrast. But they're two different, like you have materials and then a substance here.

MR. LINDSAY: Right. Because I think that the language, and there are other places in the specification I'd like to discuss as well, but in the context of these two examples, the matrix material is the term that is used throughout the specification. And it doesn't always have to do with a doping, right? Sometimes it's just describing the HOMO/LUMO levels for example, of the matrix material.

So here the inventor has decided to use a different term, which actually I think reinforces the point in some ways that it is different. It's a substance. It's a doping substance. It's not a matrix material.

JUDGE REPKO: That's why I think that just generally I mean, I'm kind of skeptical of your argument here just because it does say materials and substances. So it doesn't necessarily address my skepticism there, right? Because that's your argument, that universally distinguishes matrix materials from dopants, then you have materials and substances. I think that's -- I'm a little skeptical about that for that reason.

MR. LINDSAY: And I understand that. So perhaps some additional examples will help the conversation, will help the issue.

JUDGE REPKO: Sure. Sure.

MR. LINDSAY: So here on Slide 15, column 1, column 6, column 4 you see repeated examples of where the specification is talking about a matrix material, and then it's being doped with an emitter, emitter molecules. And again, this gets back to the verb context that I was referring to a minute ago where you have a matrix material, and it's being doped with an emitter.

An emitter we know is a dopant. I don't think there's any dispute between the parties on that. And in fact, Dr. Holmes acknowledged that there's a distinction, and this is Slide 16 now, between matrix material and emitter material.

So the emitter is a more specific example of a dopant obviously. But it's a dopant none the less, and we think those additional examples kind of maybe get to your point Your Honor about you know, what does substance mean. Well, we know we now have a specific example that's being doped into the matrix material.

There's this passage that Petitioners identified. And this is the, I believe the only example that they try to use in the intrinsic evidence that they claim supports their argument that a matrix material can include

dopants. And so we don't agree with that. We think a plain reading of this passage will show that the matrix in question here is the NPB matrix, and that into it is being doped BCP.

Again, just a plain reading of this passage I believe will show that that's the case. And that's exactly what Dr. Sims testified to. Now they talked about his earlier testimony where he had said that BCP was a matrix material. And he corrected that because he was looking at a different -- if you look the patent, column 8, the table he was referring to, it's the same page. And he's just reading from the page.

But when you get to that passage in column 8, that's a different example. It's a different embodiment. In that example, BCP is being used, clearly being used as a dopant, because it's being doped into the NPB matrix.

And on this point, this is -- so this happens a few times in the argumentation where Petitioner is conflating a composition with its usage. So the fact that BCP may be used in a different embodiment as the matrix material is of no import here, because its usage is what matters. And we see that from their own prior art. I always say Choulis, so apologies if I mispronounce that.

Butt Choulis does the same thing. It has PBD that it uses in the emission layer as a dopant. And then it has an entirely different usage for the exact same composition as a neat layer, a pure layer, in the matching layer.

So it's not uncommon to have one component, one material be used in different ways.

JUDGE REPKO: So if generally you're thinking of a matrix material as being defined by its usage, you're thinking of also a doping material as

being defined by its usage, right? This is used to dope and this one is used as a matrix, right? So what is it -- what distinction are you trying to draw there with this, thinking of it as a usage versus composition aspect of your claim construction?

MR. LINDSAY: I think the point was, when you see BCP in column 8, and it's being used as a dopant, it doesn't mean that it's always going to be a dopant. It can be used in a different context as a matrix material.

Now, what Dr. Sims has testified to is that it has to be in a more or less continuous state to be a matrix material. I understand that's a, you know, that's a construction that, you know, we've taken a position on. They have, you know, a different view of it. But, at the end of the day, it's only necessary to determine that matrix materials do not include dopants for purposes of this dispute.

JUDGE OBERMANN: But how do we do that? If it's on usage and we don't have dopant in the claim, you're arguing that it's a percentage.

MR. LINDSAY: No, not at all, Your Honor. So the prior art, the Choulis reference, Sugiura, Thomas, they all use the term dopants. I take that back. So Sugiura doesn't use the term dopants. It uses these little, round agglomerations which Petitioner's claim construction expert in the District Court described as agglomerations. That's where that term actually came from.

And so you have these, you know, this is what the references disclosed. They have anticipation standards to satisfy here. They don't have disclosure of a matrix material. So they need to draw this linkage between these dopants and a matrix material. There's no express disclosure, again, matrix material.

So how do they do that? Well they do that by arguing that a matrix material can include a dopant. And we're saying, based on the intrinsic evidence -- and there's a lot of extrinsic evidence here as well. In fact, the extrinsic evidence is universal. I don't believe I've seen a single piece of extrinsic evidence that's said a host or matrix material can be a dopant.

JUDGE REPKO: It's not that it can't be a dopant, it's just like can the material function as a matrix material, can the material function as a dopant? Would you agree with that, that it's all based on usage, how the material is being used?

MR. LINDSAY: Yeah, I would agree it's dependent on usage. And in the prior art, they haven't shown that the usage of those dopants are as matrix materials. They are -- their dopants are being added to an existing host structure.

JUDGE REPKO: It seems like you're trying to distinguish a matrix material, a material that functions as a matrix material from another material based on the composition. Is that accurate?

No, you're saying --

MR. LINDSAY: No, no. No. What I'm -- it may or may not be based on the -- it's based on the structure. So it's whether it's in a more or less continuous state. This is the testimony that we have, you know, that we have in the record on this issue.

JUDGE OBERMANN: Didn't the District Court reject that?

MR. LINDSAY: No. No, it did not. I'm glad this came up. So I'll go to take a look at what the District Court said.

So this is their slide, right? This is Slide 10 from their slides saying the District Court rejected this. So in fact, this is page 32 from the order.

This is not in the slide deck, but since this came up I thought that Your Honor should see the entire context.

So first of all, the District Court did not construe matrix because it found the dispute was really with respect to the structure of the claims, not the meaning of what a material matrix is. So it had no reason to accept or reject one or the other claim construction.

And in any event, like I said, it was focused on the structure of the claims which I think is a different issue here, which is does a matrix material include a dopant.

So on Slide 21, this is completely consistent with every piece of extrinsic evidence including their own prior art. Thompson, Ground 4, again specifically, repeatedly talks about matrix materials, and then distinguishes that from charge carrying dopant materials, or materials that are being doped.

Again, there's no instance in which Thomas or anyone else conflates the two. In Slide 22, this isn't just random patents. This -- OLED manufacturers at or around the time of the invention. Novaled, a well-known company, filed a patent. Same thing. You have a matrix material, and it is defined or described as something into which further materials are added. Dopants, for example.

JUDGE REPKO: So it's defined by its usage, right? In this line.

MR. LINDSAY: Right.

JUDGE REPKO: It's how it's used.

MR. LINDSAY: Right. I don't know that I'm disagreeing with that. Like, I think obviously if you're intending for something to be a matrix material, it's going to have a more or less continuous phase, and is going to

be able to accept, and -- things are going be embedded into it. It's a housing if you will.

JUDGE REPKO: That's what this says.

MR. LINDSAY: Where if you have a dopant, it's the opposite, right, it's being received into that matrix material.

JUDGE REPKO: Okay.

MR. LINDSAY: Host is a term that sometimes pops up. This is just to show -- I don't think there's really a dispute here between the parties that host matrix materials, you're kind of talking about -- you're at least in the same ballpark.

And the reason that's significant is because on Slide 24 Dr. Holmes testified that none of the systems that he's described or talked about in this IPR use the term host or co-host as being a dopant. He agreed with that. He could not identify any other work which ever used the term host, co-host as a dopant.

And again, Your Honors, I think it's just because these are generally considered to be quite different. And the distinction can matter.

In Thompson, for example, it is specifically identified as being a distinctive feature. So in yellow, he talks about typically you've got charge carrying materials that are the predominant component or sole component. But then in green he says, but one of the distinctive features is that it may be used as a charge carrying dopant material in an inert matrix.

So he, at least, believes he's flipping the science, right? And you're having the dopant material be the charge carrying aspect of it, and the matrix be inert.

So I'm just pointing this out because the distinction between these two names, the nomenclature, can matter, and in this case, very much does matter.

JUDGE REPKO: This one too, they also define it by the use, right? Typically used -- typically used, right? So I mean, there's -- the green parts are used in a certain way and the yellow part is used in a different way.

MR. LINDSAY: Yeah. And again, I don't want to -- I'm not --

(Simultaneous speaking.)

MR. LINDSAY: -- I don't believe I'm disagreeing with you, but I want to be cautious because at the end of the day the evidence in the record -- I'm not an expert, but the experts say matrix material has to be a more or less continuous phase. And once you have that, yes, it's capable of certain usages, right, whereas a dopant is not.

So the other aspect I wanted to touch on, Your Honors, was the new claim construction from Petitioner's reply.

JUDGE OBERMANN: I have a question now that you've pointed us to Slide 25. Do we need to read the word inert into Claim 1 in order to exclude a dopant material? Is that how you're describing a matrix?

MR. LINDSAY: No, I don't believe that would be necessary at all. Dopant materials can themselves be inert. They don't necessarily have to have charge carrying capabilities. The limitations in the claim, the HOMO/LUMO level limitations, that's where the claim is further limiting the matrix to being -- having some charge carrying capabilities.

So it's not part and parcel to the term matrix material. You can have an inert matrix; you can have an inert dopant, I would imagine.

And in fact, I think in the case of an emitter -- emitters, and we'll see this in a couple of slides, they can have a very high HOMO level which makes them amenable to producing or creating holes. But they're never described as matrix materials because they don't have the composition. They're intentionally kept separate in the housing. There's expert testimony about this point.

So they wouldn't be inert by -- they wouldn't be inert by themselves, but in a matrix structure they're intending to not interact and carry charges.

So Slide 28, Petitioner said, you know, they don't believe specialized construction is necessary. The District Court came down on the construction, and then in the reply they say, well, matrix material actually indicates that the material is part of the same matrix. So this is in -- also in Dr. Holmes's reply declaration. So we just wanted to address this as well.

So this is on Slide 30. So I think generally the experts have agreed that dopants are added to an existing host structure. This is Dr. Sims's testimony on the point. He describes, down at the bottom, a dopant is a material that is housed in a matrix.

Dr. Holmes said something very similar. A dopant is merely something that's added -- it's an added component, or it's a component that's -- rather, it's added to a film, a functional layer.

And so why is this -- and I should mention this is also on Slide 12 of their slides, so I don't believe this is really in dispute. Why does this matter? Because when you talk about embedded material, something that's added, like a dopant, that is not part of the matrix. That's the point we'd like to make.

And it's, as Dr. Sims testified here at the top of the slide, a matrix is a surrounding medium, a housing, if you will, into which something is embedded. And this is based on some extrinsic evidence that he cites down at the bottom, more or less continuous matter.

And the reason I mention that is because it's almost the very same -- it's almost the very same testimony that Dr. Schubert has given as well, and relied on many of the same references. This is their claim construction expert from District Court, so I think it's highly relevant.

Finally, Dr. Holmes was asked about this because in his -- he submitted a reply declaration. He said it's got to be part of the matrix. So I asked him. I said, Dr. Holmes what, does embed mean part of? Is it different? And he said it's not something he's considered in detail. He's given another opportunity to answer the question, and he said, this is not something I'm willing to offer a new opinion on.

Okay. So that's where the state of the evidence stands with respect to their -- with respect to their reply construction.

And I'll move to Claim 9, and then maybe come back to things -- I just want to make sure we have enough time for Claim 9. So Claim 9 adds the concentration gradient for the emitter material. And the motivation to combine is to achieve the advantages that Yong describes, right, improving devices' efficiency and stability. That all sounds great.

But what does Yong actually say? And Your Honor asked earlier today about whether there was a concentration gradient with respect to the transport materials in Choulis, right? And you had the issue right, and we'll see why in a moment.

But what Yong is saying is, like look, you have these transport materials which themselves already have an existing gradient. It's in yellow. And that's the backer. That's the world it's living in. And it says, up to this point if you try to uniformly dope the emitter material, that's the phosphorescent, you end up limiting the efficiency and the brightness.

So down at the bottom, in the -- more the -- the Contents of the Invention, it says, so what -- again, in yellow -- so if you have this, you know, non-linear decrease of electron transporting, what do you want to do? You want to change your emitter gradient.

And you want to have -- this is about the, line up from the bottom -- you want to make the distribution trend of the phosphorescent dyes, the emitter material, in the host material conform to the distribution trends of electrons in the host material. You want to match the gradient.

That's a problem. That's a problem for Petitioner. Because the fact is, Choulis's transport materials do not have a concentration gradient. Dr. Sims, here on Slide 64, testified to that. But it wasn't just Dr. Sims. Dr. Holmes confirmed that Choulis explicitly does not disclose a concentration gradient for its hole and electron transport materials.

So under Yong's principle, you would have a uniform emitter, because that's what you're dealing with in terms of the transport materials. You have uniform transport materials. You're trying to match that. So Yong would not have a -- it would, if anything, teach away from having a gradient for the emitter material.

JUDGE OBERMANN: So in other words, we -- in your view, we're missing a reason to modify Choulis in a manner that would -- does this directly relate to whether or not you're going to get the HOMO and LUMO?

MR. LINDSAY: Not yet.

JUDGE OBERMANN: Okay.

MR. LINDSAY: So that's on the next slide. That's on the next issue, which is more, I think more of a reasonable expectation of success. Because the reasonable expectation of success is of achieving the claimed invention, right? It's not just some combination; it has to be the claimed invention.

And so I'll go ahead and jump ahead because one of my favorite topics. This is their -- the full extent of their reasonable expectation of success argumentation. There's very limited in the petition dealing with this. But the first point is to your point. It says two things, that Choulis says that you can evaporate, and that you'd have, you know, PVK deposited according to evaporation. That was known.

And the second point is this solution base layering approach that produces a gradient. I'll take the second one first because it's the easiest. That's not an argument that they've made. They claimed today I think for the first time that maybe it's an alternate theory, but Dr. Holmes specifically said he's using Yong with evaporation.

There's no evidence to suggest that you can combine these two references. At least that isn't even the argument that they've made using a solution-based approach. It's evaporation.

So what does Choulis say about evaporating PVK? It says that you shouldn't do it. It says repeatedly that if you have a polymer like PVK, you're supposed to use a solution-based approach, and it's only -- and this is in the last highlighted part here -- running a little low on time -- it's only if you have small molecule materials. So this is like the third line from the bottom.

Alternately, if you have small molecule materials, instead of polymers, then you can use evaporation. So there's nothing in Choulis that gets you to evaporating PVK.

And regarding that small molecule argument, Dr. Holmes confirmed he is not making a small molecule argument for Claim 9. It's PVK. It's the polymer PVK that's satisfying those HOMO and LUMO levels. And I'm about to get back to your point, Your Honor.

Because as Dr. Sims pointed out, Djobo, which is the background reference, not part of the combination, mind you. It's a background reference. They say it demonstrates you can evaporate PVK. Well what Djobo tells you is if you try to do that you get decomposition, you get degradation of PVK into vinylcarbazole and some mixture of vinylcarbazole and PVK.

And Dr. Holmes confirmed that. I'm on Slide 71, Your Honors. He confirmed that you get this mixture when try to -- because of the heat, you'd evaporate PVK and you'd get this degradation into vinylcarbazole. He also said, down at the bottom, you don't want decomposition. So maybe that's more of a motivation to combine argument.

But at the end of the day, what you end up with is not PVK. And he hasn't circled back and told us our new mixture, that if we try to do this, what's our HOMO/LUMO levels? Can we plug those in to still meet Claim 1? We don't know, Your Honor.

In fact, Dr, Sims here said, he pointed this out at as a deficiency. There's no demonstration that the resulting material would have the same HOMO/LUMO levels. And without that showing -- this is on Slide 70,

sorry -- and without that showing, they haven't shown that Claim 9 is satisfied because, again, it incorporates all of the limitations of Claim 1.

There's one final point I'd like to make on this. So this all makes sense when you consider Slide 73. Dr. Holmes was asked, has he ever seen work that evaporated PVK for a phosphorescent OLED? That's Choulis's phosphorescent. And he said, no, I haven't.

Even today he said no, not since then. This is never, ever done. And it's done for a reason. It's done because it's not a good way to do it. Even if you can, you get decomposition, you get a mixture of unknown constituents, and it's, again -- I think Dr. Holmes said it best. It's just, he's never seen it done.

So I think I'll go back and talk about this -- Slide 85 here. Right, so there's this idea that if you have hole transport, or you have a electron transport material, that that means it's a matrix material. And that's definitely not the case. If you think of, like, a Venn diagram, there's certainly an overlap in the middle where you have matrix materials that are hole transport materials.

But there are also other parts of those diagrams. You have matrix materials that are inert. We saw that with the Thompson reference. And you also have transport materials that are not matrix materials.

JUDGE OBERMANN: Let me get this straight. Because we really honed in on the other side and cornered them to describe matrix without using the word matrix. And they came up with the definition that has to do with a film that holds everything together, I guess. Or a film basically.

And you're describing matrix, if you were not to use the word matrix, does it have more to do with the function in the material?

MR. LINDSAY: So I just want to be clear, Your Honor. Are you asking about the word matrix alone or matrix material?

JUDGE OBERMANN: Well, let's do matrix material.

MR. LINDSAY: So as I think the expert, Dr. Sims, has said, matrix material, in his view, is going to be material that's in more or less a continuous phase. There's some other testimony about it, you know, being kind of a housing or a structure of some type into which you can embed other materials.

You know, the example here, the emitter material, right? And they were described the patent as the emitter being added and doped into the matrix material. So I think that would be matrix material.

I don't think Your Honors need to look at a definition or need a definition of matrix by itself. I don't believe that's a dispute --

JUDGE OBERMANN: Okay.

MR. LINDSAY: -- in this proceeding. I think just looking at matrix materials, what they're trying to read it on gets us where we need to be.

JUDGE OBERMANN: I see. Okay. Thank you. That was helpful.

MR. LINDSAY: I do want to address one other thing that came up in the institution decision about the prosecution history, if I may. So I'm on Slide 44. So the institution decision talked about, you know, matrix materials. To some extent it was a different argument. Again, it was based on some concentration specifics. But the Forrest reference, which was part of -- which came up during the prosecution history, was mentioned. And so I want to address this for Your Honors.

So Forrest was a reference that was applied by the Examiner. He read the -- these -- it's called discontinuous 1, 2, 3 seen in Figure 9H here on the

matrix material. I don't know that there was an express argument in return to -- I think there was, taking some allowable subject matter at that point which obviously, inventors and applicants have all sorts of reasons for taking allowable subject matter.

But what I wanted to point out is that Forrest itself is not a disbursed agglomeration. It's not Sugiura at all. It's in fact an intentionally, at least vertically, continuous.

So first of all, those layer -- they call -- he calls them layers, right. So it's discontinuous 1, 2, 3, and so forth. If the specification's replete with the term discontinuous layer. Layer by itself implies some connectedness. So we aren't talking about islands in the sea, if you will, if you allow me to describe Sugiura that way.

And he does that because that material, and as he said, as he -- as I -- as highlighted here, is in direct contact with material in an adjacent layer. So on Slide 45, why -- he does that because he needs conductive pathways. He needs those conductive pathways from the donor to the acceptor. And the way you do that is by having this vertically continuous layering which, again, they're all -- be --discontinuous, they're certainly not agglomerations in that sense.

And then finally on Slide 46, Dr. Sims said, you know, we know that they are more or less continuous, namely in the vertical direction. Because you have these conductive pathways. You wouldn't get those pathways if they were truly dispersed agglomerations, as in the case with Sugiura.

So I'll stop there, Your Honors. I think I'm out of time.

JUDGE OBERMANN: Thank you very much.

Just one moment please. Well, you may sit.

Okay. Do you all have a preference? Do you want to continue for an hour, or would you like to break for lunch now?

MR. WEIDENFELLER: Your Honor, we'd like to wrap up the '164 Patent before lunch, if we could

JUDGE OBERMANN: Oh, I see. So you'll do your rebuttal?

MR. WEIDENFELLER: Yes, Your Honor.

JUDGE OBERMANN: Okay.

MR. WEIDENFELLER: If that's okay.

JUDGE OBERMANN: That's great. And then I guess you get a surrebuttal. Is that right, Patent Owner?

MS. ZHONG: Yes.

JUDGE OBERMANN: Okay. So should we do that? Let's do that.

MR. WEIDENFELLER: Thank you.

JUDGE OBERMANN: That's a great idea. Thank you.

Whenever you're ready we will -- how much time will you have for your surrebuttal?

MR. WEIDENFELLER: Fifteen minutes, Your Honor.

JUDGE OBERMANN: Thank you. I'll put that on the clock. And take your time. I won't start until you begin speaking.

MR. WEIDENFELLER: Thank you, Your Honor.

MR. BYUN: Turning to Patent Owner's demonstratives at 63, this relates to the combination of Choulis and Yong, and the motivation to combine. Patent Owner has a fundamental misunderstanding of what Yong teaches.

Yong teaches that in OLEDs, electrons have a gradient that is -- they're not evenly spread out. Yong then teaches that you can achieve

higher efficiency if you form gradients with the emitter material that matches that of the electron gradient.

Looking at the excerpt from Yong on the bottom of this slide, Yong states, In OLEDs, the concentration distribution of electrons generally decreases nonlinearly from the electron transporting layer to the hole transporting layer.

And then he goes on to teach, in green, The gradient distribution of the doping concentration of phosphorescent dyes -- that's the emitter material -- in the organic light emitting layer in the host material in the above technical solution is to make the distribution trend of phosphorescent dyes -- again, the emitter material -- in the host material conform to the distribution trend of electrons in the host material.

So the idea is simple. You match the distribution of emitter material to the distribution of electrons. In the title of this slide, Patent Owner misstates that Yong's principle is to match the emitter gradient to the transporter materials gradient where instead of an electron, Patent Owner is arguing that you match the emitter gradient to the transport materials' gradient, where, instead of electron, Patent Owner's arguing that you match the emitter gradient to the transport materials gradient, which is wrong.

Yong teaches, again, conforming to the electron gradient, not to the electron transport material gradient. Indeed, Yong doesn't even have a separate electron transport material in its emission layer. That's why in this, highlighted in green, Yong's talking about a host material, electron in the host material. Because Yong doesn't have a separate electron transport material to begin with.

Turning to Slide 65, Patent Owner misstates that Dr. Holmes's testimony -- Patent Owner characterized Dr. Holmes's testimony as though he said that Choulis does not have electron gradients. That's not what he said. As shown on this slide, what Dr. Holmes said was, Choulis doesn't explicitly have a concentration gradient for their hole and electron transport materials in the embodiment I'm looking at.

So this -- the title of this slide is wrong when it says Dr. Holmes confirmed that Choulis does not have transport gradients or electron gradients. It does.

And also, what Patent Owner states in this red box is also incorrect when he says Yong would match Choulis's uniform transport materials with a uniform emitter. This is simply incorrect because, again, what's important is electron distribution. And electron concentration in Choulis is graded.

What Dr. Holmes did say about electron gradient was that the constitution gradient of charges in the emissive layer of an OLED is something that can almost always be counted on, just because of the fact that you're injecting holes from one side, and injecting electrons from the other. So you can always expect there will be a constitution gradient because holes are coming in and flowing across the layer.

JUDGE OBERMANN: What are you reading from please?

MR. BYUN: This testimony can be found in Exhibit 2020 at page 190, and similar testimony can be found in page 179 of the same exhibit as well.

Going back to the claim construction order, we're in Slide 10 of Petitioner's demonstratives. And Your Honor asked Patent Owner's Counsel what is Patent Owner's proposed construction for matrix material. Counsel

responded saying, well, it means a more or less continuous phase. And I would like to note that that's the construction that Patent Owner proposed in the District Court litigation which Judge Gilstrap rejected.

Now Patent -- Counsel -- Patent Owner Counsel stated that the Court did not accept or reject any claim construction. That is incorrect.

Going to the claim construction order from the District Court. That's Exhibit 1030. So page 32 has a section beginning with a discussion of matrix and matrix material. So here are the parties' constructions. And when we go over to the conclusion of this section, that begins at page 34, Judge Gilstrap says, having found that the most natural reading of the claim language supports Samsung's position, and that the intrinsic record does not suggest or support an alternative reading, the Court adapts Samsung's construction for matrix material.

Now during Patent Owner's argument, Judge Obermann asked Patent Owner's Counsel whether the percentage of material still matters to Patent Owner's arguments. And Patent Owner's Counsel responded, not at all.

Well, Patent Owner's statement directly contradicts Patent Owner's expert's testimony. So we'll go back to Slide 14 of Petitioner's demonstratives.

Recall that, initially, Patent Owner's expert agreed that BCP, as described in the specification, was a matrix material in this case, and that BCP was also a dopant. That after an extended discussion with Patent Owner's Counsel, the expert tried to change his testimony. The underlying reasoning that he provided in order to justify his attempt to change his position was based on the concentration amount.

So you'll see highlighted in his response, well, just after the highlight, he's saying that what he was thinking at the time was that you had a sort of a similar percentage of each of these materials. And that with regards to BCP, he doesn't see any specific percentage, and therefore he thought his initial thinking was erroneous.

So Patent Owner's Counsel's position is directly contradictory of Patent Owner's expert's position, and this inconsistent position should not be given any weight.

JUDGE OBERMANN: All that set aside, we've been shown some evidence today including, I think it's the Thompson reference, which is not applied in the grounds. But it seems to indicate that somebody of ordinary skill in the art would have understood the term matrix material to refer to a host material into which other things are embedded. If we find that to be the case, do you lose on this issue?

MR. BYUN: Not at all, Your Honor. And that's because Thompson is an extrinsic evidence that used the term matrix material in its own way that is contradictory to how the specification of the '164 Patent used the term.

And as Your Honor knows, extrinsic evidence cannot be used to contradict intrinsic evidence.

JUDGE OBERMANN: I don't know if it's a direct contradiction. My concern is a little more general, getting away from the rules of claim construction, and into the area of what would have been the ordinary understanding of a person of ordinary skill in the art. Because that is extrinsic.

MR. BYUN: Absolutely.

JUDGE OBERMANN: So that's where I'm having my difficulty right now. Because there is an appeal to some of the evidence that's been presented, even setting aside the and/or in the spec and all this. Because that's not real clear either.

The idea that a matrix material was well understood in this particular art, and if we look at some of these materials it would indicate that that understanding was that matrix material is a host for other things that are embedded.

MR. BYUN: The term matrix material is not a term of art.

JUDGE OBERMANN: Well, then how do you have an ordinary meaning?

MR. BYUN: In view of the --

JUDGE OBERMANN: Oh, I see.

MR. BYUN: -- specification --

JUDGE OBERMANN: Okay.

MR. BYUN: -- we have to use intrinsic evidence as a best guide.

JUDGE OBERMANN: Okay. And you're saying it's not a term art. It's not a term understood in the art.

MR. BYUN: That's exactly right.

JUDGE OBERMANN: And what's your basis for that?

MR. BYUN: We have -- let me bring up -- I brought up Petitioner's reply where we addressed that concern.

JUDGE OBERMANN: My questions and your searching is taking up some time, so I'm going to let you go a little over if you need it.

MR. BYUN: Thank you, Your Honor. I'm having difficulty locating the pincite at this time.

JUDGE OBERMANN: Okay. That's fine. Why don't we -- if you can find it maybe during the break and just let us know where it is.

MR. BYUN: Yes. Absolutely. We'll come back to that.

JUDGE OBERMANN: Okay. I've reset your clock to three minutes which is about where we were, I think, before this started.

MR. BYUN: With regards to the question of extrinsic evidence, so we'll provide you a cite for the proposition that matrix material is not a term that is well-known in the art, that it's not a term of art. And we have to focus on the specification.

The specification shows that you're mixing just -- instead of having just one matrix material you're mixing three additional -- two additional matrix materials to form a matrix, and that in particular the reason for adding those two additional matrix materials are because you want to help with hole transport and electron transport.

And that is exactly what is shown by Choulis and, as we discussed earlier, Choulis's Figure 4 discloses not only one material, but additional materials for the exact purpose of helping with hole transport and electron transport.

Now you have to look at what the specification teaches in its context, instead of looking at what other references may have used the term matrix material perhaps differently. Or whether Choulis may have used the term dopant to describe its emitter material or not.

Regardless of how other references characterize its own invention, and regardless of how Choulis -- whether or not Choulis described its material as a dopant or not, the reality is that the device that is being described by Choulis is very similar to what's described in the specification.

And I would leave with the discussion of the '164 Patent, especially column 7 and 8. Really, bottom of column 7 is the disclosure of BCP that we discussed.

Patent Owner's expert later said, well, he was confused because he was thinking about percentage in the table in column 7 shown on the left-hand side. But the Board would note that the description of this table shown in column 7 is consistent with Petitioner's position where the materials in the table are described as a first matrix material, mCP, but also a second matrix material, the hole transport material, and a third matrix material, the electron transport material.

And the specification just goes on to provide other examples. In addition to the example that's given on this table where the specification tells you at column 8, line 3, as electron transport materials, the following can also be used and provides BCP as an example. And column 8 discussion of BCP is an extension of that.

Unless the Board has any further questions --

JUDGE OBERMANN: No, I don't. Let's see. No, thank you so much, Counsel.

MR. BYUN: All right. Thank you very much.

JUDGE OBERMANN: And when Patent Owner is ready, please let me know how much time you would like for your surrebuttal, and I'll put it on the clock.

MR. LINDSAY: Just 10 minutes, Your Honor.

JUDGE OBERMANN: Okay.

MR. LINDSAY: My screen isn't being mirrored. So -- it's okay. We can -- I think it's because the application. I have a PDF open here. It doesn't want to show it.

I'm ready, Your Honors.

So on the issue of Claim 9. A couple of things first. We heard a couple of times about Choulis having a gradient. And I didn't see any cites to the Choulis reference. I saw some deposition testimony. There is no other reason to believe it would have any sort of gradient that would be of the kind that Yong has. And Dr. Sims testified to that extent. And there's a reason for that.

So I opened up Yong, and I'm on page -- this is Exhibit 1009. I apologize I couldn't share the screen. Page 10, that's labeled. It's page 9 of the document itself. And it describes how in general devices -- in general devices holes are the majority carrier while electrons are the minority carrier.

And I think Petitioner said that Yong has no electron transport material. And because of that, so it's not at all like Choulis, which does, obviously. So because of that, you get this concentration of the NPB, and now I moved over to page 8, that's of the document, page 9 that's labeled. And it says, concentration of NPB gradually decreases from the anode layer to the cathode while the concentration of Alq_3 gradually increases.

And it just describes this concentration gradient structure which is nowhere to be found in Choulis and, again, is a product of the fact that it's dealing with a situation where you have no electron transport material, which, of course, we know Choulis does.

JUDGE OBERMANN: Yong has no electron transport material.

MR. LINDSAY: I'm sorry. It has, yeah, it doesn't have electron transport material, Yong. I apologize if I said otherwise.

Well, for some reason I am not being mirrored.

PARTICIPANT: So I'm being told by the VTC tech that you have the extended on instead of the mirror.

MR. LINDSAY: Okay. Could I have one minute of -- just to?

JUDGE OBERMANN: Certainly. I just paused your clock, so whenever you need to get back to it.

(Pause.)

MR. LINDSAY: So I'm on their Slide 19, Your Honors. I want to go back to this idea of transport materials, you know, whether -- and this is not in the context of Claim 9, but of course all of these concepts apply as well as since it's dependent from Claim 1.

Somehow that these transport materials are matrix materials. Okay. So on Slide 19 they say that Patent Owner equates the second and third matrix materials with the hole and electron transport materials. That's obviously not our position.

In fact, look at the citation. Exhibit 1003 is Dr. Holmes's declaration. And we're just saying -- stating what he describes in his paragraph 30 of that declaration. That is definitely not the case.

Now on their Slide 40, this is testimony from Dr. Sims. And again, we disagree with the characterization of the testimony. He was asked, this is in Sugiura's TPD. He was asked about the hole transport material, the TPD, and whether or not that would be close enough, sufficiently close to be able to transport hole -- holes correctly.

Now this is where we get into -- there's two issues here. There's the issue of, do you have the requisite HOMO and LUMO levels to be able to create holes or electrons. That's one thing. But how well are you able to then transport them, and that's a function of composition.

So he went on to testify that it's difficult to say. We need to know what the molar ratio is. Why is the molar ratio important? Which Dr. Holmes did not compute, did not do any of this analysis. Because it tells you how close those molecules are. Without that, you're not going to know whether they're able to effectively transport materials.

And so you look at Claim 1, it said it the same way, right? So you have limitations that are dealing with the ability to create holes and electrons to begin with, the HOMO/LUMO levels. And then you have the recitation of a matrix material which tells you something about the proximity of those molecules to each other, that they aren't dopants, that they are more or less continuous.

So I just want to put his testimony in context. Because these are two different concepts that I believe they're trying to conflate because, why? Because they have anticipation to get over, and they have no express disclosure of a matrix material. So they're trying to draw a string between disclosure of hole and transport materials to matrix materials, right, think, like, diagram. It's not there. It's not there. They can't do it.

And then same thing for the electron material, Alq_3. Dr. Sims was asked about this as well. And so, again, because of the levels, the energy levels in Sugiura's system, you would expect that it would be capable of creating electrons. But how -- and then I'm now highlighting -- I'm still on -- now I'm -- how effectively is it going to be able to do that is another thing.

Because we don't know the composition. We don't know. And it's no disclosure that these are in fact matrix materials.

And stepping back from a technology perspective, that's because these are solution-based approaches. So Choulis, Sugiura's spin-coated. You may remember that being mentioned. They're not evaporation, okay, which the patent is --

JUDGE OBERMANN: Is this a no reason to combine argument or a reasonable expectation of success argument?

MR. LINDSAY: This is probably more reasonable expectation of success argument because they're based on anticipation, the topic I'm talking about now.

But here on Slide 98 of our slides, the technology behind the '164 Patent is evaporation, right? So we have some -- and what that allows is very precise application of materials.

And Dr. Sims testified, on Slide 99, this is from his declaration, paragraph 74 talks about the fact that you have evaporation. This allows you to have this fine intermolecular mixing of materials, and he goes on to describe the benefits of that.

Well, Sugiura is spin-coating. That's the way it applies its materials. This is on Slide 100. And then Slide 101, Dr. Sims talked about spin-coating. What is it like? Well, it's very turbulent, materials are going to crash out at different rates. It's very hard to get a fine mixture. It's very hard to get -- and that's why they probably drew that schematic that way. Because they don't really know what it's going to be like.

And I'll just go -- let's talk about Dr. Sims for a second. This is the issue. This is from his declaration, paragraph 9. And this is Exhibit 2019.

He was -- he worked at -- he's an expert from DuPont that was specifically working on this issue, understanding the differences and deficiencies of solution-based processing as compared to evaporated OLEDs.

So that's why when you see Sugiuras, and you see the Choulises of the world, they're not going to be achieving the matrix materials that the patent talks about because they're -- playing in a different ballpark.

He goes on, on the next page, paragraph 11, to talk about additional research, the outcome of all this research. Again, this is a DuPont expert that's actually working specifically on this problem that's telling us that Sugiura's spin-coating is not going to be able to produce a fine mixture. You're not going to be expected to get matrix materials.

Just real quick, we wanted, in terms of matrix material term of art comment. I'll just go back to Slide 22. And I mentioned this before. So this is Exhibit 2024. This is a Novaled patent, you know, well-known OLED manufacturer, uses the term matrix material, doesn't have any problem using the term matrix material. Neither did Thompson. Again, distinguishing it from dopants and dopant-like substances.

And, you know, maybe it was more common in Germany. I'm not sure. But the term matrix material is not this, you know, made-up term, amorphous term. There is direct and pure evidence in the record as to other companies, including manufacturers, that have no problem using the term, and using it in a manner which is completely consistent with the specification.

So unless Your Honors have any questions, I'll rest.

JUDGE OBERMANN: Okay. Thank you. Okay. So what's your preference, do you want to take a break now? Yes?

MR. BYUN: Your Honor, would you like a cite?

JUDGE OBERMANN: Absolutely, yes. Thank you.

MR. BYUN: The cite is to Exhibit 1044 at paragraph 11. That is Dr. Holmes's reply declaration. Exhibit 1044, paragraph 11.

JUDGE OBERMANN: Paragraph 11. Thank you so much, Counsel.

MR. BYUN: Thank you.

JUDGE OBERMANN: All right. I'm just going to put that in my notes in the appropriate place here. I can do that later.

Do you want to take a break now or do you want to -- take a break? Okay. And how long would you like to break for? We want to be at your disposal, whatever works for you.

MR. WEIDENFELLER: Forty-five minutes, Your Honor.

JUDGE OBERMANN: Forty-five minutes. Does that work for you, Patent Owner? Forty-five minutes or would you prefer an hour?

MS. ZHONG: We actually want it shorter because most of us have a flight a 5:30 today.

JUDGE OBERMANN: Oh, okay. What would work for you? I want to make sure you catch your flight.

MS. ZHONG: Can we do 30 minutes?

JUDGE OBERMANN: Thirty minutes.

Does that work for you?

MR. WEIDENFELLER: Sure, Your Honor.

JUDGE OBERMANN: Okay, and I'll go off the record now. Thank you.

(Whereupon, the above-entitled matter went off the record at 12:45 p.m. and resumed at 1:20 p.m.)

JUDGE OBERMANN: Thank you. We're back on the record. Okay. So we're going to move on to the next IPR, which is the one that ends in 1094.

And how much time would Petitioner like for their direct argument?

MS. HANSEN: Thirty minutes, Your Honor.

JUDGE OBERMANN: Okay. I'm going to put 30 minutes on the clock, and I'll start the clock ticking when you begin speaking.

MS. HANSEN: Good afternoon, Your Honors, and may it please the Board, my name is Alexa Hansen. I am here on behalf of Petitioners with respect to the 1094 petition concerning patent ending in '223.

As Your Honors know, trial is instituted on two grounds: one based on the reference that we call Werner -- Exhibit 1005 is a translation -- and the second ground based on the reference that we're calling Ma, which is Exhibit 1007. Unless the Board would prefer me to start with Ma, I will start with Werner.

Werner was a PCT application that was published in 2005 and is directed to an electronic device with an organic semiconducting material doped with a metal complex as an n-dopant.

In claim, turning to Slide 7 here, Claim 1 that we're concerned with in the '223 Patent is directed to an electronic device having a number of different layers. And there is no dispute between the parties that Werner expressly discloses each of these layers, with essentially one exception.

For the purposes of Claim 1, the dispute centers around the final wherein clause, namely, whether Werner discloses joint, or in the case of Claim 10, simultaneous vaporization of the metal complex and an organic

compound, wherein the organic compound comprises a heteroaromatic compound, which is conjugated with an aromatic compound via a C-C bond.

Now, for purposes of the Court Reporter, I will try very hard not to say that phrase any more than is absolutely necessary, referring to it as an organic compound of Claim 1.

Now, the question is, does Werner disclose these elements as well, and the answer is yes.

Turning to Slide 8, as the abstract to Werner shows, what the invention in Werner about is the use of a metal complex as an n-dopant for doping organic semiconducting matrix material that have the goal of having little reduction potential, while achieving high conductivities.

Now, I want to turn first to the organic compound of Claim 1, and specifically, Werner discloses using substituted heteroaromatic compounds, including compound Bphen, which, as of the priority date, was a very well-known material for use in OLEDs as the organic compound.

And indeed, the Werner reference makes quite clear that, in particular, Bphen, which is an example of a compound called a phenanthroline, can be used as a matrix material. In addition, Werner discloses a different category of matrix material: compounds known as heteroaromatics. And in both of these cases, the heteroaromatics, as well as the phenanthrolines, they're preferably aryl substituted, an aryl group, of course, being an aromatic group. And Bphen is the classic example. It is a heteroaromatic group conjugated to an aromatic group, the phenyl group, via a C-C bond.

Now, turning to Slide 10, Werner also discloses numerous metal complexes. Generally, as we see set out in the abstract, it's the abstract is directed to a metal complex. And according to the invention, it's a neutral,

electron-rich metal complex having a central atom, and it can be multinuclear and comprise a number of ligands, especially a ligand that is known as hpp. And hpp has a very particular structure. It is depicted in the context of the Werner reference.

And to put it together, hpp leads to use of the compound $W_2(hpp)_4$, a tungsten(hpp), tetra(hpp) compound. And that is specifically, that particular metal complex is also specifically disclosed in Werner.

Now, Pictiva's main criticism concerning Claim 1 focuses on motivation to select the specific combination of $W_2(hpp)_4$ plus Bphen. But this argument fails for two reasons. And if we return to Slide 7, which shows the claim, as you'll see in Claims 1 and Claim 10, there is no requirement that it has to be specifically $W_2(hpp)_4$ and Bphen, merely that it be a metal complex with a central metal atom on the one hand, and an organic compound with a particular structure we've already disclosed. Pictiva does not challenge that proposition.

The other part is that -- the other reason why Pictiva's argument fails is that Pictiva cannot escape that Werner specifically discloses two categories of compositions that Werner says you should bring together: a metal complex and an organic matrix material. And as an example of one of those is specifically organic compounds according to Claim 1, namely with heteroaromatics conjugated to an aromatic group, such as Bphen, such as the substituted phenanthrolines, and as the second column shows, the metal complex, which includes specifically $W_2(hpp)_4$.

This is sufficient, and as our Reply explains, the Syngenta opinion -- and our discussion of that is in our Reply, but the Syngenta opinion, starting at page 43, states that disclosing specific examples of what to use are

sufficient in order to show anticipation, which, of course, is -- would render the claims at least obvious.

Now, turning to Slide 12, Werner already discloses that using metal complexes, like $W_2(hpp)_4$, for doping organic compounds like Bphen, will be successful. As the slide shows, using the organic compounds according to the invention to produce n-doped organic semiconducting materials will produce a variety of electronic devices. And in each of those devices, using metal complexes as n-dopants can improve the conductivity of the doped layers.

Now, other prior art, turning to Slide 13, confirms what Werner tells us, that using aryl phenanthrolines doped with $W_2(hpp)_4$ will result in layers with improved conductivity. This is most clearly shown in another publication from the Werner group, the Novaled group from Dresden, first cited by the Patent Owner, Exhibit 2044, what we're going to refer to as Werner '541.

Now, each of the doped phenanthrolines that you see on the screen here showed a higher conductivity as compared to, for example, undoped Bphen, which at the time was a very common material for semiconductors, even in 2005, or, and as this patent also shows, even doped Bphen.

Turning to Slide 14, Pictiva cited to Werner '541 for the proposition that it taught away from the combination of $W_2(hpp)_4$ and Bphen. And yes, the authors there, in attempting to establish why their specific phenanthroline derivatives were particularly good, pooh-poohed the conductivity achieved by $W_2(hpp)_4$ doped Bphen. But the data shows, the data reported in Werner '541 shows that by doping Bphen with $W_2(hpp)_4$, there was improved conductivity over undoped Bphen.

Now, sorry. Apologies. Admittedly, there's an incongruity in this reference. In Table 1, it says the conductivity is 4 times 10 to the minus 9, and in Example 2, it says that the conductivity of the $W_2(hpp)_4$ doped Bphen is 10 to the minus 7. Now, this could be a typo. We don't know. But at the end of the day, what really matters is that doping Bphen with $W_2(hpp)_4$ shows a considerable improvement in conductivity.

JUDGE BAER: And just to be clear, when you say an improvement, you mean an improvement over non-doped, not an improvement over any specific other kind of doping; is that correct?

MS. HANSEN: Correct, Your Honor. Yes.

And we know that even a 40-fold improvement, as we saw in Table 1 of Werner '541, is a good improvement. Ma, for example, touts its two to three-fold improvements in device performance as significant. And Werner '541 tells of five-fold improvement of using one of its phenanthroline, doped phenanthroline derivatives over the doped Bphen example as being something that was worth talking about as being an improvement.

Now, Pictiva takes some issue about how Dr. Rand calculated his two to three-fold increase in conductivity according to Ma, noting that current densities were measured vertically and reflect resistance from the various materials that the charge needed to pass through. And thus, the two-to-three-fold improvement may not necessarily be from the electron transport layer itself. That's true. But at the end of the day, the reason we cited this material is to show that a two-to-threefold improvement is deemed to be significant.

Now, I'd like to turn briefly to the issue of joint vaporization, which is another aspect of that wherein clause that we saw in Claims 1 and Claims

10. Werner also discloses drawings for simultaneous vaporization of its metal complexes and its matrix materials, or the term that they use here is matrix materials, as required by Claims 1 and 10.

Now, on Slide 18, it shows that Werner sets out various methods for doping the matrix materials with the n-dopants. And one of them is co-evaporation. The most natural interpretation of the term co-evaporation, especially with the description provided here, is that both components are vaporized at the same time in a vacuum. No further description is provided. This is joint vaporization. One would expect more details provided for other types of vaporization that you would see, for example, sequential vaporization.

Like, for example, it's another option in Werner and provided as another methodology that could be used for doping the matrix material with n-dopants. Therefore, because Werner discloses metal complexes and organic compounds of the structure required by Claim 1 and 10 that are jointly vaporized, Werner expressly discloses all of the elements of Claims 1 and 10.

Now, I'd like to turn briefly to Claim 9, and turning to Slide 22. Now, Claim 9 is directly dependent on Claim 1 and states that the electronic device formed is an OLED. Now, there's no dispute that Werner discloses that its n-doped films can be used in OLEDs.

Now, Pictiva disputes whether or not Werner satisfies the claim based on the specific combination of $W_2(hpp)_4$ plus Bphen, but as we've established, Claim 1 does not require that specific combination of compounds. It's merely a metal complex and an organic compound.

JUDGE BAER: But isn't it that -- I think Patent Owner's point is not that the claim requires that specifically, but that your combination, as you articulated it, required that specifically. So why isn't that decisive?

MS. HANSEN: Because that's not true. If you take a look at the petition at pages 22 to 29, $W_2(hpp)_4$ was used as an example of the binuclear metal complexes, the paddlewheel complexes, and Bphen was used in it as an example of the matrix materials, including the phenanthrolines, and also the heteroaromatics, including TAZ.

JUDGE BAER: And just, again, quickly, that was at your petition at 22; is that correct?

MS. HANSEN: 22 to 29, I believe, is the full length of that discussion, Your Honor.

JUDGE REPKO: So if we removed all that discussion about W2 and Bphen from the petition Claim 1, you'll still meet the requirements of Claim 9?

MS. HANSEN: Yes.

JUDGE REPKO: How so?

(Simultaneous speaking.)

JUDGE REPKO: What combination of materials?

MS. HANSEN: According to Claim 1, the combination of any metal complex with a central metal atom and an organic compound that meets the structural requirements of Claim 1, of which there are multiple disclosed in Werner, the Werner reference.

JUDGE REPKO: But almost all of your discussion is of a specific combination, right?

MS. HANSEN: A lot of our discussion is about $W_2(hpp)_4$ plus Bphen, yes. That is right, Your Honor.

JUDGE REPKO: So then how, again, how would you meet the limitations of the Claim? I'm not seeing a whole lot of discussion of other embodiments here from Werner.

MS. HANSEN: Right. So the claim itself, Claim 1, is very broad.

JUDGE REPKO: I understand. Right.

MS. HANSEN: Claim 1 is -- and so all that is required is a combination of joint vaporization of a metal complex with a central metal atom and an organic compound. And given that that is all that's required, Werner discloses joint vaporization of a metal complex with a central metal atom and an organic compound.

JUDGE REPKO: But all of your discussion, again, is directed to a specific combination. So, I mean, it's if that doesn't work, then what are we supposed to do in terms of burden if you're just going to describe this? I mean, I don't -- especially with respect to Claim 9, which has this, you know, specifically used the OLED, and isn't it true that, you know, they have that comparative example, too? And it says you can't use that for the OLED, right?

MS. HANSEN: So two different things. First of all, it is important to distinguish Werner from Werner '541. These are two different references. The first part is Werner discloses more than just $W_2(hpp)_4$ plus Bphen, which we put in our petition. Our petition is broader than just $W_2(hpp)_4$ plus Bphen. And we said that the disclosure of any of those things would meet the limitations of Claim 1.

Claim 9 is dependent on Claim 1, and the description there, as we talked about at page 49 of our petition, is again directed to does Werner disclose OLEDs? And Werner discloses use of its films, broadly, in OLEDs.

And so, on that basis alone, even without looking specifically to the particular examples of $W_2(hpp)_4$ plus Bphen, we carried our burden by the preponderance of evidence that Werner expressed -- or Werner discloses all of the limitations of at least Claims 1, Claim 10, and Claim 9.

JUDGE REPKO: So what do you make of that Comparative Example Number 2? I mean, do you agree that it's too low to produce an OLED? You said it's a different, I mean, thing, but what do you make of that example?

MS. HANSEN: So the example in Werner '541, Exhibit 2044, is really more -- well, there's sort of two things about it. One, it's clear that the inventors there were trying to establish a comparison point for their new phenanthroline derivatives, and they needed something to say, our new compounds are better than something else. And so, to me, I read that as saying we need to say that this is not good enough.

The second part is there's a question of good enough for what. And is it good enough for a commercial device? It may not be good enough for a commercial device, but the case law has always been clear that it's not required. A commercial embodiment is not the standard of reasonable expectation for success, unless there is something in the claims that requires that to be so, and there's nothing in the claims that requires that to be so.

The evidence of what's in the '541 shows that if you dope Bphen with $W_2(hpp)_4$, you are going to show an improved conductivity. That much is

guaranteed, no matter if it's 40 or if it's 4,000. And that is all that is required by the claims, and frankly, that's all that Werner says that you're going to do.

JUDGE REPKO: Claim 9 says OLEDs. And I guess, going back to your point about commercial OLEDs, or what, I don't see any of that in Comparative Example 2. I mean, is there anything that talks about specific types of LED, OLED?

MS. HANSEN: There is discussion in the specification that talks about how the $W_2(hpp)_4$ plus Bphen will not be beneficial for use in LEDs because of the amount of time that it degrades, which would not be useful in something that you would want to have as a commercial product, I would imagine.

JUDGE REPKO: Okay. The sentence that's kind of troubling to me is it says it's -- I'm going to quote it and say, too low for use in organic light-emitting diodes. It doesn't really have any qualification of any types. It seems a pretty broad statement, right?

MS. HANSEN: It is a -- it is a broad statement. But again, Your Honor, I would take you back to the fact that Claim 9, again, does not require specifically $W_2(hpp)_4$ plus Bphen. Certainly, all of the aryl phenanthrolines that are in Werner '541 are within the disclosure of Werner itself, their aryl-substituted phenanthroline compounds. And so, they're simply specific examples of what the original Werner already disclosed.

JUDGE REPKO: So, when we're looking at Claim 9 and your analysis of Claim 9, in view of your analysis of Claim 1, we should just kind of delete all the parts that talk about Bphen and W2 because those, that discussion doesn't describe the properties of the embodiments that you were relying upon in Claim 1 and Claim 9?

MS. HANSEN: There are particular embodiments of it, but certainly, there are other embodiments of what's being disclosed in Werner, the aryl substituted phenanthrolines, into which Bphen falls; it's part of the broader disclosure in Werner. That, you know, Werner '541 says would be good enough. All of the --

JUDGE OBERMANN: But you didn't argue it that way. You didn't argue it that way. If there's another compound that would've, you know, met Claim 9, you were -- you should've pointed it out, but you didn't.

MS. HANSEN: We pointed to the general category, Your Honor, of the phenanthrolines and the --

(Simultaneous speaking.)

JUDGE OBERMANN: Yeah, and how do we know which ones that are going to meet Claim 9, and which aren't? We're supposed to look at this other Werner reference and figure it out ourselves?

MS. HANSEN: The compounds that -- the phenanthroline compounds that are aryl substituted would all fall within the scope of Claim 1 for --

(Simultaneous speaking.)

JUDGE OBERMANN: What about Claim 9?

MS. HANSEN: Claim 9 is an OLED. It is generally an OLED directed to those compounds, and Werner says that the metal complexes plus organic compounds of its invention will be successful for use in OLEDs.

JUDGE OBERMANN: Now you're talking about the Werner that you actually applied in the grounds.

MS. HANSEN: Yes, Your Honor.

JUDGE OBERMANN: And where is that argued in your analysis of Claim 9?

MS. HANSEN: If you take a look at page 49, I believe the description is to -- is fairly broad, and if you have the citation on the screen here, at 58 to 21, it talks about the applications of its films.

JUDGE OBERMANN: We're looking at the petition, page 49?

MS. HANSEN: Yes. And that discussion, Your Honor, was not limited to $W_2(hpp)_4$ plus Bphen.

JUDGE OBERMANN: So it all comes down to inherency and one paragraph in your declarants?

MS. HANSEN: Well, it directed -- it starts disclosure, Your Honor, in the Werner reference, which says the film can be used in, for example, OLEDs.

JUDGE OBERMANN: Organic OLEDs?

MS. HANSEN: Yes, Your Honor.

JUDGE OBERMANN: Okay. Please continue.

MS. HANSEN: I'd like to turn, actually, now to Ground 2, unless there are any further questions on Ground 1.

JUDGE OBERMANN: I don't think so.

MS. HANSEN: Okay. Turning to Slide 39, now Ma is the basis for the second ground, and it is an article from Elsevier's Synthetic Metals Journal, examining OLEDs based on new n-doped electron transport layers. Specifically, in this scenario, using the metal complex lithium quinolate, Liq, in a film where it has doped, again, Bphen.

Now, turning to Slide 42, much ink has been spent by the parties debating whether or not Ma is prior art to the '223 Patent, and I expect you

will hear a lot about this issue when Pictiva stands up. But the issues here are quite simple. The article states on its face that it was available online on August 29th, 2008.

JUDGE REPKO: What does that mean, though? I'm kind of curious about that. Is there -- do you have evidence to discuss what exactly does that mean by available online? Is it this version? Is it the received version, accepted version? Which version actually is online?

MS. HANSEN: So we have the declaration from Dr. Garland, who is a publisher at Synthetic Metals, who said that the version that we have now, which has a paper volume number, is the version that was available online on August 29th, 2008. And so, there is nothing from the paper; there is nothing from the record that suggests that any modification was ever made to what was available online versus what we have before us today as Exhibit 1007. Now -- sorry.

JUDGE REPKO: No, go ahead.

MS. HANSEN: Okay.

JUDGE OBERMANN: Is there any reason why we don't have a Wayback declaration?

MS. HANSEN: Ms. Munford put together a declaration where she gathered what evidence she could from the Wayback Machine, but of course, we are subject to the vagaries of what the Wayback Machine chooses to capture and when.

JUDGE BAER: Could you just explain that point? And that came up in the paper several times, and I wasn't quite following whether in the Wayback Machine doesn't identify how many hits, but how many times the Wayback Machine -- could you just lay that out a little more clearly for me

what that means, what it means when the Wayback Machine shows us the data that you provided or that Patent Owner provided for the webpage in question? Could you help me with that, please?

MS. HANSEN: Sure. So we looked at the particular list of Articles in Press, which is maintained by the ScienceDirect website, and the available dates when the Wayback Machine imaged that page was, I think, in early March of 2008, and then not again until December 9th, 2008. So, insofar as what was on the page exactly on August 29th, or just prior to the priority date in late September, we don't have any evidence one way or another.

JUDGE BAER: Because of when the Wayback Machine did its crawling to figure out what was where? Do I have that right?

MS. HANSEN: Correct, Your Honor.

JUDGE BAER: Okay.

MS. HANSEN: So, the information that we have to rely on is the reference itself, and this is coming from Elsevier, which is a well-established publisher.

JUDGE BAER: Could we touch on that particular point? And I know that this is in our Institution Decision, and you've cited that.

MS. HANSEN: Yes.

JUDGE BAER: And I assume you cited it in our Institution Decision because it's sort of a sticky point. Could you give us your best evidence that Elsevier is an established publisher, other than our Institution Decision?

MS. HANSEN: Sure. So we have the declaration from Ms. Garland. We also have the declaration from Ms. Munford, which walks through how various academic institutions would have had subscriptions to ScienceDirect. There is also evidence in the record that the --

JUDGE BAER: That's to ScienceDirect or -- I'm speaking specifically of not this specific ScienceDirect or the Synthetic Metals, but specifically to Elsevier. Did anybody say, look, Elsevier doesn't publish garbage; they only put up stuff that they verified, or Elsevier only has five publications, and everybody knew they were the standard, any sort of evidence along those lines that Elsevier is an established publisher, so that when we see a picture with Elsevier on it, that should mean something to us?

MS. HANSEN: Sure. The fact that Ms. Munford, in particular, testified that she knows it to be well -- or a well -- let's look at the precise word here -- a well-regarded publisher. We also know that experts from both sides have interacted with this journal. Dr. Schanze --

JUDGE BAER: When you say this journal, again, you're talking about now Synthetic Metals, not with the Elsevier publisher; is that correct?

MS. HANSEN: Correct, Your Honor. So, for example, we have Dr. Schanze, who was had familiarity with Synthetic Metals in particular in the 2008/2009 time frame.

In Dr. Rand's subsequent deposition, which is Exhibit 2056, he, at pages 189, he talked about how, to his, best of his recollection, in 2008/2009, he had an RSS feed to, among others, Synthetic Metals, which would've dumped any new article into that feed. And he, as being an expert in the field, this is a journal that he would have looked at and would have followed because it would've had information that would've been of interest to him to understand developments in the field.

JUDGE REPKO: I have a question. Just to kind of go back to that Garland declaration and these dates that we see here, received, accepted, available online, so the declaration of Ms. Garland says that, you know,

they're maintaining a copy of it that existed on or about November 8th, 2024, or no? What was -- what exactly, what copy of this -- like, what does this mean, these three things again? I don't see that in the Garland declaration.

MS. HANSEN: So the date talked about in the Garland declaration is only the final date, the available online date. That is the persistent metadata that is, that discuss, I believe, in paragraph --

JUDGE REPKO: I think it was 11; is that what we're --

MS. HANSEN: Paragraph 10, Slide 45.

JUDGE OBERMANN: Can we give Garland's declaration any kind of weight where she wasn't produced for a cross-examination, and why would we?

MS. HANSEN: This is a general declaration that was provided by a third party. I mean, we unfortunately don't have the ability to --

JUDGE OBERMANN: Well, I understand that, but we have a long history of pretty much giving no weight to a declaration where you can't control the declarant and bring them forward. So what happens then? We just turn to the Munford declaration?

MS. HANSEN: You can also turn to the Munford declaration, who has reviewed it and has said that she believes that it is --

JUDGE OBERMANN: She doesn't have any personal knowledge, according to your friends.

MS. HANSEN: She does not have any personal knowledge about this particular article, but she certainly has experience with articles like it.

JUDGE OBERMANN: She's relying on a December copy of the article.

MS. HANSEN: She used -- the Exhibit 1007 is from the -- it has page numbers, so is from the version that was put into the printed publication, but that does not change that it was available online earlier, and there is no evidence in the record, and Petitioner -- or the Patent Owner has not put forward any evidence that there are any changes whatsoever to the article as it presented in the printed publication versus what was available on August 29th, 2008.

JUDGE OBERMANN: And she was produced for cross?

MS. HANSEN: She was produced for cross-examination, yes.

JUDGE BAER: On this issue of the Garland Dec., and, you know, I'm sympathetic; you can only control what you control, that sort of thing. At the same time, as Judge Obermann articulated, it is hard for us to say, well, we're going to give this declarant weight, even though whether it's your fault or not is sort of beside the issue; she wasn't available for cross-examination.

So my question is, are you aware of any case law that addresses this specific issue when it's a third-party declarant that -- and it's a little different than if it were an expert. I sort of understand it logically, but my question specifically is, is there any case law addressing that that it's a little bit more acceptable if it's a declarant that's not really in your control? And that's fine if you want to take some time, but if you're aware of any case law, that would be helpful.

MS. HANSEN: Off the top of my head, I am not. I would be happy to submit supplemental briefing if that would be of interest to Your Honors.

JUDGE OBERMANN: No.

JUDGE BAER: I'm not sure that we need supplemental briefing, but you're welcome to take some time and address it in your rebuttal time, if you like, but I think the question is, are you aware of any? I'm not asking you to concede that there's none, just that you're not aware of any, and that's fine.

MS. HANSEN: Yep. I will say that if you compare it to the pantheon of literature about whether or not something is publicly available, there is a world of difference between the situation that was in Blue Calypso, for example, where it was a report accessible via a single HTTP site to a graduate student's personal website, compared to a journal article that is indexed by ScienceDirect, which is something certainly that both experts were familiar with, and frankly, both experts were familiar with this particular journal article. To suggest that, for some reason, it doesn't bear the hallmarks of reliability seems quite different than what we saw, for example, in Blue Calypso.

JUDGE BAER: When you said both experts were familiar with this particular article, I remember Patent Owner's expert saying something like, well, I've seen it as a part of this case. Was there -- am I missing something? Is there some evidence from Patent Owner's expert saying that that person was aware of this, other than being provided this material through this case?

MS. HANSEN: No, Your Honor. I said that he was familiar with Synthetic Metals, the journal through which this article was published.

JUDGE BAER: I see. Thank you. That's all.

MS. HANSEN: I will reserve the remainder of my time for rebuttal.

JUDGE REPKO: Just one more question. It's like I keep going back to this. So with the, with this declaration, the Garland declaration, and then you have the Munford declaration, and they're all talking about the date of

availability generally, but there's three different article histories. Those are -- that's the same document being made available three times. Like, what is this? What you're relying essentially on the last date, right?

MS. HANSEN: Right. So the article history provides the date that the article was received, which is when it was submitted by the authors, the day that the article was accepted, and then the date that it was made available online. And so, the first two dates are, I believe, are internal dates.

JUDGE REPKO: They're not indexed at that point.

MS. HANSEN: They're not indexed at that point.

JUDGE REPKO: And then available online, you can search it, and you can index it, and things like that, right? Is that --

MS. HANSEN: Correct. That is what ScienceDirect and Elsevier's pages seem to make the --

JUDGE REPKO: Okay. And then, in the -- so in that, in the Garland declaration, that doesn't discuss the indexing? It's you're relying on the Munford declaration to discuss the indexing and that that available online means?

MS. HANSEN: Correct, Your Honor. I mean, we do have the statement from Ms. Garland that says that these publications are made available for public download through Elsevier's digital library, ScienceDirect.

And we know as according to the Munford declaration, there are a number of webpages that describe the search capabilities that would've been available in 2008, including, as best we can tell, through Articles in Press, I believe Appendix 2 to Ms. Munford's declaration, explains, for example, that ScienceDirect sets out the top 25 articles for any given quarter, and those

include the Articles in Press. And if they, those, the top 25 include the Articles in Press, it seems reasonable to assume that they would also be searchable through ScienceDirect.

JUDGE BAER: On this indexing question, is the indexing important to show that a person searching for it could've found it, or is the indexing important to show -- that just confirms that August 29th, 2008, date, because if some other service is indexing it in December, it was at least online then. So my question is, is the indexing to show that someone could find it, or is the indexing to show the date that it showed up online, or both?

MS. HANSEN: I believe it is the date that it was available online. I -- my understanding about ScienceDirect, at least from Ms. Munford's declaration, is that it would have been searchable through at least ScienceDirect, even if third-party services, for example, Web of Science, did not index it until later.

And certainly, we know from Dr. Rand's deposition testimony that he had an RSS feed to the journal, which would have put new articles from that particular journal into a feed that he could look at and then go access if he saw fit.

Thank you, Your Honors.

JUDGE REPKO: Sorry. One more question. Again, available online, going back to that paragraph 25 of the Munford declaration, which talks about articles available in press and all that, available online, is there anything we have that says available online means this Articles in Press kind of thing without 25? Any connection between those two? Any evidence that we have?

MS. HANSEN: I believe I will need to double-check it. I believe one of the appendices to Ms. Munford's declaration describes what it meant by available online.

JUDGE REPKO: Like Appendix 4, I believe she was referencing, and you think that there is something in there that will clarify our --

MS. HANSEN: I believe that is correct, and I will address that point on rebuttal to confirm.

JUDGE REPKO: Okay. Thank you.

JUDGE OBERMANN: This is maybe a dumb question, but how do we know that this particular article would've been in the top 25?

MS. HANSEN: We don't know that, Your Honor. The point about whether or not an Article in Press in the top 25 is illustrative of whether or not Articles in Press would have searchable, such that they could be downloaded. I mean, if the top 25 is able to include Articles of Press, ostensibly those articles would need to have been found somehow.

JUDGE REPKO: But I mean, if that available online has nothing to do with this Articles in Press thing in 24 -- or Appendix 4, then I don't see what relevance -- like, what does that mean? We still don't know what that means. We don't have -- I don't know if we have anything that says, that connects those two things, the top 25 and the available online thing. That's my concern.

MS. HANSEN: Understood. I believe there is a connection, Your Honor, between Articles in Press being -- becoming what is deemed to be an Article in Press as of the date that it is available online.

JUDGE REPKO: Okay.

JUDGE OBERMANN: Where does that come from?

MS. HANSEN: I believe it comes from Appendix 4, but let me double-check that, and I will get back to you on rebuttal.

JUDGE OBERMANN: Okay. I hope you briefed it.

MS. HANSEN: Thank you, Your Honors.

MS. ZHONG: We seem to be having some technical issues. This one is just not coming up.

JUDGE OBERMANN: How much time would you like for your primary argument?

MS. ZHONG: Let me do 25 minutes.

JUDGE OBERMANN: Twenty-five. Take your time, and we'll start the clock when you begin speaking.

MS. ZHONG: So may it please Your Honors, my name is Annita Zhong, and I'm arguing on behalf of Patent Owner regarding IPR2024-01094, regarding '223 Patent.

So I will start with the Werner ground, and I want to make clear that the, from what I just heard, the Petitioner seems to be running away from its petition.

If Your Honors care to look at what the petition really said, the specific combination they did the analysis for each of the elements are for the metal complex, it's by tungsten(hpp)$_4$, W_2(hpp)$_4$. And the only two organic compounds that they did the full analysis on is Bphen and TAZ.

And I am showing here the reproduction of petition, pages 26 and 27, regarding the last element, 1(c), which requires the organic compound comprises a heteroaromatic compound which is conjugated with an aromatic compound via C-C bond. The only analysis in depth is the TAZ, T-A-Z, on page 27, and Bphen, no other analysis for no other compounds.

Now, so why is that a problem? The problem is, as one of the Judges asked them, is later Werner '541. They specifically actually look at the examples of combining tungsten$_2$(hpp)$_4$ and Bphen, and they have realized the thing actually does not work.

JUDGE OBERMANN: What about with TAZ?

MS. ZHONG: Okay. There is no analysis of TAZ whatsoever. And that was -- both parties treated TAZ and tungsten$_2$(hpp)$_4$ would not behave any better than Bphen itself

JUDGE OBERMANN: Okay. So in order to show reasonable expectation of success, they needed to come forward with a specific compound because some of them weren't going to work.

MS. ZHONG: Exactly. And I am showing you here, on the right-hand side, is an excerpt from Werner itself, Exhibit 1005, PDF page 57. Those are the three specific complexes that they show. The first one is we call aluminum Q3. The second one is a Bphen, and the third one is BAlq$_2$ by its common name.

And then, if we go to Exhibit 2044, which is what they call Werner '541, Werner looked at all three of them. And, inevitably, what Werner said for those three, as far as conductivity is concerned, insufficient, very low.

And why is that important? And, here, I also want to make sure that the dispute is not just at the max limit. The dispute is also about whether you form electron-conducting layer. The electron-conducting layer is formed by joint vaporization of the metal complex with the organic layer. But if the resulting film is not sufficiently conducting, you don't have electron-conducting layer. This limitation, the claim is not rendered obvious.

JUDGE OBERMANN: Is this where we come into your argument that it was an unpredictable art, and it would have taken about 190 years of testing this subset?

MS. ZHONG: Exactly. Exactly. Because what you show here, Werner itself didn't later on just say, hey, here are the three that I have, and then did experiments.

JUDGE OBERMANN: Right.

MS. ZHONG: Too low, insufficient.

JUDGE OBERMANN: So Werner did our original reference, 105, and then later came forward with three, one of which happens to be the one they selected and showed that it didn't work, basically.

MS. ZHONG: All three didn't work.

JUDGE OBERMANN: Right.

MS. ZHONG: None of them worked. So they say, oh, yeah, the conductivity is going to be increased. Maybe conductivity is going to increase. The claim requires electron-conducting. The sand (phonetic) is not conducting. I add a little metal; it's going to be more conducting. But does that resulting mixture is electron conducting? There is no showing there. We don't -- the electron -- electron-conductivity is not in reference to the relative improvement but to the actual number, right?

And Werner has made it pretty clear here, in Table 1, in saying that, whether that is a typo or not, his conclusion is that it's insufficiently conducting. And the same for the Comparative Example Number 2, where he also did an experiment. Granted, his was a slightly different loading on the tungsten$_2$, and the recorded number is much higher, but still, he looked at it, saying that

those are insufficient conductivity. The conductivity is insufficient for organic light-emitting layer. That's Werner's words.

I understand the Counsel says that they said those words because they wanted to show a highlight the actual inventions in the '541, but I want to point out what Werner actually said when he was talking about their results. He says, it has surprisingly been found that certain phenanthroline derivatives can be used as matrix materials, which can, if necessary, be doped with metal complex dopants. This is Slide 43. I am citing from Exhibit 2044, column 8, lines 44 to 53. When someone says it's surprising I found this to work, it means I don't expect it to work based on my previous results or what I have seen.

JUDGE BAER: Ms. Zhong, can you help me with -- I'm back on your Slide 22 in this cite to Table 1, this insufficient, this word insufficient. Is there any indication in the reference itself about what that sufficiency is talking about? Insufficient for what?

MS. ZHONG: If you read the context of it with the 2044, it's talking about the OLED application in particular. So the insufficiency is with respect to the OLED application at least, but there is also no showing that the electron-conductivity is sufficient for any of the other optic electronic applications. There is no --

JUDGE BAER: And when you say sufficient to these applications, and again, I'm not so much interested in your opinion of this, but if there is record evidence in the reference talking about what that insufficiency for OLED means. It won't work. And again, I'm not asking for your interpretation, but I just want to make sure I'm not missing anything in the reference itself that is discussing this insufficiency any further.

MS. ZHONG: So --

JUDGE OBERMANN: I don't want to speak for you, but the very sentence is the conductivities achieved are insufficient.

MS. ZHONG: So let's look at the Slide 40. Okay. So Slide 40 is, again, from Werner '541, Comparative Example Number 2, column 10, lines 9 to 19. And again, it's looking at Bphen plus tungsten$_2$(hpp)$_4$. And if you look at the highlight sentence from page 3, it says the conductivity of a semiconductor material consisting of compound IVa:Bphen is too low for use in organic light-emitting diodes.

So whatever -- I don't know what the exact structure is, but Werner is telling me, whatever number they got, which is 4 times 10 to the minus 7 Siemens per centimeter, that'd be too low.

JUDGE BAER: And I appreciate that. I just didn't know if I was missing something that discusses what insufficient conductivity -- what happens in that case, and --

(Simultaneous speaking.)

JUDGE BAER: I just want to make sure I'm not missing anything.

MS. ZHONG: Insufficient conductivity means you may be able to make a stack; the thing is not going to work as an OLED. It's --

(Simultaneous speaking.)

JUDGE BAER: -- curious if any have -- I understand your argument there, for sure. I was just curious if there was any of the discussion that you just articulated, if there was anything further in the reference itself.

MS. ZHONG: As to?

JUDGE BAER: As to what you just said about insufficient conductivity, that what happens is it won't work.

MS. ZHONG: Okay.

JUDGE BAER: If there was any further discussion in the reference itself.

MS. ZHONG: So there is Comparative Example Number 3, where they looked at the -- as a device stack, what that half-life time is. The half time is, I think it's 5 seconds -- 5 minutes to 20 minutes. And I need to look it up, but my discussion was Dr. Rand in his second depositions is he says, well, look at it; like, the conductivity is really low. So we are really pushing a lot of heat through it, so it's burning it. It's basically degrading the material quickly, so it's not working.

JUDGE BAER: And that deposition, the deposition reference again, that's the information I was looking for. And was it that discussion was in -- it's fine if you want to --

MS. ZHONG: Yeah, I probably need to look it up. That is in, my recollection, it's in Dr. Rand's second declaration.

JUDGE BAER: Thank you.

MS. ZHONG: Deposition. Okay. So, as Your Honor has figured out, the entire thing regarding conductivity is completely outputted. And the Petitioner is trying to draw the analogy to Syngenta. Syngenta involves maybe a dozen, like a handful of limited examples, so he can test it.

But, here, the undisputed evidence is that -- I discussed this with Dr. Rand to say how many organic compounds Werner has disclosed. He basically says, I can't count, but at least 1,000. So I type in lower number. Dr. Schanze actually had a much higher number. And the same for the metal complexes. I asked them how many do you have for the metal complexes? He again says let's just look at a couple -- like, we just looked

at one or two of the classes. He said over 2,000 for sure. So they talk about too many complexes with uncertain conductivity. So you basically have to do all tests in order to find which one is going to work.

But I think the law on this is pretty clear. Basically, the Federal Circuit says, to have a reasonable expectation of success, one must be motivated to do more than merely to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result.

That's exactly what happens here. Compounds 1(a) through 1(b) that Petitioner now is running away and trying to rely on, is it simply disclosing Werner at any place? I haven't seen it, and they have not pointed out where that particular structure is expected.

And I also want to mention that it's not just that the tungsten$_2$(hpp)$_4$ doping Bphen, you don't know what the conductivity would be, but it would be the same if you take some of the specifically disclosed metal complexes, including tungsten complexes, and to try to combine it with Bphen. Dr. Rand basically says it's challenging to know what the conductivity would be without doing experiments. I ask him, do you know how it would compare to tungsten$_2$(hpp)$_4$ with Bphen? He basically says I have no way of predicting it. So that, again, shows you he found unpredictability and a lack of reasonable expecting success.

So what the Petitioner is really asking us to do is from Werner's kitchen sink approach to pick out specific compounds and hope they will work, but they have not shown it. And at the specific examples we picked in the petition didn't work, so they're now trying to have a new theory. That should not be the case. They are the master of their petition. They picked

those specific compounds. They are stuck with it. There is no -- you cannot inject new theories in the reply.

Does Your Honor have any additional questions regarding Werner?

JUDGE OBERMANN: I don't think so.

MS. ZHONG: Okay. I want to talk about Ma a little bit. So I am showing you an excerpt from the petition, Page 57, and I want to direct your attention to the paragraph starting with third. Ma discloses that electron-conducting layer is obtained by joint vaporization of a metal complex with an organic compound.

JUDGE BAER: I'm sorry. This is petition, Page 57?

MS. ZHONG: Yes, so petition, Page 59.

JUDGE BAER: Thank you.

MS. ZHONG: And so, they are not saying that it would be obvious in light of Ma to do joint vaporization. They say Ma's disclosure of co-deposition of the lithium quinolate and Bphen discloses joint vaporization. But what they fails to inform the Board is that the expert in the district court reached the opposite conclusion.

I'm showing you Slide 110, and the excerpt is from Exhibit 2051. I believe these are the publicly available versions. I don't think there is any confidential information in these two paragraphs. So, in these two paragraphs, 452, Dr. Kymissis is basically saying Ma recounts that Bphen and lithium Q were co-deposited using evaporation to form an ETL. ETL stands for electron transport layer. And 543, he said, make it clear, I do not agree that this process constitutes joint vaporization. There is no ambiguity there.

And Dr. Rand does not try to explain why Dr. Kymissis reached this conclusion. In fact, he is aware of Dr. Kymissis's conclusion and decided not to ignore it and decided not to explore further to understand why they reached a different conclusion.

And here is Dr. Kymissis's deposition testimony. So my colleague was discussing Exhibit 19, which is the Ma reference, with Dr. Kymissis. And he asked expressly, does Exhibit 19 disclose joint vaporization? Exhibit 19 is the Ma reference. He says, I'm not sure. And there is some discussion of the deposition, but it is not -- you know, it is a relatively short paper, and I can't say whether or not it represents joint vaporization.

So, basically, he is saying Ma is not giving me enough information for me to conclude that there is joint vaporization going on. And Ma is the sole reference for the joint vaporization limitation. So, if Ma does not disclose that, then the entire Ground 2 falls apart.

JUDGE OBERMANN: And that's their own witness?

MS. ZHONG: That's their expert in the district court. And that's a part they want to strike, because they want to hide that unfavorable testimony from the Board. The entire transcript was used with Dr. Schanze before the reply is due, and they withhold that transcript, because they know we cannot submit it as part of the sur-reply. So that's a game they're playing.

And Dr. Schanze actually agrees with Dr. Kymissis in that respect. He basically says Dr. Rand believes that Ma's ETL was formed by joint vaporization, and I disagree because Ma provides no information on its evaporator configuration, the position of the sources, or the degree of intersection, if any, of the plumes from the Liq-source and the Bphen-

source. And this is Slide 113, from Exhibit 2041, Dr. Schanze's declaration, paragraph 154.

And this is part of Dr. Schanze's deposition transcript, Exhibit 1021, Pages 173 to 174. So I discuss with him, what is the common and ordinary meaning of joint vaporization held by Dr. Kymissis? So he discussed what Kymissis was saying, that the metal compound and the organic compound needs to be present in the vapor phase, and it depends on the pressure how much interaction the two materials will have in the vapor phase, and it also depends on the structure of the evaporation sources, the plumes are allowed to interact in any way that permits reaction to occur in the vapor phase. So that's what Dr. Kymissis believes joint vaporization requires to show.

So then I asked him, does the Ma reference provide the details mentioned by Dr. Kymissis that is needed to determine whether there is joint vaporization or not? And Dr. Schanze says no, there is not, just the same as what Dr. Kymissis has concluded.

JUDGE REPKO: So I'm hearing some feedback in your microphone. Can you move the microphone back a little bit, maybe?

MS. ZHONG: Me?

JUDGE BAER: Can you just aim it up a little bit?

JUDGE OBERMANN: Great. The other side.

JUDGE BAER: There you go.

MS. ZHONG: Okay. Sorry.

JUDGE BAER: Thank you.

JUDGE REPKO: Not at all.

MS. ZHONG: And I'm now showing Slide 115. And again, that's the deposition transcript of Dr. Schanze, Pages 171 to 72. Again, it's discussing

Dr. Kymissis's deposition testimony and his agreement or disagreement with that deposition testimony.

So we asked Dr. Kymissis if he evaporate something at the same time, will that result in joint vaporization? And Dr. Kymissis's answer is not necessarily. He says it really depends on the details of the deposition, the pressure, the reactivity of the two materials, the degree of intermixing.

None of those were analyzed in the petition. And none of those, they don't claim that Ma actually provides sufficient detail to give you, to draw the conclusion at whether there is joint vaporization.

And doctors, again, Dr. Schanze agrees as to that testimony by Dr. Kymissis; it is consistent with his understanding of whether co-deposition necessarily results in joint vaporization. The answer is not necessarily. It really depends on the reaction conditions.

So what we have here is a situation, you have three experts -- two experts, one from on the Patent Owner's side, one from the Petitioner's own side, who has concluded Ma just does not provide sufficient detail for you to draw a conclusion joint vaporization action occurred.

There is a third one, Dr. Rand. He just says co-deposition means joint vaporization. He does not try to explain why Dr. Kymissis reached a different conclusion. He basically says, I'm aware of those testimony, but I don't think it's valid. He could have talked to Dr. Kymissis or talked to one of the engineers, but he chose not to. So that's where we end up with on Claim 1 of the Ma ground. Samsung's own expert in the district court has agreed Ma does not disclose joint vaporization.

And I'd like to touch briefly regarding Claim Number 2, which is the coordination.

Okay. So this is the construction adopted by the District Court at Samsung's urge. And it's a narrow construction. And if you read the transcript on Slide 130, which is Exhibit 2103, Pages 84 to 85, what Samsung's district court attorney explained is that their construction is trying to make sure that the coordination bond is limited to dative bond. But I asked that question specifically, whether there is coordination involving the lithium nitrogen bond, because a dative bond requires there to be lithium and nitrogen, that type of bond. It cannot be just some random bonding. And Dr. Rand basically says, I did not determine that.

And because Patent Owner also believes that the coordination is not limited to dative bonding, but it's requires to be some kind of chemical interactions between lithium bond and the organic compound, which can include Pi bonding. So I also asked them whether you have determined there is coordination involving the lithium Pi bonding. He basically says, I did not limit myself to the requirement of a specific type of coordination between types of bonds or types of atoms.

So Dr. Rand's determination of whether there is coordination or not is inconsistent with the position that he took in the district court, which is a much more narrow construction. His construction basically would involve pi-pi stacking, physical with intermixing, while the district court construction is a very narrow type of dative bonding.

And here is Page 134, Exhibit 2042, lines -- Pages 211 and 212; again, Dr. Rand did not determine and cannot determine the type of interactions in the Ma mixture, and that he did not determine the type of interactions in the Werner mixture either. So, basically, under the proposal they have advanced

in the district court, there is absolute absence of any evidence that there is coordination going on.

Now, they did bring up one thing about the Ki reference in their Reply, which is a Samsung paper that talked about the vapor deposition of Bphen and lithium quinolate, but it's a different system than Ma. It uses also a different processing conditions. So, on Page 143, I'm summarizing some of the differences. The pressure is different. The deposition rate is different. And I also know the two devices do not behave the same. How do I know that?

So here is an excerpt from Ma, Page 812. And if you look at Figure 5, which is on the lower right-hand corner, what you see is that as the conductivity -- or the current density of that device will increase as you dope lithium Q compared to the non-lithium Q one. But that is not the behavior we see in Ki.

And here is an excerpt from Exhibit 2050, which is Ki, Figure 4. So, if you look at Figure (a) and you look at how the voltage, the driving voltage, is changing as a percentage of the lithium quinolate, you see, actually, the voltage, the driving voltage, actually increases, which is the opposite as in Ma, where the driving voltage actually drops as you dope lithium quinolate. And the luminance, in the Ki reference, the addition of lithium quinolate is actually reducing the luminance as well.

And then, if we move to Figure (b), the inset, and if you look at the EQE, which is external quantum efficiency, it also decreases as you add lithium quinolate to it, which is not the supposed behavior in Ma, because Ma supposedly teaches that when you add lithium quinolate to the Bphen, the driving voltage would decrease, and efficiency would increase. So with

Ki here, it's behaving completely differently than the Ma. So you cannot say what happens in Ki is going to be happening in Ma. It's not inherent. It's not obvious.

I see that I have run out of time, and I will reserve the rest of my time for rebuttal.

JUDGE OBERMANN: Thank you, Counsel.

(Pause.)

JUDGE OBERMANN: Petitioner, do you know how much time you'd like for your reply?

MS. HANSEN: Ten minutes, Your Honor.

JUDGE OBERMANN: Ten minutes. Take your time. I won't start the clock until you're ready.

MS. HANSEN: I appreciate that. I just wanted to make sure that I was getting it big enough that anyone could see it, including me.

(Pause.)

MS. HANSEN: So, I wanted to start by answering the question that I said that I would answer, which is what evidence is there relating the "Articles in Press" date to the issue of the availability online. So this is Appendix 2 to Ms. Munford's declaration. This shows that -- there's terrible feedback.

JUDGE BAER: Could you just -- if you could just aim the mic up, that seems to help.

MS. HANSEN: Okay.

JUDGE BAER: Thank you.

MS. HANSEN: This shows that the Item Number 65 is the Ma reference, and it shows that it was available online the 29th of August 2008.

Now, if you go all the way to the end of that appendix, which I will try to get to without scooching onto the next page, there is a note to users on the bottom, where it says that the section Articles in Press contains peer-review-accepted articles to be published in the journal. When the final article is assigned to an issue in the journal, the article is removed from the section and will appear in the associated published journal issue. The date it was first made available online will be carried over. So that is a connection between the Articles in Press and the online availability date.

In addition, there is also a discussion in Appendix 4 to Ms. Munford's declaration, which is a screenshot from May 9th, 2008, so just before, talking about the top 25 hottest articles. And it shows that Articles in Press -- all articles are included in the Top 25 list, including Articles in Press, that means that because Articles in Press are available online in ScienceDirect before their print publication, Top 25 lists may include articles which have only just been published in the print journals. So that is additional evidence showing the connection between Articles in Press designation and the availability online date.

JUDGE REPKO: So there's no definition of available online, though, right here? It just says this means that articles -- I guess I'm looking at the Articles in Press, second sentence. This means Articles in Press are available online in ScienceDirect before their print publication.

So that -- when they're referring to available online, they mean that language? Like, there's no definition of available online, but it just means Articles in Press before -- like, what does that mean exactly? It kind of goes back to the indexing thing. Like, we don't really have any discussion of what it means to be available online.

MS. HANSEN: So the list of available online refers to -- at least, and certainly currently, refers to the date when a version of the article was made available online in the journal. And this is Footnote 5 to our original petition, which includes a HTTP link.

This is also consistent with, for example, if we look at Appendix 2, if you look at the information that is available with this page -- and I will go to it as soon as my mouse catches up -- as part of it, you have a link to the -- you can get a preview. You can purchase the PDF. There are related articles, and that is the information that, as we understand it, would have been made available as of the 29th of August 2008.

JUDGE REPKO: What page is Footnote 5?

MS. HANSEN: Footnote 5 in our petition, on page --

JUDGE REPKO: I have 16 is what I got.

MS. HANSEN: Yes, page 16.

JUDGE REPKO: Okay. It's kind of circular definition there. Available online means it's available online.

MS. HANSEN: Now, I wanted to briefly address, if I could, this testimony that Patent Owner pointed out from Dr. Kymissis, who is SDC's expert in the district court-filed litigation.

Now, Patent Owner characterized this testimony as unambiguously saying, that Ma does not disclose joint vaporization. That's not actually clear from this statement. The paragraph is discussing the process that is used for the accused products, and if, under Pictiva's view of the accused products, if that is obtained by joint vaporization, then Ma discloses this limitation.

The following sentence says, I do not agree that this process constitutes joint vaporization. I intend to offer more detailed opinions on this topic in my rebuttal report.

Rebuttal is known infringement. Therefore, I think that there is significant ambiguity as to whether this process refers to Ma or it refers to the accused product process. And frankly, I think there is more support for the latter, given the final line that says I intend to offer more detailed opinions on this topic in my rebuttal report, which would be a non-infringement report.

Moreover, if you take a look at the next slide, if it were so clear that Ma did not disclose joint vaporization, certainly Dr. Kymissis's testimony here would not be quite so, for lack of better word, ambiguous. He can't say whether or not it represents joint vaporization.

Certainly, what we have from doctor -- what we have in the disclosure of Ma is a description of the process by which it is used, and if we look at what is disclosed here, it provides a co-deposition process. It gives the rates. It gives that the layers were monitored using independent sensors. It provides that, for the chamber pressure-wise, it provides the deposition rate was maintained at a particular rate for the organic materials. Without more, the natural reading of what this co-deposition process discloses is joint vaporization.

And indeed, Dr. Schanze, when describing his own work in doing a co-deposition process of a B2B -- a BTB plus Liq film, and as a -- we asked him, as the person who oversaw this experiment, did you jointly vaporize the B2B and the Liq? To the best of my understanding, yes.

Now, look at the detail that is provided here with respect to the experiments that Dr. Schanze ran. It provides the ratio. It provides a rate. It provides the thickness, but it doesn't provide anything else. The bare disclosure that we have here, the most natural reading is that it is, in fact, joint vaporization.

JUDGE OBERMANN: What are we looking at here? Is this a slide?

MS. HANSEN: Yes, Your Honor. It is a slide, and I apologize. It is Slide Number 49.

JUDGE OBERMANN: Thank you.

JUDGE REPKO: So then what do you make of this argument about intermixing? I mean, does this show the requisite degree of intermixing? Is intermixing necessary when you're thinking about joint vaporization here?

MS. HANSEN: I'm not sure what level of intermixing would be necessary for the purposes of joint vaporization. I mean, in all honesty, the '223 Patent is not particularly illustrative as to what it means by joint vaporization. Certainly, in the German proceeding in which this declaration was submitted, the claims used joint vaporization, co-vaporization, simultaneous vaporization, all somewhat interchangeably, at least certainly among the translations that we have seen.

So I think that the issue is, is without more, the most natural reading is what is being disclosed in Ma, which is at Slide 48, is, at best, or at least, joint vaporization.

JUDGE REPKO: Yeah, but does it say anything about intermixing, though, I guess? It isn't -- I mean, is there anything here that talks about intermixing in a way? Because it's possible that we could think of maybe co-deposition being a subset of -- or joint vaporization being a subset of co-

vapor or co-deposition, right? Maybe it's like there's a degree of intermixing that's required to reach the level of joint vaporization, whereas co-deposition, there may be some processes that don't necessarily intermix to the degree required.

MS. HANSEN: That may be possible, but with the -- the only information we have from Ma is what we have, I have here, and the testimony from Dr. Schanze that if you're going to do something more significant than simply evaporating things simultaneously, you're going to have to provide more information. And that is at Exhibit 1021, lines 39:20 through 24, which we can show on Slide 51.

If you were to do -- if you were to describe sequential deposition, one would expect that it would affect the structure of the material, and so you would expect it to be stated. Because Ma didn't, we must assume that it is basic joint vaporization.

JUDGE REPKO: Okay. Thank you.

MS. HANSEN: I see my time has elapsed. Thank you, Your Honors.

JUDGE OBERMANN: Thank you.

And when Patent Owner is ready, how much time would you like?

MS. ZHONG: Ten minutes, please.

JUDGE OBERMANN: Ten minutes. I'll put the time on the clock, and you take your time. We won't start until you're ready.

(Pause.)

MS. ZHONG: Is there a reason that it's -- my screen is not showing up. Sorry for the technical difficulty.

JUDGE OBERMANN: That's okay. Take your time.

(Pause.)

MS. ZHONG: So I want to start with talking a little bit of Ma's prior art status. This is Garland declaration, paragraph 10. If you look at it, they actually said the date of publication for the first online version. So there are -- there appear to be different versions. There appear to be versions. That's the final version that's attached to the Garland declaration, and they submitted as Exhibit 1007. And then, there is the first online version. So those are two different versions. They relied on the December 2008 version, which was the volume and the issue numbers assigned to it. They did not rely on the first online version that supposedly is available for August, in August 2008.

So, regardless the issue determined regarding whether they need indexing or not, they simply rely on the wrong version. The version they rely on is only available in December 2008. It's not available in August 2008.

And how do I know that? This is from Exhibit 1037, Munford declaration, page 53, which is the last page of Appendix 2, and it's at the very end, note to users, where they say, the final articles -- when the final article is assigned to an issue of the journal, the Article in Press version will be removed from the section, which is the Article in Press section, and will appear in the associated published journal issue.

So we know there's at least one difference. The first online version doesn't have the issue or the volume assigned to it. It doesn't have that information. The final version would have. So the version they're relying on is not the first online version. They may say, oh, the substance is the same. Well, you should have tried to get a version of the first online version

from Elsevier and rely on that one instead of last one, which is not available until December 2008.

JUDGE REPKO: So what do you make of this sentence right here that says the date it was made, it was first made available online, will be carried over?

MS. ZHONG: It will be carried over because that's the online date. They trying to keep that metadate, but the version has changed, because the new version has at least the new volume and issue date will be added to that, so that's going to be a different version in that sense.

JUDGE REPKO: So --

MS. ZHONG: But the online version, the first publication date, like the, what they call the online date, will be carried over, but it's a different version.

JUDGE REPKO: So that date that we see labeled is available online. That's what that sentence is referring to?

MS. ZHONG: So that data will be carried over into the later version.

JUDGE REPKO: And there's new stuff. It says when the final article is assigned to an issue, the version will be removed; the date will be carried over.

MS. ZHONG: Yes.

JUDGE REPKO: Right. Okay. Thank you.

MS. ZHONG: And Counsel also mentioned Dr. Rand's testimony regarding RSS feed. That thing is not in his declaration. He just mentioned it, out the blue, at his deposition. There is no way for Patent Owner to verify statement. And as far as I know, it's also somewhat inconsistent with another ask for Dr. Holme's testimony, where he said he received RSS feed

for new issues. New issues is usually referring to the printed publication, not the online versions, because they don't have issues.

So Dr. Rand's testimony should be given no credit in that respect. If that's the case, he should have included in his reply declaration, which he does have a section without any -- the public, supposed public availability of the Ma article.

Concerning Dr. Kymissis's statement in his report, Exhibit 2051, if you read the context of 543, his first sentence is, under Pictiva's view that the accused products contain an electron-conducting layer that is obtained by joint vaporization, which I disagree with, then Ma discloses this limitation. I do not agree that this process constitutes joint vaporization.

So the context is pretty clear. He's talking about a Ma process, not about the accused process.

JUDGE REPKO: But the sentence before talks about the accused process. Can you further elaborate on that argument?

MS. ZHONG: So it's a masked-man argument, basically say if infringe, then invalid. So if you think of accused products, which use complete different reactors, deposition conditions, and materials, but you can prove that there is joint vaporization in the accused process, then Ma has joint vaporization. It's that logic.

JUDGE REPKO: Okay.

MS. ZHONG: But the statement is still with regard to the joint vaporization in Ma because this is an open report on invalidity. And open report on validity doesn't talk about infringement process.

Now, concerning Counsel's argument that in the -- Dr. Schanze's German declaration doesn't have a lot of detail to determine whether there is

joint vaporization or not. I think the difference really is we don't know what Ma's reaction condition is.

Look, Dr. Schanze did his experiments. He knows exactly what his reactor looks like, where the source material is configured, how the source material is configured, how much plume their interaction is; he was there observing them. That's why he can conclude in his experiment and conduct Kymissis's required conditions. He can conclude there is joint vaporization, while he said for Ma, there's just not that kind of detail for me to make a determination, the same as Dr. Kymissis reading Ma. He says, I don't know.

JUDGE OBERMANN: What --

(Simultaneous speaking.)

MS. ZHONG: There is co-deposition, but there is not joint vaporization.

I also want to point out Counsel seems to say that the specification is talking about simultaneous deposition, co-deposition -- or co-vaporization, joint vaporization interchangeably. But if you look at, actually, Claim 10, Claim 10 is a method claim. It doesn't use a word joint vaporization. It uses a word simultaneous vaporization or the like. And we have testimony from Dr. Kymissis as well. Simultaneous vaporization is a much broader term than joint vaporization.

So what we can say is that experts from both sides, excluding Dr. Rand, but between Dr. Kymissis and Dr. Schanze at least, joint vaporization requires a little bit more than just simultaneously vaporize two materials. There needs to be some intermixing of the materials before they -- when, like, at least at the point when they hit the substrate, there needs to be some intermixing; at least, for example, what we call the plume is intersecting

with each other. Ma, as Counsel has just conceded, it doesn't have that information. They cannot conclude it one or the other.

JUDGE OBERMANN: The two witnesses that you say agree to -- agree that there need to be at least some mixing --

MS. ZHONG: Doctor --

JUDGE OBERMANN: It's Dr. Schanze and doctor --

MS. ZHONG: Dr. Kymissis.

JUDGE OBERMANN: And what is the evidence of that? Is that what we're looking at on the screen?

MS. ZHONG: That one and the testimony that I discussed earlier.

JUDGE OBERMANN: Okay. What are we looking at on that screen, the German thing?

MS. ZHONG: Oh, the German thing, because the Counsel said Dr. Schanze, the German declaration, lacks detail. And I'm saying, which Dr. Schanze could say, that he conduct his own experiments. What he cannot say about Ma is all those conditions that Dr. Kymissis says you need to determine whether there is joint vaporization or not. Dr. Schanze knows the evaporator design. In his experiments, he knows how much intersection of the two materials are. He knows the intermixing. He knows that because he did experiments, and he supervised the experiments.

JUDGE OBERMANN: And what are we looking at on the screen, please?

MS. ZHONG: The screen is just showing the petition with -- the second-to-last two paragraphs.

JUDGE OBERMANN: Oh, this is from the petition?

MS. ZHONG: That's from our Sur-reply.

JUDGE OBERMANN: I see.

MS. ZHONG: Trying to distinguishing the separation from Dr. Schanze's German declaration from the Ma.

JUDGE OBERMANN: Thank you.

MS. ZHONG: Why Dr. Schanze can conclude that his experiments is involving joint vaporization, while it's not -- he cannot make the same conclusion about Ma just because he knows what he did, the conditions, the reaction conditions. He can't say the same about Ma.

JUDGE OBERMANN: I think --

MS. ZHONG: I think Your Honors may be a little bit confused regarding the Ki versus Ma analogy. I only discussed this because Petitioner is saying, since Ki also involved Bphen and lithium Q, and Ki seems to indicate there is some coordination between Bphen and lithium Q. Ma necessarily discloses that.

JUDGE BAER: And just for the record, can you tell us what we're looking at on the screen, please?

MS. ZHONG: This is Exhibit 1, the Ma reference, first page.

JUDGE BAER: Thank you.

MS. ZHONG: Okay. And what I'm trying to point out is, in the Ma reference, what Ma is saying that he, in his system, when lithium Q is added to Bphen, there is going to be a reduction in the driving voltage and increase in efficiency, but that's not the case in Ki.

JUDGE OBERMANN: You have gone over time. You have gone over your time if you want to keep going to --

MS. ZHONG: Understood. Yeah, I will -- one more minute, should be done.

In the Ki reference, as I mentioned, it's the opposite. The addition of lithium quinolate actually drives up the voltage and decreases the efficiency. So the two systems are different. Ma and the Ki are different. So you cannot draw inference from what's happening in Ma from Ki. Those are two different systems, found under different conditions, having different qualities. That's all.

If Your Honors have additional questions, I'm happy to entertain, but I went over my time, so --

JUDGE OBERMANN: I think we're good. Thank you. Thank you so much, Counsel.

Okay. Would you guys like to continue, or would you like to take a short break?

MS. ZHONG: Whatever suits Your Honors.

MS. HANSEN: A brief break might be nice, Your Honors.

JUDGE OBERMANN: Okay. How about is 10 minutes good, or --

MS. ZHONG: Yeah.

MS. HANSEN: That would be great.

JUDGE OBERMANN: Okay, 10 minutes. We'll come back -- why don't we come back at 2:10?

(No audible response.)

JUDGE OBERMANN: Sorry. That would be 3:10.

(Whereupon, the above-entitled matter went off the record at 2:55 p.m. and resumed at 3:11 p.m.)

JUDGE OBERMANN: We will be starting the third case today, which is IPR2024-01095.

Petitioner's counsel, how much time would you like to open?

MR. FRISCH: So I'll be splitting this argument today with my colleague, Mr. Lee, who's arguing through the LEAP program. I think combined we'd like to use 32 minutes. I'm planning to spending 20 minutes on my portion of the argument, 12 minutes for Mr. Lee. However you'd prefer to put that on the timer.

JUDGE OBERMANN: I will put 32 minutes on the clock, and I'll depend on you to hand it over to your colleague when you're ready. 32 minutes, and I won't start until you begin.

Mr. FRISCH: Good afternoon, Your Honors. Jared Frisch of Covington and Burling for Petitioner, Samsung Display. I will be presenting argument today on the last of the three patents, the '425 Patent, IPR2024-01095.

As I noted, with me is my colleague Mr. Kee Young Lee, who I'm happy to say will be arguing pursuant to the LEAP program. I'm planning to present argument as to Grounds 2 and 7 of the petition today, the Ma grounds. Mr. Lee will be presenting arguments as to Grounds 3 through 5 and 8 through 10.

As a bit of brief background, the petition presented 10 total grounds, with Grounds 1-5 being based on Diekmann, and Grounds 6 through 10 being based on Suzuki. Diekmann is a reference that was considered during prosecution of one of the '425 Patent's parent applications. That's Application Number 13/139,514. The '415 application was actually rejected based on Diekmann, and as Petitioner discussed in the petition at page 9, the '514 application was ultimately allowed over Diekmann, only by incorporating highly specific limitations that are not present in any of the claims of the '425 Patent. The prosecution history of the '425 Patent --

JUDGE BAER: Counsel, I don't mean to interrupt, but I think we're going to be tight on time, and as I understand it, none of this is disputed. The first and sixth grounds are out, because those have been disclaimed, so if we could jump right into Ma, I think that'd be helpful.

MR. FRISCH: Sure. You beat me to it. That's why they're greyed out here, a couple of them have been disclaimed. So let me jump forward.

JUDGE BAER: And just a housekeeping matter on Ma and Ma's prior art status and its public availability, this issue comes up in both the '94 case and the '1095 case.

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

JUDGE BAER: The records are little different, and the arguments -- I understand the arguments to be the same, I understand there were space needs. Just as a housekeeping matter, are we okay treating the issues the same in both cases, such as -- there's no material difference, is there, between the cases on this particular issue, that is whether Ma is a printed publication?

MR. FRISCH: I think generally that's correct, Your Honor. The one thing that I would point out is just that the '425 Patent has a later priority date, and so that does impact how the evidence plays with respect to the '425 Patent. So specifically the '425 Patent has a priority date of December 11th, 2008. And so obviously some of the evidence that was looked at previously today, such as the indexing evidence from December 1st, 2008, might bear slightly differently as to the '425 Patent, but otherwise I think it is safe to treat the records --

JUDGE BAER: I appreciate the distinction. That's helpful, thank you, but on the issue of public availability as of the August 29, 2008, that

issue is the same across both cases and no material differences across the cases? Is that correct?

MR. FRISCH: Correct, Your Honor.

JUDGE BAER: Thank you, that's helpful.

MR. FRISCH: If I may proceed, Your Honor, I'll just jump straight to Slide 14, and this is the start of the combination of either Diekmann or Suzuki with Ma, regarding Claims 2 and 17. Moving to Slide 15, the dispute between the parties, with respect to these particular combinations, centers around the additional limitations of Claims 2 and 17. Claim 2 requires that the electron transport layer of Claim 1 comprise Liq, the long form of which is shown here.

Claim 17 essentially requires the same. I'm not sure that it's patentively distinct; it requires comprising at least Liq. It's worth noting at the outset that Pictiva does not dispute that both Diekmann and Suzuki teach every limitation of Claim 1. As we already discussed, Claim 1 has been disclaimed.

Pictiva also does not dispute that Ma teaches n-doping an ETL with Liq, consistent with the additional limitation of Claim 2. Finally, Pictiva does not dispute that Ma discloses that Liq doping an ETL improves conductivity. Pictiva only disputes whether a person of ordinary skill in the art would be motivated to implement Ma's teachings in Diekmann and Suzuki with a reasonable expectation of success.

JUDGE BAER: And, again, I'll ask you the same question I asked your colleague. When you said improves conductivity, I assume you mean as compared to an undoped ETL, not as compared to any specific ETL that might be in either of the primary two references, is that correct?

MR. FRISCH: Yes, that's correct, Your Honor. And I know there has been an argument, which I'll get to a little bit more later, but I'll address now, as to comparing that to other dopants. But I would argue that that raises the bar as to obviousness. There doesn't need to be a comparison as between the particular dopants.

The Honeywell case, which I can jump straight to here, actually says that it does not require that a particular combination must be the preferred or the most desirable combination described in the prior art in order to provide a motivation for the current invention. Rather, the question is whether there is something in the prior art as a whole to suggest desirability, and that's the obviousness of the claimed invention, and I do think Ma does that through its teachings that I'm going to go through.

So jumping back to Slide 18. As the title of Ma indicates, Ma is a paper specifically directed to describing organic light-emitting diodes based on new n-doped electron transport layer. And in particular, Ma's focused on reporting the benefits of using Liq in a doped ETL. Looking at Slide 20, as Dr. Holmes has explained, Ma teaches that doping an ETL with Liq results in a number of benefits, increased current density, reduced driving voltage, and improved electron transportability. And Pictiva's expert, who is shown here on the right, Dr. Pattison, he acknowledged in his deposition that Ma not only identifies Liq as an n-type dopant, but also that Ma discloses that doping an ETL with Liq improves conductivity.

If we go to Slide 21, the record demonstrates that a person of ordinary skill in the art would have been motivated to use Liq as an n-dopant in either of Diekmann and Suzuki for a host of reasons. Looking at Slide 16, first, Diekmann already taught an n-doped ETL, which is shown here in Figure

2A of Diekmann as doped layer 402. And I don't' believe that's disputed. If you move to Slide 17, similarly Suzuki taught an n-doped ETL as part of its organic layer sequence 7, shown in Figure 9. And, again, I don't believe that's disputed. And as we discussed, Ma expressly taught various benefits of using Liq doped ETL, the increase in current density, the reduced driving voltage, and improvement in transport conductivity in an OLED.

Moving to Slide 38, the third item is that Diekmann taught that it's preferable for its dopant to be a large atom or molecule. And if we look at Slide 39, Liq has a higher molecular weight than, for example, any of the exemplar dopants that were specifically discussed in Diekmann. Their molecular weights are shown here.

JUDGE BAER: Well, if I could push on that a little bit, because I understood your point earlier that I don't have to show that it's better, that Ma's dopant is better than Diekmann's, but now you're starting to go into that range and into that sort of argument, and so it's not quite fair to have your cake and eat it too. Either you're saying look, a person of skill in the art would have reason to use Ma's dopant instead of Diekmann's because Ma's is superior, or you're saying a person of skill in the art would have reason to use Ma's dopant because it was a known dopant. Perhaps you're saying both, but I want to be clear that those two things are distinct. So are you arguing both those things, or just one, or just the other?

MR. FRISCH: I do think at the end of the day, in many ways, it is both. I don't think it has to be the best, to your point. The point of showing the molecular weights here is merely to show the fact that when Diekmann was discussing what dopants he thought would work in his particular device, he was saying large molecular weight dopants are preferable, and then he

provides a number of examples. He does not limit his invention to those examples, but he provides a number of examples. I think cesium, barium, lithium fluoride.

And so those give you examples of what types of molecular weights he was thinking about. And so the illustration on Slide 39 is merely to point out that those particular dopants had the weights seen here, for instance, 25.94 grams per mole or 137 grams per mole. Liq actually has a molecular weight of 151 grams per mole. So it was merely just to indicate not necessarily that it's better, although in this context it may be better from a molecular weight standpoint, but it's at least analogous to the various types of dopants that were being used in Diekmann.

Moving back to the slides, Slide 35. The last point that I would make is it's well known that Liq had good electron injection and transport properties. For example, as Dr. Holmes explained, it was well-known that when an Liq doped ETL abuts the cathode, which it would in both Diekmann and Suzuki, according to their structures, the Liq dopant increases the number of electrons injected from the cathode into the system.

JUDGE BAER: And, again, you said increases, and by increases I assume you mean, as compared to what?

MR. FRISCH: Well, for these particular ones, yes, it's not comparing it, I don't believe, to one of the other types of dopants. What these papers are discussing is that when you have a system that has Liq in it, that provides a good transition for an aluminum cathode, which is a common type of cathode, in order to allow electrons to get from that cathode into the emission layer. So you're right; it is not in comparison to the particular dopants being discussed in Diekmann, but more of a generalized.

Accordingly, based on all of the items I just discussed, I believe applying Ma's teachings to either of Diekmann or Suzuki would be nothing more than the use of a known technique to improve a similar device in the same fashion.

In terms -- well, jumping to Slide 22, a person of ordinary skill in the art would have had a reasonable expectation of success in doping Diekmann's and Suzuki's ETL layers with Liq. Again, for a number of the reasons, including some of those that we've already discussed. First, as we discussed, both Diekmann and Suzuki already contemplated an n-type doped ETL in their system.

Second, references like Ma and Endo, Exhibit 1049 in the record, already demonstrated the use of Liq-doped ETLs in OLEDs prior to the '425 Patent. And as Your Honors correctly acknowledged in the institution decision at page 24 to 25, the fact that prior art already teaches the relevant feature being used in a relevant system, here it's Liq doping ETL in an OLED, demonstrates that one of skill in the art would have had a reasonable expectation of success in implementing an Liq doped ETL in either the Diekmann or Suzuki structures. And third, as Dr. Holmes has explained, implementing Liq as the n-dopant in an ETL was well within the ability of a person of ordinary skill in the art, which, again, I think is shown through Ma and other references.

Jumping to Slide 23, Pictiva's papers set forth a grab-bag of what I would argue are unavailing and speculative arguments in hopes of distracting from what as I believe we've just seen is a fairly clear-cut set of combinations. Moving to Slide 25, first, Pictiva argues that Liq in Ma operates via different underlying mechanism than the n-dopants in

Diekmann and Suzuki. Pictiva's argument is based on Ma's discussion of Liq as potentially operating via what he calls short hopping.

It's worth pointing out first that Ma is not actually definitive as to Liq's operating mechanism being short hopping, rather it specifically says that the high electron conductivity of Bphen doped with Liq may be originated from short hopping. In any event, there's no support for Pictiva's position that the purported difference between these types of dopants, electron hopping dopants and electron donor dopants, somehow renders Diekmann and Suzuki's incompatible with Liq.

If we go to Slide 26, in designing an OLED, in particular the electron transport layer, given its function, the goal is to increase conductivity. That's what you're trying to do with ETL. And that's irrespective of whether you do that based on some type of electron hopping or electron donation. And as shown on this slide, both sides' experts agree that conductivity is a function of not only charge carrier concentration, that would be the donor, the number of electrons donated, but also carrier mobility, and that's kind of the short hopping discussed in Ma.

And as we discussed, both parties agree that Ma discloses that Liq doping does increase carrier mobility, which would therefore increase overall conductivity. Pictiva has not provided any technical basis for why Liq doping could not be incorporated into either Diekmann or Suzuki's structures to form a functional OLED, which is all that's really required by the claims. Indeed, the record demonstrates actually the opposite to be true. Diekmann explicitly discusses the use of LiF as one of its possible ETF dopants, lithium fluoride.

If we go to Slide 30, as Dr. Holmes has explained, it's well-established that the mechanism by which LiF improves electron injection, the dopant that's in Diekmann, that that's analogous to the mechanism by which Liq improves electron injection. If we look at Slide 31, in fact Liq and LiF have been used in functionally equivalent analogous contexts since well before the '425 Patent. For example, both have been used as standalone electron injection layers; that's what's shown here in Slide 31. If we look at Slide 32, both have also been used as ETL dopants, including in Alq_3, which is one of the ETL materials specifically identified by Diekmann.

And if we go to Slide 33, notably there's a study from 2002 by Endo, which is here, Exhibit 1049, which actually shows that Liq had better current density and luminance characteristics than LiF. And this is shown in Figures 4 and 5 of Exhibit 1049. You can see here at the bottom, the Liq is the open circle, whereas the LiF is the square, and then it changes in a couple different iterations.

Now, Pictiva argues next that Petitioner has not directly compared the benefits of Liq doping to other dopants. We talked about that earlier. I believe that that raises the bar in terms of the actual standard, and so I won't belabor that point.

Looking at Slide 48, another argument was raised as to there being lack of compatibility as between materials used in phosphorescent and fluorescent OLEDs, and the idea that lithium can cause quenching, particularly in phosphorescent OLEDs. As Dr. Holmes has explained, researchers routinely extended OLED architectures from fluorescent devices to phosphorescent devices. This is demonstrated as shown here in Figures 29 and 30 of Exhibit 2101, by the fact that similar cathodes, anodes, electron

transport layer, hole blocking layers, and hold transport layers were used across the two different types of devices. The left-hand image here is a fluorescent device; the right-hand device is phosphorescent. They've been color-coded to show similarities. Obviously, the emission layers are not the same, hence they're not color-coded to be the same.

If we look at Slide 49, further demonstrating this point is the fact that researchers built OLED stacks that simultaneously comprised both fluorescent and phosphorescent emission layers at the same time, shown here in Figure 1 of Exhibit 1053. Figure 1 of Exhibit 1054, that shows you that the similar materials could be used for both phosphorescent and fluorescent devices.

Looking at Slide 50, in terms of the quenching concern, as Pictiva's expert acknowledged, that's not a concern that's unique to Liq. That's actually a concern for basically any dopant, including the dopants identified in Diekmann. Dr. Pattison acknowledged that, as shown here on the right side, that cesium could have a quenching characteristic, that barium could have, as well as, I believe, LiF at the same time.

JUDGE REPKO: So just to be clear, you know, you're just talking about substituting one for another, one component for another. Your obviousness rationale isn't based on improving anything. You're going to say that it doesn't improve it in any way, and that's what we're going to base our decision on, is you're swapping out elements?

MR. FRISCH: Well, you are swapping out elements in a sense. I don't know that I would characterize it quite as swapping because Diekmann isn't specific as to any particular dopant. So I don't think it says you have to use this one. So we're not, per se, swapping one for the other, but it is based

on the fact that we believe Liq is a known dopant, Ma discussed known benefits of that dopant, Diekmann discussed items that he was looking for respective to dopants, for instance large molecule, and a person of ordinary skill in the art having knowledge of those potential benefits as discussed in Ma, and the characteristics of that dopant as discussed in Diekmann would think to try --

JUDGE REPKO: Well, now you're getting into the benefits. But I just -- what I heard you say is, don't worry about the benefits, don't worry if it improves it or not. Do I consider the benefits or do I not consider the benefits? I just want to be clear.

MR. FRISCH: I think the benefits -- I apologize, I did not mean to interrupt.

JUDGE REPKO: No, go ahead.

MR. FRISCH: I think you consider the benefits. All I was saying is you don't need to necessarily show a benefit in order to be able to make an obviousness combination.

JUDGE REPKO: Right.

MR. FRISCH: But I do think benefits, you know, goes back all the way to the teaching suggestion motivation test, which obviously we're past, but I do think Ma provides -- those benefits provide motivation. Those benefits provide suggestions.

JUDGE REPKO: But you're trying to dismiss Patent Owner's arguments by saying oh, you don't need the benefits. So then should we also dismiss your assertions that there are benefits, too, when we're considering the obviousness? I guess that's what I'm saying. I mean, it's -- I've heard a lot about that, right?

MR. FRISCH: I don't think so, and I'm not trying to dismiss their arguments to say there are no benefits or that they've shown that there are no benefits. I'm just saying that by saying that they have to specifically -- or that we have to specifically compare our -- the dopant of Liq back to the list of dopants in Diekmann, I think that's above and beyond what's required by law.

JUDGE REPKO: Sure, of course. So I just want to get this dispute kind of straight in my head, though. So, I mean, it seems like if you were alleging benefits and they produced some sort of evidence saying no, you're wrong, that's an incorrect statement, there's no benefit here, I mean, shouldn't you squarely address that rebuttal to your assertion?

MR. FRISCH: Yes, and I don't believe that they have shown anything showing that there aren't benefits to Liq. I don't believe there's record evidence. They've pointed to a number of papers post the '425 Patent. Again, legally, I don't think it's proper to look at those papers. Obviousness and expectation of success are measured as of the time of the invention. That's what should be looked at, what was understood as of the time of the invention. That's what was in Ma. But even if you look to those later papers, those papers still describe the same if not similar benefits of Liq. And I'd be happy to go through some of those, time permitting, or save that for rebuttal, but those later papers do discuss the same types of benefits.

JUDGE REPKO: Okay, thank you.

MR. FRISCH: Almost out of the time that I saved for myself, so I'll just make one final point here. Pictiva spent a significant portion of its surreply, and I suspect will spend a significant portion of its discussion here today discussing purported objective indicia of non-obviousness. We

believe Pictiva raised those arguments for the first time in surreply. In fact, in our reply we actually pointed out that to that point there had been no secondary consideration of non-obviousness argument. And that's reply at 1, where we pointed that out. I think the proper time for Pictiva to have made those arguments would have been in its Patent Owner response so that we had the benefit of those arguments to reply.

Based on that, we don't believe they should be considered. And I'll add to that that we don't believe that they've even made a proper showing in the surreply as to any of these secondary considerations or objective indicia of non-obviousness. There's no attempt to even show a nexus, which is obviously a requirement to rely on those. The word nexus does not even appear in the papers.

Unless there's other questions, I'll turn it over to my colleague.

JUDGE OBERMANN: I don't think there are. Thank you.

MR. FRISCH: Thank you.

Mr. LEE: So, good afternoon, Your Honors. Kee Young Lee of Covington and Burling for Petitioner, Samsung Display. So as my colleague mentioned, I'll be presenting on the other grounds, not based on Ma, so those are dependent claims directed to OLED encapsulations, touch sensors, and gesture control of devices that include organic light-emitting diodes.

So turning to Claim 4, for these later grounds the main arguments are, like in Ma, the motivation to combine and whether a person of ordinary skill in the art would have had a reasonable expectation of success. Pictiva largely does not dispute that all the limitations of the Diekmann claims would have been met based on these combinations that have been presented.

So the Lee reference, what does Lee teach? What Lee teaches is a multilayer encapsulation for an OLED, where that encapsulation comprises alternating layers of inorganic barrier films and polymer interlayer films that decouple those inorganic layers. And critically for Lee's invention, some of those polymer layers are made to be more crystalline so that you have both semi-crystalline polymer layers as well as highly-crystalline polymer layers.

And Lee specifically speaks to the benefits of the system. On the right-hand side of Slide 66, it explains that this type of structure is a benefit over prior art that just had the inorganic polymer alternating layer structure, because in Lee's structure, by making some of the polymer layers more crystalline, they themselves can act more like barriers as well, which would improve the overall encapsulations, resistance to water vapor and oxygen.

And as explained in the petition, for example at page 40 for Diekmann and page 71 for Suzuki, the primary references also have the exact analogous encapsulations, for example the alternating layers of inorganic barrier layers and polymer layers, which is the very structure that Lee says it is improving upon. So, and the petition also explained that using Lee's encapsulation, and this is in Slide 64, would then result in a significantly improved lifetime for the underlying OLED device itself. So that is pretty clear motivation to combine, in our view.

And as further explained in the petition, for example at petition at page 41, the same evidence also supports a reasonable expectation of success. Not only is Lee's encapsulation described as specifically being for OLEDs, Diekmann and Suzuki have, as I've mentioned, the same kind of multi-layer encapsulations that are analogous to the structure that Lee was improving upon.

Now, Pictiva has two main arguments in response, and I'll address the first argument that Petitioner's combination seeks to modify Diekmann's or Suzuki's barrier layers and that there's no motivation for such a change. And we think this simply misconstrues the proposed combination that we advanced in the petition. So as shown in Slide 65, the petition was pretty clear that proposed combination would be to use Lee's encapsulation in place of the encapsulations that are described in Diekmann and Suzuki. And so we're not seeking to apply Lee's method to modify individual layers that already exist in Diekmann or Suzuki, where it's a replacement.

And second, Pictiva argues that because Lee doesn't specifically mention n-doped electron transport layers or phosphorescent OLEDs, that it's unclear that Lee's method of annealing temperatures to create these more crystalline polymer films could be suitable for an n-doped phosphorescent OLED, like that described in Diekmann and Suzuki. Now, as an initial matter, Pictiva's argument seems to require the secondary reference and a combination to either teach all the limitations of the claim alone or at least require some express suggestion in the secondary reference itself for the combination, neither of which is a proper obviousness analysis under legal precedent.

Now also, Pictiva also reads the reference too narrowly. And if we turn to Slide 68, Lee actually specifically contemplates that some of the organic materials that are used in the OLED stack, including specifically calling out electron transport layers, they might be thermally unstable at temperatures that are commonly used for annealing. And so it specifically identifies it as a problem and specifically describes solutions. For example, it says you can use laser or focused IR methods to ensure that energy is

applied to the specific polymer layer that you're trying to make more crystalline, while ensuring that that energy doesn't get sent to the OLED device sitting underneath it. And so -- and it also describes an optional reflective layer, which could additionally help to prevent the laser from penetrating into the organic device layers.

So, again, so Lee itself contemplates the exact problem, which in our view is there wasn't really evidence in support of this problem, so it's just a hypothetical speculative concern that's raised by the Patent Owner, but Lee addresses that sufficiently in its own disclosure.

JUDGE REPKO: What you're saying there is you're just taking that encapsulation layer and putting it in place, right? Do we need -- do we care about this at all really? I mean, does this actually change your theory, your obviousness theory, if we now have to consider these additional parts when your original obvious theory was just, like, you just swap it in?

MR. LEE: No, Your Honor, but I expect the Patent Owner would point out that when you build with these encapsulations, you already have the existing OLED underneath. So even if we are saying we are using these encapsulations in place of the encapsulation that's already in Diekmann or Suzuki, you would still have to take into account the temperature, because you're building the encapsulation on top of an underlying OLED.

JUDGE REPKO: So there's more stuff than what you originally said in your petition that you need to do, other than just swap it in?

MR. LEE: So what you need to consider is that you need to be sensitive to the temperature that you're applying to the underlying OLEDs, because that's -- you're building the encapsulation on top of it. But our

argument is that these concerns are already addressed by the very method that Lee teaches for forming its encapsulation.

JUDGE REPKO: So you need this as part of your combination?

MR. LEE: So as part of our combination, we've articulated that there is a reasonable expectation of success because Lee contemplates that it is used for OLEDs. And this is really a rebuttal to this hypothetical problem that Patent Owner has raised and which Lee --

(Simultaneous speaking.)

JUDGE REPKO: It's a hypothetical problem, but is it a problem that is the result of you just taking these encapsulation layer and putting it in place, swapping that out, doing your swap? To improve lifetime, right, that's the whole purpose, right? You're going to swap them out, and you're going to improve the lifetime, but you also need this.

MR. LEE: So I guess this -- I wouldn't say you need this to have what is required by the claim, because this is -- what we're saying is you would -- this is the method for creating a structure that we would eventually use.

JUDGE REPKO: Required for your combination.

MR. LEE: Right, it would be a consideration, but one that does not dissuade you from attempting this combination.

JUDGE REPKO: Thank you.

MR. LEE: And so I believe Patent Owner in surreply also points to some dependent claims that mention temperatures of up to 350 or 400 degrees Celsius, but if you look at those dependent claims, they're actually referring to the temperature of the polymer layer that's being annealed and not the underlying OLED layer, which supports our interpretation that Lee is correct that you would be applying a temperature that's sufficient to anneal

the polymer layers themselves, but would not be damaging the underlying OLED layers. So that also supports the expectation of success.

Now, other than its misreading of Lee, the only other evidence that Patent Owner cites in support of its arguments about whether Lee's system could be applied to an n-doped phosphorescent OLED is a declaration from its expert, Dr. Pattison. But Dr. Pattison's declaration is pretty conclusory on this point. He doesn't really provide sufficient evidence or technical reasoning to support why we should expect this to be a problem, particularly for n-doped phosphorescent OLEDs, when Lee contemplates that OLEDs would be -- that its system would be -- could work with OLEDs. And, in fact, Dr. Pattison's declaration merely parrots the same conclusory arguments that are in the Patent Owner response, sometimes near verbatim, as shown on Slide 69.

Now, turning, unless there are further questions, to the touch sensor grounds, which are Claims 9 through 11. Again, the arguments here, and as we'll see the arguments with respect to the gesture control claims is, again, similar, motivation to combine and expectation of success. The petition, we believe, sufficiently articulated both the motivation to combine and the expectation of success. So Diekmann and Suzuki use organic light-emitting diodes in applications for devices such as displays and lighting, and those electronic devices do require control. And in fact, as Patent Owner, you know, acknowledges in its reply, Diekmann talks a lot about the need for user control to operate its various embodiments of its lighting and displays.

And touch sensors are well-known input devices, and touch sensors were further desirable because they would allow the user to operate the device more intuitively. And as the petition explained, and as this panel

found at institution, using touch sensors that are integrated into the OLED would be particularly desirable because it would allow the same benefits of having touch sensors, while ensuring that you reduce manufacturing costs and allowing you to have a thinner profile for the device.

And again, as the petition explained and as the panel found at institution, a person of skill would have reasonably expected success because the prior art already had examples of this very structure of organic light-emitting diodes with touch sensors integrated within. And despite having an opportunity to do so, Dr. Pattison did not provide any evidence to the contrary; Pictiva didn't cite any other evidence to the contrary. So as the record stands -- and Dr. Pattison really didn't provide any testimony about the touch sensor or the gesture control claims.

So I see that I am out of time, so unless there are further questions on this, I will let you --

JUDGE OBERMANN: Thank you so much, Counsel.

How much time will we be putting on the clock?

MS. ZHONG: 25 minutes.

JUDGE OBERMANN: 25 minutes.

MS. ZHONG: How much time do we have left, does the Patent Owner have left?

JUDGE OBERMANN: My colleague is keeping track. You have 40 minutes total time for your opening and rebuttal.

MS. ZHONG: Okay. So I will do the 25 minutes for now.

JUDGE OBERMANN: Okay.

MS. ZHONG: Thank you.

JUDGE BAER: And, Counsel, just as a preliminary matter, same question for you as I asked Petitioner. For the Ma prior art status, and at least as it applies to the August 29, 2008, am I correct there, the issue are the same between the two cases?

MS. ZHONG: Not exactly the same.

JUDGE BAER: Could you help me with that?

MS. ZHONG: Okay. First of all, the evidence is different. The Munford declaration is not in IPR2024-01095. And before I proceed further, Your Honor said first thing in the morning that he did not receive the demonstrative?

JUDGE BAER: We did receive the demonstrative. That was my mistake. I apologize. We have it.

MS. ZHONG: Okay. I was getting a little bit nervous.

JUDGE BAER: We have it. I apologize.

MS. ZHONG: Okay. So the Munford declaration is not in the record for this proceeding. So to the extent they rely on the Munford for all those public availability whatsoever, it's not there. So the evidence is different.

JUDGE BAER: That puts us in a little bit of an awkward position, because that puts us in a position to potentially have two different decisions. So the solution to that would be of course that they would just seek permission to file the Munford declaration in this case, which I think we'd be --

MS. ZHONG: That would be unfair, because we did not take a deposition here, and her deposition, we did not discuss her -- all her, like, the deficiency in her analysis. So it's their decision, and it's their burden to prove that it is prior art. They chose not to put the Munford declaration in

this proceeding. They chose to submit Garland declaration that they know from the very beginning that she could not be made available. It's their decision.

JUDGE BAER: On the Munford declaration, was she deposed in the other case? She wasn't, was she?

MS. ZHONG: She was.

JUDGE BAER: She was deposed in the other case? And certainly we wouldn't have a problem with you submitting the deposition. My question is, is there a material difference between the two? And you're saying the evidence is different. The solution would be we'd have you both file whatever evidence across the two, but I guess I'm trying to avoid the awkward situation where we have the same issue and we'd have to deal with the record -- but I guess, if you want to maintain that position, that's fine, I would just encourage the parties to then contact the board to submit whatever evidence is going to be relevant in both cases. But I would hope we could avoid that, but if that's what we need to do then so be it.

MS. ZHONG: I think it's fairness issue. They are the master of the proceeding. They decided what evidence to put in. That's their decision. Your Honor should not try to make up the -- a record for them.

JUDGE BAER: I understand that. Would you be opposed to them submitting -- now submitting the evidence that's not in the record for the '95 case in the '94 case?

MS. ZHONG: I need to take it back.

JUDGE BAER: Fair enough. Thank you.

MS. ZHONG: Also, before I proceed for the rebuttal on this case, I owe Your Honor one cite from the '1094 case, where you asked whether the

electron conductivity has anything to do with how the device performs. And I mentioned the reply deposition testimony of Dr. Rand. And the testimony is Exhibit 2056, on page 210, lines -- I can't barely see it, I think it's 5 or 8 to 20. So it's on page 210, lines 5 to 20.

Now, if it pleases Your Honor, I do want to start with the state of the art. Contrary to Petitioner counsel's argument, we have been consistent. In POR 36, we already pointed out they say lithium quinolate, it's a well-known dopant, but the single reference they had in the petition is Ma, the 2008 declaration -- the reference. In response, their expert did some more search, and what he came up is another one by Kido in 2002. So those are the two only references before the priority date that they could find to use lithium quinolate as the dopant in electron transport layer in an OLED device. And in both cases, they use -- it's for fluorescent OLED; it's not for phosphorescent OLED. And in both cases, the fluorescent layer, the emitter layer doesn't even have a dopant. It's aluminum q3, which is the oldest type of the emission layer. So that's the state of the art.

And 2011 is the first paper that used lithium quinolate in an electron transport layer in the phosphorescent device. So what you are having here is a nine-year span from the first report in the record, 2002 the Kido-Endo paper, Exhibit 1049, when the first reported attempt that the lithium quinolate used as electron doping, electron transport layer was reported, to 2011, when that usage is expanded to the phosphorescent OLED, or I will just say PHOLED as an abbreviation.

And what the expert also said is at the time of the invention, the OLED community is best described as high-impact and fast-moving. And if there is something interesting, a new material that's really interesting, a new

architecture that emerges, people must integrate into their devices. So but what you are ending up here was a nine-year gap in a fast-moving community to extend the use of lithium quinolate from a fluorescent aluminum q3 based fluorescent OLED to a phosphorescent OLED.

That, I mean, we are talking about -- whether it's secondary indicia or not, that's the objective evidence of the state of the art, what the community was doing, the history of the development. You are --it's a very difficult case, usually, when you're trying to substitute one known dopant with another one. You say, is it obvious? Is there expectation of success? And it's difficult for you to cast back 17 years earlier to 2008 to say what a person of ordinary skill in the art would do, but the history here is showing there's a huge gap between each report of the use of lithium quinolate. That shows either there's no interest in the community to try lithium quinolate in the PHOLED, or they tried and they couldn't get it to work. And in fact, a six-year gap between Kido and Ma, that also tells me something. There is probably someone who's out there trying, but they couldn't get it to work.

JUDGE BAER: Counsel, so Counsel for Petitioner characterized this as a secondary consideration. And I know there's some crossover between secondary considerations and whether there's a reasonable expectation of success and whether there's a motivation to combine. Would you agree with that characterization? Are you saying this is a secondary consideration? Or is this just whether there is a motivation to combine?

MS. ZHONG: I wouldn't really characterize it as secondary consideration. I characterize it as objective evidence, the evidence that's not expert testimony that's created for this proceeding.

JUDGE BAER: I'm not sure I understand the difference between objective evidence of non-obviousness and secondary considerations of non-obviousness.

MS. ZHONG: Okay. Maybe the way I should put it, it's this objectively reflects the state of the art. It's not --

JUDGE BAER: So when you say objectively reflects -- I'm not trying to trap you here. Objective indicia is sort of a special word in patent law. I don't understand you to be arguing there are secondary considerations, or what we have also called objective indicia of nonobviousness, and I want to make sure that's correct. Am I correct about that?

MS. ZHONG: That's correct.

JUDGE BAER: Thank you.

MS. ZHONG: What I'm saying is that these are the evidence in the record that shows what was happening at the time of the invention, the state of the art.

JUDGE BAER: I take your point. Thank you.

MS. ZHONG: Okay. So here is a gap, the six-year gap between the Kido and the Ma reference, nothing in between. Their expert looked but could not find anything, and there is no explanation why there is a six-year gap. If they say oh, yeah, it's a well-known dopant, people would just swap one for the other. The Virtek case is pretty on point, I think. Whether it's known or not, it doesn't matter. There needs to be a reason why you use it in a particular system. Here the question is really what is the reason for your to use it, right?

And the other thing I want to point out, the Kido paper, you may say, like, the Kido paper is kind of an obscure paper by some unknown group

that people don't really know about, but that's not really the case. So I asked Dr. Holmes specifically whether Kido is a well-known group at the time of the invention, and the answer is positive. He even went further to say in general the community is following Kido's work, including Exhibit 1049, which is the 2002 paper.

So you're talking about a situation that the whole community is aware of the Kido paper, and for six years nobody did anything, or at least there's no report of furthering to use lithium quinolate in an electron transport material as -- in electron transport layer in the OLED device. You start to question what is going on. Is it so obvious, in that case, for you to say I will just swap out the well -- the better known one, like cesium, lithium, and barium with lithium quinolate? You don't see any report in the fast-moving community where supposedly people would be trying to integrate any interesting new materials on your architecture. You don't have it here.

JUDGE BAER: Is it Petitioner's job to show, this goes to the discussion we were having with Petitioner, is it Petitioner's job to show that a person of skill in the art would have been motivated to swap out the dopants disclosed in the primary reference? Or just to show that the dopant in the Ma reference, that is the lithium Q, is a known dopant? Do you disagree what the law says on that?

MS. ZHONG: I disagree. I think the Virtek test is right on point. In that case, there were two known detection systems. The reference even said they're interchangeable. And the Federal Circuit reversed the PTAB, because --

JUDGE BAER: So I understand with the case law that Petitioner cites that says this doesn't have to be the best possible combination.

MS. ZHONG: It doesn't have to be the best possible combination, because maybe there is something out-performing lithium quinolate, right? But we have to have a reason why you're changing that system in Diekmann or Suzuki. What is the reason?

JUDGE BAER: But wouldn't that in essence allow unimprovement patents? That is to say, if you have a disclosure of some superior way of doing something and there's another known way of doing that same thing, it's just inferior, that would be non-obvious, and we'd be allowing unimprovement patents for known things, wouldn't we?

MS. ZHONG: I'm not going to argue policy here, but I do think the obvious law is a little out of whack of what's going on in the community, right? Would a person of ordinary skill in the art go and make the changes knowing that you're going to spend the money, spend the resources, and get something that you know that's not going to work better?

JUDGE OBERMANN: But what about all the cases that talk about known interchangeability being enough?

MS. ZHONG: The question here, Your Honor's question is great. There is no known interchangeability.

JUDGE OBERMANN: How do we know? I work in chemical cases a lot, and what we normally look for is a list of suitable alternatives in one of the references. We don't have anything like that here.

MS. ZHONG: Okay. So, first of all, the lithium quinolate doesn't always work. They say, like, we cited the post-2008 paper to show those, but those later papers, 2022, 2023 papers that show that using the lithium quinolate doesn't necessarily increase efficiency, does not necessarily decrease the driving voltage. It goes to show that the benefits they're talking

about that would motivate someone to use lithium quinolate is not necessarily there. So you have to experiment with different systems to see which one is going to work, which one is not. That goes right to expectation of success, as well as motivation. Because if I don't know whether something's going to work or not -- and they're not saying the Ma system, the Diekmann and Suzuki system are the same. They're different.

If I don't know -- like, it may work in some systems but not in the other. That's not a motivation. There has got to be something more than I just try and try. Maybe it's good to try, but obvious to try still requires you to have a finite number of predictable solutions. Here they say, like basically say Werner is open universe as to what kind of dopants they're using. It's an open universe. If it's open universe, I mean, there's not a finite number of solutions and the predictability is not there. So, you can't say a simple like, switching one for the other situation, because you don't have a finite number of predictable solutions.

JUDGE OBERMANN: Okay, that makes sense. Thank you.

JUDGE REPKO: But looking at this, at the alleged motivation, I don't see here, where are they talking about obvious to try? Where are you getting obvious to try?

MS. ZHONG: Well, obvious to try requires you to have finite number of predictable solutions.

JUDGE REPKO: That's not what they're saying, though. This is on the left, on your slide here, that's from the petition.

MS. ZHONG: Yep.

JUDGE REPKO: And what I see there, I don't see anywhere obvious to try. At the top it says one would have been motivated to use it, and then

you highlight a part that says increase current density and reduce driving voltage.

MS. ZHONG: Correct, yes.

JUDGE REPKO: So I mean, what's your basis?

MS. ZHONG: Basis is on the right-hand side, with the lithium quinolate and Bphen, the same material as in Ma. Depends on the system you have, you may not have the driving voltage benefits they're talking about.

JUDGE REPKO: Yeah, so I'm just trying to figure out like what the dispute is here, because it's like, we have a couple different theories. One is like, you have art recognized equivalence and we could just swap them out and they were all recognized to be the same, and we also have some arguments against these increase the benefits to some of these things. So I just want to make sure that we're all arguing the same thing. How do you view the petition? You're arguing against beneficial results and explicit motivation?

MS. ZHONG: No. Let me turn to -- okay. First of all, as Dr. Pattison has testified, that's Slide number 41, Exhibit 1043, testimony on page 135, you could try anything, but the question is why would we try it, right?

JUDGE REPKO: So you're focused on an explicit motivation or some sort of implicit motivation, some benefit? That's what you're arguing against?

MS. ZHONG: Yeah. I'm never saying -- whether we are going to use lithium quinolate or not, it really depends on the state of there being knowledge, right? The state of knowledge for the lithium in the Diekmann and Suzuki situation, the express description of the function of that n-dopant

is as an electron donor, but for Ma, it's not acting as an electron donor. It says expressly it's trying to help as a helping mechanism, it's a different mechanism. So as Dr. Pattison has stated in his deposition, Exhibit 1043, pages 132 to 134, he basically says whether you have a motivation to swap really would depend on the level of how widely the material is known, and if the materials that you are talking is actually operating by the same physical mechanism. That is not really -- I don't think it's truly disputed. So, that's why Dr. Holmes in his reply is trying to retroactively say oh, yeah, yeah, lithium quinolate can act as n-dopant as well. But that is not consistent with what his testimony originally.

So, in his reply declaration, he relied on several references including Liu to conclude that lithium quinolate could act as an electron donor type n-dopant, but then if you look to the left, which was his initial deposition, Exhibit 2019, on page 65 lines 17 to 21, I asked him, is lithium quinolate an electron donor? And his answer is that in the context of Ma, lithium quinolate is mainly serving to improve mobility, and in the context of Liu, which is the same reference he mentioned in the reply declaration, that's really a very different system because it's a neat film of liquid quinolate, rather than n-dopant, into an electron transport material. So, I don't have any further speculation to offer on what lithium quinolate may or may not be doing. So, his original position is that he does not really know the operation mechanism of the lithium quinolate, and in the reply he changes. He says lithium quinolate would act as an electron donor type. That's inconsistent position, especially when we don't have a chance to submit a rebuttal expert declaration.

And another thing I want to point out as to whether -- what is the comparison? Here is a comparison according to Dr. Holmes. The box on the right-hand side, Exhibit 2019, pages 138 to 139, he basically says in Diekmann and in Suzuki the inventor has already decided that they are making a doped device, and so the comparison wouldn't be necessarily to an undoped device, because that decision is already made. The doping is already there. And so here, the question would be is there an expectation of success in using lithium quinolate as the n-dopant as an alternative to whatever n-dopant is already being used.

So, Dr. Holmes is conceding the point, and from a POSITA's perspective, whether you're going to make that switch or not, you're really trying to compare the performance to the existing or other alternatives that Suzuki and Diekmann has already stated. But he really does not have any of those comparisons that's been made. For example, I think If you look at the -- I'm just reproducing the motivation to use lithium quinolate as n-dopant, which is slide, I believe 21 from the Petitioner's deck. They've listed a number of the reasons. Number three, I would say, is the only one that fits the bill under Dr. Holmes' analytical frame work, which is how would it compare to other known n-dopants in Diekmann and Suzuki?

And as far as that concern, there's really no evidence whatsoever. So I asked him how he would compare the lithium fluoride's diffusion constant compared to the lithium quinolate. He basically says I don't know. And that's Slide number 71, Exhibit 2019, page 182. And regarding the relative performance, again, he conceded that he never made a direct comparison of the devices made by the lithium Q-doped devices versus the alternate doped ones. And that's Slide 56, again, Exhibit 2019, on page 140 to 141.

And again, I asked him to compare the diffusion constant of lithium quinolate versus other alternative, and he said in terms of the actual measurement of diffusion, that's not included, basically he made no determination whatsoever. And Slide 73, again, I'm going to discuss this later, immediately after this. In lithium quinolate, the hypothesis of how it works is that lithium quinolate is going to dissociate into lithium, which is a small atom that can diffuse easily. The same with lithium fluoride. So I said, you don't know the percentage of dissociation of lithium fluoride, right? He says he does not know. So in that sense, he really cannot compare how the effective diffusion of lithium quinolate really is compared to lithium, saying that he does not know what the cesium barium loading is. So there's no comparison, apple to apple comparison of using lithium quinolate, which is at pretty high loading if you look at what Ma's system is, versus cesium, as to what would be effective diffusion for that whole thing.

And so I'm showing you Slide 64. So, 64 is to address their alleged motivation that larger molecules supposedly would have a lower diffusion constant. It's probably true for large molecules like constant 2, page 54, which is a common n-dopant study at the time. But for lithium quinolate, what really happens is, lithium quinolate would dissociate. Upon subsequent cathode deposition, lithium quinolate would dissociate, and it would dissociate it into small lithium atoms, and also possible lithium atoms. And lithium is a much smaller atom than cesium, barium, lithium fluoride. So, if the diffusion is a concern, you really need to look at how much of lithium is generated, and what is effective diffusion, because of the dissociation to generate lithium. No analysis whatsoever.

And another point is, lithium quinolate actually -- that's Slide 65, actually has a weaker binding energy than lithium fluoride, which means it tends to generate more lithium than lithium fluoride, even though it has a larger molecular weight. Because it dissociates, so it doesn't really matter what the total weight is. You really need to look at what's the percentage of lithium, the free lithium that's generated, and how fast that one is diffused. There's no analysis whatsoever.

And Dr. Holmes agreed that all I can state on that point is referring back to Liu, which is an exhibit I already mentioned earlier. Liu showed that lithium quinolate can release or can be dissociated upon metal deposition. So that is a point I don't think is in dispute. Lithium quinolate is going to generate free lithium, cation, or atom. And we really need to look at the effective diffusion caused by the lithium, and there is no analysis whatsoever in there. And Exhibit 2032, which is Dr. Holmes, his reply declaration, and he confirmed for Endo, Endo says lithium quinolate is diffused to lithium free metal. So again, lithium quinolate is not necessarily lithium quinolate once you form the OLED device. You really need to look at what's the active species that's in the dopant, and what's the diffusion of that active species, the effective diffusion. No analysis whatsoever.

So, if you look at all the stated reasons for using lithium quinolate, the increased current density and reduced driving voltage, I have showed later studies said this is not a given. Sometimes you get it, sometimes you don't get it. It's trial and error. So, you don't have a finite number of predictable solutions. The same as improving transport conductivity. Large weight molecule, lithium quinolate does not behave by itself. It dissociates into active species of lithium cation and lithium atom. There was no analysis

whatsoever. With that one, the resulting dissociation is going to give you a lower diffusion.

And as to put electron injection and transport properties, Dr. Holmes basically conceded that Ma does not disclose that. That's Slide 36, it is in 2019, on pages 291 and 292. So, I asked him, in Ma, does the addition of lithium quinolate to the Bphen layer help reduce the injection layer? He said, that's a good question, but I don't think it does. So, one of the benefits, alleged benefits of the motivation is trying to have good electron injection transport properties. And he basically says lithium quinolate is not doing that, at least in the Ma case, when it's doped into the electron transport layer. I see that my time is up, and I will reserve the rest of the time for rebuttal.

JUDGE OBERMANN: Sorry, I just have one question.

MS. ZHONG: Sure.

JUDGE OBERMANN: Is it true that you raised new arguments about objective evidence after your response?

MS. ZHONG: What do you mean?

JUDGE OBERMANN: I thought I heard your opposing counsel say that you raised secondary considerations too late?

MS. ZHONG: I think I just had an exchange with Judge Baer, we are not saying secondary indicia. We are saying all those evidence shows the state of the art.

JUDGE OBERMANN: I see, okay. Sorry about that. Okay, Petitioner, you have 23 minutes remaining, is that right?

MR. FRISCH: I believe my calculation is close to 12, Your Honor.

JUDGE OBERMANN: 12?

MR. FRISCH: Between 12 and 13.

JUDGE OBERMANN: Okay. We gave the Patent Owner a little extra time, so if you'd like 23 minutes I can put it on the clock.

MR. FRISCH: Happy to have you put it on the clock, Your Honor, but I'll try to keep it brief. I don't expect I'll need that much time.

JUDGE OBERMANN: Thank you. You know what? I just realized that we did make a mistake. You actually do get 12, because we weren't taking into account the 15 fewer that the other side has to do the LEAP. So, if you don't mind I'll bring it back down. I'll give you 13, because you thought that's what it was.

MR. FRISCH: Thank you, Your Honor. Appreciate it. Just waiting for my slides to come up, and then I'm ready to go. Okay, I'll un-connect and try it again. Well, Your Honors, I'm happy to proceed without the display, if we can't get it to work.

JUDGE OBERMANN: Are you able to see it on your screen? Because we can always pull things up on our screen if you tell us the number of the exhibit, or even if it's in the record we have the record in front of us as well.

MR. FRISCH: Yes, Your Honor, and I'm likely going to stick of the parties' slide, so I'll try to make sure you know which one I'm going to.

JUDGE OBERMANN: Thank you, if you can just tell us what slide you're on, that would be great.

MR. FRISCH: Sure. Thank you, Your Honor. So, I'll just take up where we kind of left off first. If you look at Pictiva's Slide 18, I would submit that there's no real issue as to what is being done here. The first bullet on that slide is objective evidence of non-obviousness in using LIQ in PHOLEDs. I take that to mean objective indicia of non-obviousness and

secondary considerations. In fact, I believe I heard counsel essentially imply that the timeline we were looking at suggests a failure of others, which is a common secondary consideration.

JUDGE REPKO: I mean, I think you could characterize it in that way, but one of the ways that they said is they kind of looked at your obvious to try or perhaps maybe like equivalent alternatives argument and they're trying to make the case that it wasn't all that predictable. These swaps weren't all that predictable. So, how would you respond to that if we kind of think of it that way rather than this objective indicia of obviousness?

MR. FRISCH: Sure, Your Honor. I mean, first I would start with this timeline about it not being predictable. That timeline is based solely on specific pieces of evidence that were put into the record. There was no requirement nor suggestion that either party search the entire history of using LIQ to build a complete timeline. They've put in a couple papers that are in the record and said look, there's a gap from here to here, therefore clearly no one was using it. I don't think that's the case. I think in fact, the Choi reference --

JUDGE REPKO: Well I mean, if your theory is interchangeability, and predictability, it kind of turns on predictability a little bit though, right? Would there be predictable results? And if they're showing a lot of evidence that it maybe is not predictable, and maybe it's unexpected, and maybe it's all of these things, isn't that relevant to your core argument there?

MR. FRISCH: It could be relevant, Your Honor, although I think our case goes well beyond just your obvious to try kind of interchangeability. There's express teaching suggestion motivation coming out of Ma, as well as Diekmann itself in terms of explaining that there's a reduced driving

voltage, explaining that there's increased current density. And I don't think they have shown that there would be a problem using LIQ. In fact, I think I heard counsel get up and say a number of times that these post '425 papers that they rely on, I think the quote was don't necessarily show improvement. I think they were acknowledging that in many cases, they do. I think they also said sometimes you get it, sometimes you don't. again, acknowledging that these papers were showing that there were benefits.

And I think if you look at the particular papers themselves, you'll see that, and don't have them to pull up here, but I can give you the particulars that I'm looking at. If you look at Exhibit 2003, the Kim instance, this is one of the post '425 papers. The abstract, it says when the LIQ is mixed in the ETL, the efficiency and operating voltage of the experimental devices were improved in comparison with the reference devices due to greater electron transport efficiency and improved whole electron balance. Later, 57 to 58 in that same paper, it proves that the LIQ doped in the ETL improves the driving voltage of the device.

Page 56, when the LIQ is doped in Bphen, electrons can be directly injected from the cathode, and leads to more efficient electron injection. And in fact, the key paragraph that we were showing, that was Exhibit 2104, that had a graph that they suggested shows that LIQ didn't have the benefits of Ma. And if you actually look at page 1681 of that particular paper, it says the device within the ETL containing 50% LIQ maintaining the luminance up to 100 degrees C. And on page 1681, it says in addition, the operational lifetime of the device with the ETL containing 50% LIQ was extended by a factor of 67, compared to the reference device with the pristine Bphen ETL. Same thing is true in Exhibit 2024, which is another paper post '425, on

page 7998. In this paper, we verify the significant improvement in device performance to extend the lifetime of existents (phonetic) and the balance of the charged carrier injection and transport an EML by using ETL with LIQ.

JUDGE REPKO: So you're relying upon specific benefits in the prior art as part of your obviousness theory, and that's what we should consider? Not necessarily just interchangeable alternatives, and so the benefits are relevant.

MR. FRISCH: The benefits are relevant. KSR sets out that you have teaching suggestion motivation as well as these other ways to show --

JUDGE REPKO: And that's your theory, the teaching suggestion motivation?

MR. FRISCH: I think that's part of our theory. I think we've also shown that you're applying a known technique from Ma to a known system to gain the same benefit. But that's part of our theory.

JUDGE REPKO: You have two theories to your basis?

MR. FRISCH: Yes, I think there's multiple bases. Which, I don't think the law says that you can't have multiple KSR bases.

JUDGE REPKO: Right, but earlier you told me you don't need to show an improvement. That's what the law says, you don't need to show improvement in -- I get how you're saying that our obviousness theory is that there is an improvement, here are the improvements, and this is what you should think about.

MR. FRISCH: I don't believe you need to show an improvement, but I think showing an improvement can be a basis for motivation.

JUDGE REPKO: Okay.

JUDGE BAER: Maybe there's some ambiguity here when we use the word improvement. When you say there's an improvement, an improvement over what?

MR. FRISCH: Sure. I think the way that this art was working at the time, people are looking at different devices, they're building stacks, like we've talked about. Different layers. You see that even the base references themselves, Diekmann's showing different materials that he used. People in the art are looking at the paper to try to find out how can I improve conductivity? If I improve conductivity, I improve overall emission from the device. I don't think that's in dispute.

What we're essentially saying is, you had Diekmann, you had Suzuki. They're telling you, we've got these OLED devices, they have some examples of dopants that they want to use, they're not limiting to those. They say they have others. You then have a reference over here, that's Ma. This is a standard scientific paper. The title itself says we're working on OLEDs, and we've discovered a new n-type dopant to put in ETL, and we're seeing benefits from it, right? We're getting reduced driving voltage, we're getting improved current. I would submit that that, even by itself, without all the additional things we've talked about, would have been enough to motivate a person of ordinary skill in the art at that time that paper came out, right before the '425 Patent, to look and say well, if I have this stack and it's open to different types of n-type dopants, why don't I look to this one?

And then you go further. Diekmann said high molecular weight, this is a high molecular weight type of dopant, it would be one to try.

JUDGE BAER: I have no further questions on that, thank you.

MR. FRISCH: There were a number of slides put up, I believe it was Pictiva's, or Patent Owner's Slide 34 regarding Liu. I would just point out that I think those slides were actually testimony from Dr. Holmes discussing how something would work in Ma specifically. And obviously, we're not talking at the end of the day about how something works in Ma, we're talking about a combination. What would happen when you take the LIQ and you dope in Diekmann? And it has a particular structure that we've talked about, and the LIQ there would have bought to the cathode. And I think that was the relevant discussion, but that's not what Dr. Holmes was being asked about in that particular set of questions that he was answering. And that's where Liu comes in. Liu is a paper discussing what happens when you have LIQ next to an aluminum cathode that can cause additional electron injection.

Again, there were a number of slides, I believe it was Slides 71 to 72, that Patent Owner put up regarding Dr. Holmes and questions he had to answer about specific diffusion coefficients. I think this again kind of ignores Diekmann's specific teaching. Diekmann was talking in terms of relevant size, atomic molecular weight. That's why he did put those in. now, I'm sure there's reason to believe that that's beneficial, but he was being asked specific questions about actual diffusion coefficients, and hence he had answers sitting there, right there and then. You know, he might not be able to say the specific diffusion coefficient, but the point he was trying to make was with respect to the molecular weight, is that is what is actually called for or specifically called out in Diekmann.

I don't believe Diekmann, with respect to its own dopants like LiF, which also dissociate, specifically tries to talk about the actual diffusion

coefficients of each of those. I don't think Diekmann was looking at it at that level of detail at that time.

Dr. Holmes also explained that the devices in both Diekmann and Suzuki have barrier layers naturally in them. Again, I don't think that's in dispute. He explained how those barrier layers will also help with any disassociation to the extent that you get that. But again, you can expect some disassociation even with the types of dopants that are discussed in Diekmann. And as I talked about earlier, even their expert admitted that he'd expect quenching, which is the problem you tend to get from that diffusion from the particular dopants that Diekmann says are applicable to his own system. And with that, Your Honors, if you don't have any further questions, I believe I'm done with my presentation.

JUDGE OBERMANN: Thank you, Counsel.

MR. FRISCH: Thank you.

JUDGE OBERMANN: I believe you have 12 minutes. Is that what your calculations show?

MS. ZHONG: I think so.

JUDGE OBERMANN: I'll start the clock when you're ready. Again, we do have the slides if you just want to just refer to those. Oh, there you go.

MS. ZHONG: Hopefully this works. I will start with the lack of relevant literature on the use of lithium quinolate in the pre-priority period. Counsel said that that's because you don't have to submit everything. I asked him specifically whether Dr. Holmes -- Dr. Holmes, first of all, I asked him whether it's relevant to find literature where lithium quinolate is used as an n-dopant in the electron transport layer. He said yes. This is

Slide 21, and Exhibit 2032 on page 222. And I said, the more you can find, the more that will support your theory, correct? And he said yes. So I said, the fact is, you searched, and besides Ma, the only one you found is Endo, which is Exhibit 1049, before priority? And he conceded that point. And I said, did you locate other papers? He said none that I'm aware of at the moment. So --

JUDGE BAER: What is the significance of -- I understand your argument to be that there aren't multiple references teaching LIQ. Is that, do I have that right?

MS. ZHONG: My point is, is if it's a fast-moving community, people interested in using lithium quinolate as electron transport layer, as they say, I would expect to see more than two papers before 2008. And a six-year gap after a well-known group published their work on lithium quinolate in a different context, not the claimed PHOLED context. What I'm saying is that you are talking about a nine-year gap before anyone used lithium quinolate in the PHOLED context. You start to ask, is it really that obvious to switch one to the other? If it's so obvious, if there's motivation, there is expectation of success, why nobody else did it?

JUDGE BAER: How is that, when we asked earlier whether you were asserting secondary considerations, I understood you to say no. I'm not going to hold you to that, I want to know your position on that, but how is what you just said different than long felt unmet need? I'm not trying to paint you in a corner here, I just want to make sure that I know how you are characterizing your arguments so that I can, we can view them how you want us to view them. So I'm asking, just asking whether you want us to

view this as a secondary consideration argument, there was a long felt unmet need, or whether you're articulating this argument in some other context?

MS. ZHONG: I don't think it's long felt unmet need. It is more, evidence in there, the state of the art is there. People are not interested in using lithium quinolate, not in the context as claimed, in the PHOLED. There is no evidence anywhere they ever tried to use it before 2008, and the first usage is in 2011, three years in a fast-moving OLED community. That gives you the evidence of the state of the art, what people are doing.

They say Werner provides the motivation itself to use any n-dopant, but that's not really what Werner is really teaching, or that's not their theory. So, in the petition, they cited Werner, noting that Werner has a doped layer 402 with a dopant 410, which acts as an electron donor. They've already defined the nature of the dopant there. So, if they're substituting the dopant 410 with something else, it better be also electron donor. But we have shown that in Ma, the improvement is through the short hopping distance, which has nothing to do with being electron donor, and they don't contend in the context of Ma it acts as electron donor.

JUDGE BAER: Is their electron donor doping, is that in your claim?

MS. ZHONG: Well, this goes to the -- first of all, we believe n-dopant means there's an increase in electron density.

JUDGE BAER: Is there any briefing on this?

MS. ZHONG: Yes.

JUDGE BAER: Was there any briefing on this as a claim construction position that Patent Owner asserted?

MS. ZHONG: It's in our briefing. We disagreed with the position as to what the n-dopant means.

JUDGE BAER: Are you saying Patent Owner asserted a claim construction that n-dopant requires an electron donor? I don't remember seeing it, but I want to make sure I didn't miss it.

MS. ZHONG: We say the word n-dopant, n-doping, implies there's an increasing electron density.

JUDGE BAER: And you submitted that as a matter of claim construction, or somewhere else?

MS. ZHONG: It's in the brief, in the POR.

JUDGE BAER: Okay. I'm just not sure that answers my question. If you don't know the answer --

MS. ZHONG: It's not in a separate claim construction position, the section, but that's our interpretation of the element. And we say the flow of the argument is that it doesn't really matter, because expressly in Werner, the type of n-dopant is electron donor dopant. So you're talking about the change in the mechanism of doping. So, it's not a simple substitution of one to the other. You're talking about change of operating principle.

And I'm also trying to show here on page 40, is two different structures in Ma, versus in Diekmann and Suzuki. So in Ma, all of the performance is obtained with a separate electron injection layer. That's absent in Diekmann and Suzuki in the modified position. So we don't really know how that thing is going to perform in the structure on the left, right? and also, in Ma there is not a separate blocking layer, which they say is needed in order to block all the n-dopant diffusion. So, we don't really know when there is improvement in the driving voltage, conductivity, or any of that when we add a blocking layer in Ma. There is no evidence that's the case.

So, counsel says it's a simple substitution of a well-known dopant to another one, and I'm saying look at the structure. The device structure is completely different. So, a POSITA looking at it is to say, I don't really know whether this will work or not. All we know -- what we do know is that if you add a blocking layer, the conductivity is going to drop. That is in the prior art. And also, on Slides 31 to 33, we have included evidence where Dr. Holmes conceded that Ma does not appear to consider an increase in electron density, which is what electron donor type of dopant 410 that Diekmann and Suzuki are using.

So, what I'm saying here, you are talking about change of operating principle. When you change, switch one electron donor type of dopant to a short hopping distance kind of dopant, there is no showing that there is expectation of success. And this is also not the case as some of the cases you may be thinking of where there's a finite list where the material, the item you're trying to substitute is actually on that list. There is no such list in Werner or Suzuki, and lithium quinolate is not taught anywhere in Werner or Suzuki. So, you're talking about having open ended lists somewhere in the universe to say oh yeah, I'm just going to switch one of those millions of possibilities into Diekmann. But the question is why? You say it's because it's well known, but the prior art shows that it's not well known, because you only have two literature before 2008. Does two reports make it well known? It may be known, but it's not well known.

And regarding the better injection of electrons from cathode into organic layer, which is the motivation, again, that is the only showing from Ma is not an improvement in electron injection. It is showing that you are changing the hopping distance. You may improve the conductivity, but

you're not really helping with the injection of any of those. So, the motivation they have, none of them actually bore out. Or you can say like, none of them, lithium quinolate is going to give you that kind of benefits.

In fact, lithium quinolate, if you talk about injection barrier layer, Slide number 38, Exhibit 2004, this study actually shows that the addition of lithium quinolate is going to increase the barrier height with doping of lithium quinolate, which means it makes the injection of electrons even more difficult. And that can have a bearing on the number of electron densities, whether we don't make electrons or not.

Another thing that I think people did not pay much attention for Kido, but that's things that they only introduced in the reply, is that Kido is actually based on some incorrect energy level for the lithium quinolate being at a high level than Alq_3. The actual energy level, if we look at Slide 40, for the lithium quinolate, all the other reports is putting it below the Alq_3, not above Alq_3, as in Kido.

So Kido's hypothesis as to why lithium quinolate would work, a POSITA probably recognizes it's just incorrect. That also goes to their expectation that whether it's going to work or not, because Kido is relying on the wrong energy level to draw the conclusion as to why it would work and how it would work, and a POSITA would have recognized that's incorrect and maybe that's why there's a six-year gap where nobody was working on lithium quinolate until Ma came along. And Ma's result is that it's not working as electron donor, it's working for the hopping distance. I see that I'm running out of time. I don't know whether Your Honors have additional questions?

JUDGE OBERMANN: It does not appear so. Okay, so counsel, I greatly appreciate your arguments today, and I especially want to congratulate our LEAP practitioners. I know one of them is still here, but it was really a pleasure, especially to see the youngsters, so to speak, argue. And you both did an incredible job, I want you to be really proud of yourselves. I see a great deal of promise, and I'm really impressed with your law firm for giving you such meaty issues to discuss.

So, you did a great job, and thank you so much all counsel for your presentation. It's very helpful, we really appreciate your preparedness, and it really helped us to crystallize the issues. So, I'll ask first, Petitioner's counsel, do you have anything before we close?

MR. WEIDENFELLER: Nothing further from us.

JUDGE OBERMANN: Thank you. Patent Owner?

MS. ZHONG: Nothing.

JUDGE OBERMANN: Okay. Then with that, the proceeding is, we'll end the proceeding now, and the case is submitted, and final written decision will be issued in due course. Thank you so much.

(Whereupon, the above-entitled matter went off the record at 4:50 p.m.)

IPR2024-01093 (Patent 8,723,164)
IPR2024-01094 (Patent 8,558,223)
IPR2024-01095 (Patent 11,828,425)

PETITIONER:

David Garr
Scott Weidenfeller
Alexa Hansen
COVINGTRON & BURLING LLP
dgarr@cov.com
sweidenfeller@cov.com
ahansen@cov.com

PATENT OWNER:

Hong Zhong
Philip Warrick
Jie Gao
IRELL & MANELLA LLP
hzhong@irell.com
pwarrick@irell.com
jgao@irell.com