UNITED STATES
INTERNATIONAL TRADE COMMISSION

In the Matter of:	)	Investigation No.
CERTAIN SEMICONDUCTOR DEVICES	)	337-TA-1366
AND METHODS OF MANUFACTURING	)	
SAME AND PRODUCTIONS	)	
CONTAINING THE SAME	)	
	)	

OPEN SESSIONS

Pages: 741 through 984 (with excerpts)

Place: Washington, D.C.

Date: February 29, 2024

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1 UNITED STATES INTERNATIONAL TRADE COMMISSION
2 Washington, D.C.
3 BEFORE THE HONORABLE CLARK S. CHENEY
4 Chief Administrative Law Judge
5 _____
6 In the Matter of:) Investigation No.
7 CERTAIN SEMICONDUCTOR DEVICES) 337-TA-1366
8 AND METHODS OF MANUFACTURING)
9 SAME AND PRODUCTIONS)
10 CONTAINING THE SAME)
11 _____)
12
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14 International Trade Commission
15 500 E Street, S.W.
16 Washington, D.C.
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18 Thursday, February 29, 2024
19 VOLUME IV
20
21 EVIDENTIARY HEARING
22 The Hearing commenced, pursuant to notice of
23 the Judge in Courtroom A, at 9:02 a.m. Eastern.
24
Reported by: Richard Germosen, FAPR, RDR, CRR
25

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(In session at 9:02 a.m.)

CHIEF JUDGE CHENEY: Good morning, everyone. Please take your seats.

We're on the record now in the 1366 investigation. This is the fourth day of the evidentiary hearing.

Before we proceed to the hearing today, I want the record to reflect that I've received a message from counsel for the Respondents stating that one of their expert witnesses is having a health issue, and I'm happy to hear from the parties about how we're going to deal with that, and if we need to go on the confidential record to preserve health information, let me know if we should do that.

Mr. Lavenue?

MR. LAVENUE: Your Honor, if we could go on confidential record, I can give you an update of the status of the health issue.

CHIEF JUDGE CHENEY: We're now on confidential record.

(Whereupon, the hearing proceeded in confidential session.)

1 O P E N S E S S I O N
2 CHIEF JUDGE CHENEY: Let me make a few notes on
3 the public record. We're back on the public record now.
4 After having discussed how we're going to
5 proceed in this proceeding through the remainder of the
6 evidentiary hearing, the plan is to continue with the
7 presentation of evidence from Respondents with their
8 witnesses Dr. Marcon, Mr. Schoettelkotte, and Dr. Lebby
9 today.
10 May also hear evidence from Dr. Schubert in
11 rebuttal from Complainants today, and all parties agree
12 that Dr. Doolittle will not be called until at least
13 tomorrow morning, and we'll make efforts to have a video
14 link for Dr. Doolittle to testify in the courtroom.
15 Counsel, Mr. Kopsidas, please proceed with your
16 housekeeping matter.
17 MR. KOPSIDAS: Thank you, and good morning,
18 Your Honor.
19 The first matter is, I move for the admission
20 of an agreed-upon list of exhibits that we have conferred
21 with Respondents on, and I can provide that list to the
22 court reporter.
23 CHIEF JUDGE CHENEY: Okay. Hearing no
24 objection, the exhibits will be admitted at this point in
25 the record.

1 Please pass the list of exhibits to the court
2 reporter.
3 MR. KOPSIDAS: Thank you, Your Honor.
4 And the second issue pertains to Dr. Marcon's
5 testimony, which we're about to hear, specifically there
6 are two slides that we are objecting to and unable to come
7 to agreement, specifically RDX10.7 and RDX10.17. A bases
8 for objecting to these slides are three.
9 First, the slides, quote: Information that
10 comes from three technical articles. The technical
11 articles were produced by Respondents very late. In fact,
12 we had Mr. Marcon's deposition on October 26. The close of
13 fact discovery was November 17, and these documents weren't
14 produced until January 5.
15 We know that the information on these two
16 slides comes from three technical articles because the
17 original version of Dr. Marcon's slide cited to those three
18 articles, and when we raised our objection, they agreed to
19 not introduce the articles as evidence. However, the new
20 slides simply cite the same information, without citing the
21 late produced exhibits.
22 So, therefore, we feel it's basically one and
23 the same. It's information that was produced late that
24 Dr. Marcon is going to testify about.
25 The second basis that we have is prejudice.

1 Obviously, we're prejudiced in the sense that we were not
2 able to depose Dr. Marcon, but more importantly, Dr. Marcon
3 was put up as a corporate witness on sales and marketing
4 topics, and although he does have a technical background,
5 when we attempted to explore the depth of that technical
6 background with him at his deposition, he testified, quote:
7 Question: So if I were to ask you some technical questions
8 on this article, would you be able to answer those
9 questions, and this is in relation to a different article
10 that was timely produced that was authored by Dr. Marcon.
11 And his answer was: So in my personal
12 capacity, I'd have to say that I left the technical team
13 too -- too many years ago. I wouldn't be able to answer a
14 question about this article, especially without even
15 reviewing, but even if I would read it, it's too many years
16 and I am not an expert on this.
17 So having attempted to explore the depth of
18 Dr. Marcon's technical knowledge, he declined to answer any
19 technical questions, and, therefore, we were essentially of
20 the -- drew the conclusion that he would not be providing
21 technical testimony.
22 Having seen his slides today, they are
23 extensive in technical testimony, which brings me to my
24 third basis, which is that this is improper expert -- this
25 is improper expert testimony from a lay witness under

1 Federal Rules of Evidence 701 and 701.
2 Obviously, no expert report was produced for
3 Dr. Marcon. He disavowed technical knowledge in his
4 deposition, and just to give Your Honor a little bit of
5 background, we think we know why this is occurring,
6 Dr. Doolittle's report contains a scant few paragraphs on
7 the issue of Schottkys, yet Respondent's prehearing brief
8 goes on for 30 pages about Schottkys as a noninfringement
9 defense, and we believe that this is a backdoor attempt to
10 fill those cites with improper expert testimony from
11 Dr. Marcon.
12 CHIEF JUDGE CHENEY: Let me hear from the other
13 side before I pose these questions to you.
14 Who will address this for Respondents?
15 MR. LONG: Thank you, Your Honor. Preston Long
16 for the Respondents.
17 CHIEF JUDGE CHENEY: Good morning, Mr. Long.
18 MR. LONG: Good morning.
19 So I think I'll just explain a little
20 background here. I think there are a few details we would
21 obviously like to highlight that our friends on the other
22 side did not.
23 The papers at issue, the three papers we agreed
24 to remove, were papers in which Dr. Marcon was deeply
25 involved when he was a scientist at IMEC. As you heard,

IMEC licensed its technology to Innoscience, and so Dr. Marcon knows about what IMEC did from his early career. It was very important to him and it kind of set his career track.

The paper that Complainants raised is a paper that was much, much later that was a joint publication between IMEC and Innoscience, with which his name was put on, but he did not have any direct knowledge about the actual experiments and research involved. That's why he was unable to answer questions about that particular article. They also presented it to him without -- excuse me, without having let him read it and have a chance to consider it.

The testimony that Dr. Marcon is going to provide today is personal knowledge that he has from his time when he was actually doing experiments and his memory of them. I heard the first issue they raised was that the slides at issue -- I believe they said it quotes information from the technical articles. It does not quote it. It summarizes at a very high level and general ranges from what he remembers from his time at IMEC and what those properties are.

So just as Dr. Lidow was able to present his story about how EPC developed the technology, Dr. Marcon is able to testify as to how IMEC developed its technology.

He was noticed as a fact witness. Complainants had an opportunity to explore that. I believe they said that he was presented as a 30(b)(6) on financial topics. Technically, he was presented as the witness on any agreements that Innoscience had with others, and in particular, he was able to testify about the IMEC agreement. He, in fact, was the person who facilitated that arrangement and got the two together.

The reason he is still at Innoscience is because, in fact, he wanted to stay with the technology. When IMEC was ready to move on to newer and bigger things, he wanted to stay in this technology, in this relationship that was facilitated.

As far as prejudice, again, they did have the opportunity to depose him. They're going to have the opportunity to cross-examine him today. We would obviously prefer to have the three corroborating articles in evidence. They are not. Complainants can cross-examine him on his memory or lack thereof and solicit what his personal knowledge is, as opposed to what the papers are.

And as far as improper expert, I believe, again, we're hearing from a Ph.D. scientist who was at IMEC for 15 years and helped essentially establish the technology that IMEC developed in this field. He's not going to be providing expert testimony about what

1 Innoscience does, merely recounting what IMEC did to
2 develop this technology.
3 CHIEF JUDGE CHENEY: I just have a question
4 about the topics for which Dr. Marcon was noticed to be the
5 corporate representative. Can you review with me what
6 those topics were?
7 No, counsel for Respondent. You're the one who
8 put him up. What topics did you put him up for?
9 MR. LONG: He was noticed both for his personal
10 and corporate knowledge. It was topics 12 and 13, I
11 recall.
12 CHIEF JUDGE CHENEY: Loosely your memory --
13 MR. LONG: It was any agreements that IMEC had,
14 I believe, that might affect remedy and bond.
15 CHIEF JUDGE CHENEY: Okay. And then he was
16 also deposed in his personal capacity about his knowledge
17 of the technical aspects of the work or of the technology
18 that was licensed from IMEC, is that right?
19 MR. LONG: The only question based on my memory
20 of the transcript that he was asked was about a paper that
21 was, I believe, sent with a notice letter to Innoscience
22 before the lawsuit. It was a joint publication between
23 IMEC and Innoscience, after which he was essentially --
24 like I said, he facilitated that relationship. He did not
25 do the work. He had not reviewed the papers. So what they

1 were trying to ask was about that paper in particular, and
2 he, again, was not involved with that particular paper.
3 The technology he's going to talk about is, for
4 example, his personal knowledge of what his graduate
5 student did when he was at IMEC and what he did when he was
6 at IMEC doing his research.
7 CHIEF JUDGE CHENEY: And the paper that you're
8 talking about had Dr. Marcon's name on it as an author?
9 MR. LONG: He was one of the final authors.
10 CHIEF JUDGE CHENEY: So that's a yes?
11 MR. LONG: Yes, yes. I think he is one of six
12 authors.
13 CHIEF JUDGE CHENEY: And when he was confronted
14 with this at his deposition, he didn't have a memory of it?
15 MR. LONG: I believe he said he hadn't had a
16 chance to review it, and I think he said he didn't know any
17 of the details about it.
18 CHIEF JUDGE CHENEY: Okay.
19 MR. LONG: I don't know that they followed up
20 with any particular questions to flush out what he did and
21 didn't remember in particular.
22 CHIEF JUDGE CHENEY: Okay. But that was the
23 only line of technical questioning that came up in his
24 deposition?
25 MR. LONG: That's the only one I recall. I'm

sure if Complainants recall differently, they may identify something else.

CHIEF JUDGE CHENEY: Okay. I'll get to you shortly, Mr. Winston.

Mr. Kopsidas, anything else to add about what happened at the deposition?

MR. KOPSIDAS: Yes, Your Honor. First of all, I would just note that we have confirmation now from Respondents that the information in the slides is from the late produced articles. The topics 12 and 13, if you would like me to read those, are -- topic 12: All intellectual property you own or license that you may rely on for bond purposes that you contend covers any aspect of the accused products you purchase, sell, or -- sell, offer to sell, or market.

And topic 13 is: Any agreements you may rely on for bond purposes concerning intellectual property related to your GaN-based semiconductor transistor products.

I will also note that the time to solicit this testimony, as Respondents say, is not at the trial for the first time. It's at the deposition. And his response was: It's been too many years and I'm not an expert on this, and he was not talking specifically about that one paper. He was talking about the technology, and we did question him

about IMEC, which, by the way, IMEC technology is not even in this case, but we did attempt to question him about the technology that he worked on at IMEC, and he claimed that that was too long ago and he refused to give any technical testimony on that either.

We've had no notice of what we believe is the Schottky dissertation that we're going to hear from him today prior to their prehearing brief. It's not in their contentions. It's not in their expert's report.

CHIEF JUDGE CHENEY: Okay.

MR. LONG: If I may address that point, because I think this is -- the bigger picture here is, the word "Schottky" appears I think upwards of 90 times in Dr. Doolittle's deposition. He did discuss Schottky and work function. He specifically pointed out that the Innoscience products had a Schottky gate. The idea that there was no notice of this or no testimony from us is just simply not true. There was plenty of notice about it. There were papers, discussions of theory, and experiment about it.

I understand that they may not like the opinions that they're hearing about it, but even Dr. Schubert, if I recall, was asked whether Dr. Doolittle had provided this testimony, and at his deposition Dr. Schubert affirmatively responded that, yes, he did

1 understand that to be the position from Dr. Doolittle. So
2 I think the idea that there was no notice of this Schottky
3 argument is not true.
4 And as for the type of information we're
5 talking about here on the slides, I mean, you know, did
6 IMEC use a Schottky contact? That's the basis for the
7 entire technology. It's been published in many dozens of
8 publications publicly. It was a big deal, and that's what
9 made their technology work. It's not something that
10 Dr. Marcon would forget. He was not asked about this. He
11 was asked specifically about one paper. I don't believe
12 that he was asked about IMEC's technology in general.
13 CHIEF JUDGE CHENEY: Okay. I didn't live
14 through the deposition, but you've said two things about it
15 that from my perspective today sound to be in conflict.
16 You said he was not asked about -- I asked you
17 what technology he was asked about during his deposition.
18 You said he was confronted with this one paper, you weren't
19 aware of any other questions. Now, you say, Well, we said
20 Schottky 90 times --
21 MR. LONG: Not Dr. Marcon. I'm sorry,
22 Dr. Doolittle, if it was unclear.
23 CHIEF JUDGE CHENEY: I'm sorry.
24 MR. LONG: They're claiming that they had no
25 notice of this theory through the expert's opinion and that

is simply not true.

CHIEF JUDGE CHENEY: I see.

So Mr. Or Dr. Marcon didn't talk about Schottky 90 times. Dr. Doolittle talked about Schottky 90 times?

MR. LONG: Yeah, he was not asked about Schottky because it was the Complainants asking and they only asked about one particular paper.

CHIEF JUDGE CHENEY: Okay. Thanks. Let's hear from the Staff.

MR. WINSTON: Thank you, Your Honor.

The two slides that Complainants object to regarding Dr. Doolittle's testimony -- I mean, Dr. Marcon's testimony have to do with three documents that were withdrawn. Those three documents were produced to Complainant on January 2, I believe, which was well after the November 17 cutoff for fact discovery.

Those documents were -- because of a technical error, the Staff was -- the documents were produced to the Staff with those same Bates numbers, but they were different documents. So the Staff didn't actually get a copy of that production until yesterday. However, the Staff did have the exhibits when the exhibits were served.

The issue of whether Schottky -- or the Schottky theory doesn't show up in Respondent's contentions at all. The word "Schottky" does not show up in

1 Respondent's noninfringement contentions, and it didn't --
2 the topic didn't come up until after the close of fact
3 discovery.
4 And so the Staff also objected to the documents
5 that have been withdrawn, and the Staff does not believe
6 it's appropriate for Mr. Marcon to be talking about those
7 documents or subject matter thereof because there was no
8 notice given.
9 And Dr. Marcon was also put up for more of a
10 sales and marketing role and not -- we didn't have adequate
11 notice that he would be offered for technical issues. So
12 I -- while I think some latitude may be given for him to
13 talk about his background and his knowledge, I don't think
14 it's appropriate for him to be delving into technical
15 issues that relate to infringement validity.
16 CHIEF JUDGE CHENEY: Okay. If I understand the
17 Staff's position correctly, there are at least two issues.
18 There is the issue of these three documents, which I think
19 we all agree are not coming into the record because they're
20 not being offered?
21 MR. WINSTON: That's correct, Your Honor, but
22 then there is the subject matter of the two slides that are
23 a summary of those documents.
24 CHIEF JUDGE CHENEY: Okay. And so that's the
25 second issue is, should we allow any testimony at all from

this witness as to what is, I guess, now being called the Schottky defense, and Staff's position is we should not let this witness testify about that topic at all?

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

CHIEF JUDGE CHENEY: Okay. From the Staff's perspective, could this witness be questioned about the document that he was confronted with at his deposition?

MR. WINSTON: Yes, Your Honor.

CHIEF JUDGE CHENEY: Okay. So would the Staff support a rule that says you can ask Dr. Marcon anything about what he was asked about at his deposition, but you can't go beyond that?

MR. WINSTON: I think that would be appropriate, Your Honor. To the extent that -- in addition, if -- if Respondents wish to ask him questions on the topics that he was noticed for, regardless of whether those topics were addressed at the deposition, the Staff would have no objection to that testimony.

CHIEF JUDGE CHENEY: Okay. Let me hear a response on this proposal.

MR. LONG: Yes. So the particular agreement we're talking about that Dr. Marcon will talk about and was asked about at his deposition is the technology transfer agreement between IMEC and Innoscience. Including not only what was transferred, but how that process occurred, as

1 well as what the technology was. The foundation of the
2 technology is that it worked with the Schottky contact, and
3 we've heard from the experts there is no disagreement that
4 a Schottky contact only works on a conductive material. We
5 have always argued that our material is conductive. There
6 has been plenty of and ample notice of that, and this is
7 simply showing why, and there is no disagreement, again,
8 between the experts about this.
9 So the simple fact of did you use a Schottky
10 contact or not and how do you know that is basic, and not
11 only that, it was foundational to the research Dr. Marcon
12 did. It's foundational to the research that matured into
13 what was licensed on Innoscience.
14 CHIEF JUDGE CHENEY: Okay. Was Dr. Marcon
15 asked at his deposition about what technology was
16 transferred, Mr. Long?
17 MR. LONG: He was asked about the agreements.
18 CHIEF JUDGE CHENEY: Was he asked what
19 technology was transferred?
20 MR. LONG: I do not recall standing here today.
21 CHIEF JUDGE CHENEY: Okay. So that also means
22 you don't recall him saying at his deposition that this
23 technology that was transferred was particularly relevant
24 to a Schottky interface?
25 MR. LONG: I believe the agreement itself

states what the technology is.

CHIEF JUDGE CHENEY: And I assume that you agree with me that that agreement does not talk about a Schottky interface. It talks about things that are more general terms?

MR. LONG: The word "Schottky" does appear in the agreement multiple times.

CHIEF JUDGE CHENEY: It does?

MR. LONG: It does.

CHIEF JUDGE CHENEY: Okay. And that agreement was the subject of the deposition?

MR. LONG: Correct.

CHIEF JUDGE CHENEY: Mr. Zeineddin wishes to be heard.

MR. ZEINEDDIN: Yes, Your Honor, just because this is in the -- in the substance, the details. So here is the thing: As Staff mentioned, the specific slides have a lot of information with specific numbers that came from the articles. We didn't get these until well after his depositions, well after expert reports, well after expert discovery is concluded.

CHIEF JUDGE CHENEY: Totally clear in my mind. Absolutely clear in my mind.

MR. ZEINEDDIN: What they're trying to insinuate here is that we have a research and development

1 place, I guess IMEC, let's call it that, that's I think
2 that -- what -- what -- what's in their record from the
3 chairman of Innoscience, the research and development, and
4 they've licensed their technology, patents, and so forth in
5 know-how. And just because somebody licenses somebody
6 else's technology doesn't mean that the actual product only
7 in restrict -- restricted to that technology and nothing
8 else. They presented no evidence as to that technology.
9 The accused devices are the accused devices that
10 Innoscience makes. They've said nothing about whether one
11 thing came from their device or from their technology and
12 know-how, and it was changed by Innoscience. There is none
13 of that chain of evidence.
14 Not only that, their expert didn't have it. We
15 didn't have it. Nobody has tested any of this, and nobody
16 opined on whether or not the IMEC technology infringes or
17 not infringes. Nobody has opined on whether the entirety
18 of IMEC technology is actually incorporated in the
19 Innoscience product. Just because somebody has licensed
20 something doesn't mean that they use it and use nothing
21 else.
22 We've seen, and we've seen even arguments from
23 their experts in their cross, that you can take this thing
24 and exchange one thing about it, just change the doping,
25 and according to their contention, it changes it. We have

1 testimony on that as well. And now they're trying to say,
2 What's really accused here, don't look at these devices.
3 Let's look at this IMEC technology. That's one thing.
4 And they know this. These gentlemens are
5 well-steeped in patent law and patent licensing, just like
6 we are, just like everybody here. Just because you license
7 the technology doesn't make the accused device of that
8 technology restricted to it. Number one.
9 Number two, this gentlemen was asked about his
10 dissertation, which has Schottky in it. And it is in
11 evidence, we'll rely on it because it had tunneling, and
12 guess what, Your Honor? We are showing him his
13 dissertation, Your Honor, which was only about, what, 10
14 years before his deposition?
15 And what this gentleman said, I'm in marketing,
16 and we have to show him one figure after another, and I
17 know this is not in evidence, I'm telling you, where it
18 says there is tunneling between a GaN and AlGaN and 2DEG,
19 and he's like, I don't know any of this stuff.
20 We showed him there are three ways of
21 tunneling, and he said, I don't know any of this stuff, and
22 then he says, Your Honor, and we'll give you the cite if
23 you'd like. Then he says: I have no reason -- after asked
24 a couple of times: I have no reason to believe that my
25 dissertation was incorrect.

If they wanted to talk about Schottky, they should have given us these three papers long before. Maybe they figured out that their own expert couldn't attest to it and that is what is happening in life. We're prejudiced.

MR. LONG: If I may --

CHIEF JUDGE CHENEY: Let's just all take a deep breath.

I'll let you know when I'm ready to hear you speak some more.

Okay. Mr. Winston, you have something to add?

MR. WINSTON: Your Honor, I just also want to add that the word "Schottky" does not show up in Dr. Marcon's transcript. It was not mentioned at his deposition in any way, shape, or form.

CHIEF JUDGE CHENEY: Okay. Mr. Long, you had something you wanted to add?

MR. LONG: What I heard was a lot of argument about the merits. We are not arguing because IMEC used Schottky, Innoscience necessarily uses it. It is obviously circumstantial evidence that is relevant, and to the point that Dr. Doolittle was unable to establish it, I mean, from Dr. Doolittle's transcript, he was asked whether Innoscience's gate contact is another contact, and he said: As far as we can see from the testing, the electrical

1 testing, it has a significant Schottky character to it. It
2 has a significant curvature that would indicate Schottky
3 contact.
4 So the idea that the actual Innoscience
5 products, that there is no evidence of it, we just want to
6 rely on IMEC, is not true. What we're pointing out is that
7 IMEC developed the technology based on this fundamental
8 principle, and that, in fact, we do have testing to confirm
9 that that is, in fact, practiced.
10 We're not going to stand here and say, Well,
11 Dr. Marcon is going to tell you what Innoscience does. He
12 doesn't know what Innoscience does. He isn't the
13 businessman. He does know what IMEC did and what was
14 transferred to Innoscience, and that's an important part of
15 the story.
16 Your Honor is, of course, more than capable,
17 and I know Complainants are more than capable in their
18 brief to point out all of these issues, but to try to
19 preclude the evidence from coming in about what IMEC did, I
20 think is going to be prejudicial to the Respondents, just
21 as it would be if you had prevented Dr. Lidow from
22 testifying over my colleague's objection about his
23 knowledge of EPC's technology and how it evolved.
24 MR. ZEINEDDIN: May I respond, Your Honor?
25 CHIEF JUDGE CHENEY: If you think it's going to

1 help me rule.
2 MR. ZEINEDDIN: Absolutely, Your Honor.
3 Unlike -- we just -- they just admitted that
4 it's circumstantial evidence at best, and nobody opined on
5 it, but here is the thing, this is what this means, very
6 clear: Unlike Dr. Lidow and Dr. Beach, who are fact
7 witnesses to something that's germane in this case,
8 literally the invention, Dr. Marcon cannot attest as a fact
9 witness to the invention. He's not a fact witness to the
10 invention. He's not a fact witness to how the domestic
11 industry products are made.
12 Now, we've heard it from opposing counsel, and
13 I accept the representation, he cannot be a fact witness as
14 to the accused products or Innoscience's products, and the
15 last thing that leaves him is that he's not a fact witness
16 as to any prior art that he alleges -- none of these things
17 is prior art. Not prior use, not prior publication, not
18 prior sale.
19 So as far as I know, there is nothing in here
20 that he can be a fact witness on, except one thing: Do
21 they import the stuff? Do they sell the stuff? Do they
22 market the stuff? The scope of a remedy.
23 So now what they want to do is take that fact
24 witness, who was designated, as you heard from
25 Mr. Kopsidas, through the topics on these kind of issues,

and the fact that the license goes to, You don't want to take a license to our stuff, you take a license to somebody else, and now they want to turn him into, as you've heard, an expert. This is not fact testimony that's germane or can even be germane, especially after the representation we just heard from them now. He knows nothing about the Innoscience products.

CHIEF JUDGE CHENEY: Has everyone said everything they want to say on this issue?

MR. LONG: I get the sense that Your Honor has enough information to rule, so no.

CHIEF JUDGE CHENEY: I think so.

We're going to take a five-minute recess. Please stay in your places.

We're off the record.

(Whereupon, the hearing resumed in open session.)

1 O P E N S E S S I O N
2
3 (A recess was taken at 9:49 a.m., after which
4 the proceedings resumes at 9:53 a.m.)
5 CHIEF JUDGE CHENEY: Please be seated.
6 We're on the public record now after having
7 taken a brief recess while I considered the motion from
8 Complainants concerning limitations on the testimony of
9 Dr. Denis Marcon, a witness being offered by the
10 Respondents -- a fact witness being offered by the
11 Respondents, both in his personal knowledge capacity and as
12 a corporate representative.
13 The objection was twofold. There was an
14 objection to the potential admission of exhibits that were
15 untimely produced, and I've heard a representation from
16 Respondents that those three exhibits that were untimely
17 produced are not going to be offered into evidence, and so
18 any objection on that basis is moot.
19 And then there is the question of what
20 Dr. Marcon should be able to testify about in the scope of
21 his personal knowledge. Seems like from the
22 representations that have been made concerning the topics
23 that Dr. Marcon was designated on, those topics don't seem
24 to concern the dispute the Complainant has raised, and that
25 I think Staff also fairly shares if I were to characterize

1 the Staff's position.
2 Here is what we're going to do with
3 Dr. Marcon's testimony: Dr. Marcon can be asked what is
4 within his personal knowledge about any topic that anyone
5 wants to ask him about.
6 What I will not allow is for Dr. Marcon's
7 testimony to be coached by a PowerPoint slide. If we're
8 going to talk to him about his personal knowledge, then
9 let's see what his personal knowledge is.
10 This is not a ruling on whether any kind of a
11 theory or defense has been preserved. So I would expect
12 that the Staff and Complainants will argue in their
13 post-hearing brief about whether there has been any kind of
14 a defense preserved that this testimony will be relevant
15 to.
16 Any questions about the scope of my ruling?
17 MR. ZEINEDDIN: Yes, Your Honor. So that means
18 the slides that has those informations and numbers that
19 were extracted from these three papers that were produced
20 in January after his deposition and discovery experts,
21 cannot be presented to him, is that correct?
22 CHIEF JUDGE CHENEY: No slides can be used to
23 coach the witness' testimony.
24 MR. ZEINEDDIN: Wonderful. Thank you, Your
25 Honor.

MR. LONG: To make it clear, we will not use slides seven and 17, but again, they were very high level summaries, orders of magnitude numbers, right, not specifics. I think we will not use the slides. I expect there may be an objection to some of his testimony if he testifies to his recollection about orders of magnitude, you know, what was the gate leakage, for example, that's the only thing I'm unclear about. Maybe we can just deal with it as it comes up.

CHIEF JUDGE CHENEY: What are you unclear about? Whether there is going to be an objection? I don't expect you to be able to predict whether there's going to be an objection.

MR. LONG: It sounds like we'll just handle that if and when it comes up.

CHIEF JUDGE CHENEY: Okay. So if you ask a question about his personal knowledge and he gives an answer and there is an objection that it's somehow beyond the scope of a theory or defense that's been preserved, I imagine I'm going to rule just like I did right now, and the objection I suppose would only be to preserve the objection for consideration in the post-hearing briefs.

Does that help you, Mr. Long?

MR. LONG: I think so.

CHIEF JUDGE CHENEY: Okay. We'll see what

1 happens.
2 Anyone else have a question?
3 MR. ZEINEDDIN: No, Your Honor. Thank you.
4 MR. WINSTON: No question from the Staff, Your
5 Honor.
6 CHIEF JUDGE CHENEY: Okay. Are we ready to
7 call Dr. Marcon?
8 MR. LONG: We are, Your Honor.
9 CHIEF JUDGE CHENEY: I assume Dr. Marcon has
10 heard none of this, is that right?
11 Respondents?
12 MR. LONG: He's out there.
13 CHIEF JUDGE CHENEY: Okay.
14 Dr. Marcon, welcome to the hearing room.
15 Please come to the witness well. Remain standing until
16 I've administered the oath.
17 I want to make sure I understand what's in the
18 binder that's just been set on Dr. Marcon's desk. Is the
19 binder that's been set down consistent with my previous
20 ruling?
21 MR. LONG: I believe -- if the question is does
22 it contain the -- oh. We'll take out the slides, yeah.
23 CHIEF JUDGE CHENEY: So my ruling is that -- I
24 don't want to say it again in the presence of the witness,
25 but do not violate my ruling.

MR. LONG: Understood.

CHIEF JUDGE CHENEY: Okay. Dr. Marcon, please raise your right hand.

Do you solemnly swear or affirm that the testimony you're about to give be the truth, the whole truth, and nothing but the truth under penalty of perjury?

THE WITNESS: Yes, I will.

CHIEF JUDGE CHENEY: Thank you.

Please be seated.

THE WITNESS: Thank you.

CHIEF JUDGE CHENEY: Please proceed with your examination.

D E N I S M A R C O N,

Having been first duly sworn or affirmed on his oath, was thereafter examined and testified as follows:

DIRECT EXAMINATION

BY MR. LONG:

Q. Welcome, Dr. Marcon.

Just for the record, could you please state your name?

CHIEF JUDGE CHENEY: Let's go off the record for a moment, sir.

(Whereupon, a discussion is held off the record.)

1 CHIEF JUDGE CHENEY: We're now back on the
2 record after having taken a moment to adjust the audio.
3 Please continue, counsel.
4 BY MR. LONG:
5 Q. For the record, could you please tell us your
6 name.
7 A. Yes. I'm Dr. Denis Marcon.
8 Q. And where do you work?
9 A. I work at Innoscience Europe.
10 Q. What is Innoscience Europe?
11 A. Innoscience Europe is a subsidiary of
12 Innoscience America, which is a subsidies of the
13 Innoscience parent company.
14 (Stenographer clarification.)
15 A. Parent company.
16 THE WITNESS: Sorry, I'm not American.
17 Q. And what is your role as general manager at
18 Innoscience Europe? What are your roles and duties?
19 A. So I'm the general manager and I take care of
20 primarily of sales and marketing.
21 Q. Have you always been a businessman?
22 A. Not really. My previous life I was a
23 scientist.
24 Q. Okay. Why did you join Innoscience Europe?
25 A. I joined Innoscience Europe because I believe

in Innoscience. For that time I wanted to be part of it, and if I would have continued with my previous, let's say, job, I would best stick to technology, whereas, with Innoscience, I had opportunity to have product, the side and product that we can carry around with us. That what excited me.

CERTIFIED STENOGRAPHER: I didn't get that. I'm sorry.

THE WITNESS: Sorry.

CERTIFIED STENOGRAPHER: Judge, how do you want me to handle this if I can't understand?

CHIEF JUDGE CHENEY: Just -- you're doing great.

(Stenographer clarification.)

CHIEF JUDGE CHENEY: So the last thing I heard from you, Dr. Marcon: I had an opportunity to -- I didn't hear the last part of that.

At Innoscience I had the opportunity to do what?

THE WITNESS: So with Innoscience, I had the opportunity to send product into the market and see them -- is it okay?

CHIEF JUDGE CHENEY: To sell product into the market?

THE WITNESS: To sell, yeah, products into the

1 market, find finished product, because in my previous job,
2 we were, I would say, providing technologies to company and
3 not really end product, and within Innoscience, I could
4 have end product, really end product enter into final goods
5 that we use every day.
6 (Stenographer clarification.)
7 A. Final things that we use every day.
8 CHIEF JUDGE CHENEY: Final goods?
9 THE WITNESS: Sorry for my accent.
10 CHIEF JUDGE CHENEY: You're doing great.
11 Please continue, Mr. Long.
12 MR. LONG: Thank you, Your Honor.
13 BY MR. LONG:
14 Q. When did you join Innoscience Europe?
15 A. In 2021.
16 Q. And prior to working at Innoscience Europe, you
17 just mentioned your previous role. What was that?
18 A. I was working at IMEC.
19 Q. And for the record, could you spell that?
20 A. Sure. IMEC is I-M-E-C.
21 Q. And what is IMEC?
22 A. So IMEC stands for Interuniversity
23 Microelectronics Center. And it is an institute located in
24 Belgium, and it collaborated with university and
25 semiconductor companies to develop new technologies.

Q. How long were you at IMEC?
A. Around 15 years.
Q. From roughly when to when; do you remember?
A. From 2006 to 2021 I did my Ph.D. at IMEC after.
Q. Okay. And what did you specialize in when you were at IMEC?
A. I specialize on GaN-based power devices.
Q. And if you'd just speak slowly.
A. Yes, I'm trying my best to speak slowly. Thank you.
Q. And what was the subject of your Ph.D.?
A. It was reliability of GaN-based power devices.
Q. How did you first become aware of Innoscience?
A. When I was at IMEC, I also became part of the business team, and I facilitated the partnership between IMEC and Innoscience.
MR. LONG: If we could go on the confidential record, I'll try to keep as much of this on the public record, but this would be the Innoscience confidential record.
(Whereupon, the hearing proceeded in confidential session.)

1 O P E N S E S S I O N
2
3 CHIEF JUDGE CHENEY: We're back on the public
4 record.
5 BY MR. LONG:
6 Q. Dr. Marcon, have you authored any papers in the
7 technical literature about IMEC GaN technology?
8 A. Yes, I did.
9 Q. About how many?
10 A. I think I track lately I got more than 50
11 papers.
12 Q. At a high level, what do those papers describe?
13 A. They describe a specs of IMEC GaN-on-Silicon
14 technology, and including also IMEC 8-inch GaN-on-Silicon
15 p-GaN HEMT technology.
16 (Stenographer clarification.)
17 THE WITNESS: GaN-on-Silicon?
18 CHIEF JUDGE CHENEY: How do you spell GaNo?
19 How do you spell GaNo?
20 THE WITNESS: GaN, G-A-N. Is like --
21 CHIEF JUDGE CHENEY: I'm misunderstanding:
22 Including IMEC 8-inch GaN silicon?
23 THE WITNESS: Oh, yeah, GaN-on-Silicon is
24 G-A-N --
25 CHIEF JUDGE CHENEY: GaN-on-Silicon?

THE WITNESS: -- on-Silicon.

CHIEF JUDGE CHENEY: Thank you.

THE WITNESS: Yes, p-GaN HEMT technology.

CHIEF JUDGE CHENEY: Please continue, counsel.

MR. LONG: Thank you.

BY MR. LONG:

Q. Do you remember the first paper you wrote about IMEC's 8-inch GaN-on-Silicon HEMT technology?

A. Yes, I do.

Q. And at a high level, what did that paper describe?

A. It describes what we achieve at IMEC on our 8-inch GaN-o-Silicon p-GaN HEMP technology with a Schottky gate to be able to achieve very low gate leakage current. That was the, I say, the breakthrough described in that paper.

Is it okay?

Q. Do you remember -- again, orders of magnitude, do you remember roughly how long the gate leakage was?

A. Yeah, that was the first publication we had, and it was below the nanoampere millimeter range. I think around 10 to the minus 11 ampere millimeter.

Q. Did that number always stay so low?

A. No. So actually, we have then optimized the technologies through the year, so we have relaxed a little

1 bit the leakage specification. I think all of the amp with
2 each microampere millimeter, which is 10 to the minus 10
3 ampere millimeter, which is still very, very low gate
4 leakage characteristic, and this was in favor of having
5 better device performance in time of all resistance.
6 Q. Okay.
7 A. It's getting better.
8 CHIEF JUDGE CHENEY: We'll let you know, sir,
9 if --
10 THE WITNESS: Thank you.
11 CHIEF JUDGE CHENEY: -- there is a problem.
12 Please continue, Mr. Long.
13 BY MR. LONG:
14 Q. How was IMEC able to achieve such low gate
15 leakage?
16 A. Yeah, that was the -- what we have introduced
17 by using a Schottky gate contact.
18 Q. What is a Schottky contact?
19 A. Schottky contact is a rectifying contact
20 between a metal and semiconductor that has a diode
21 behavior.
22 Q. What type of metal did IMEC use to make that
23 contact?
24 A. We use a titanium nitride, T-I-N.
25 (Stenographer clarification.)

A. T-I-N, let's put it small, simple.

CHIEF JUDGE CHENEY: And the T is for titanium?

THE WITNESS: Excuse me?

CHIEF JUDGE CHENEY: The T is for titanium?

THE WITNESS: Titanium nitride, correct. Thank you, Your Honor.

BY MR. LONG:

Q. When you said that a Schottky contact behaves like a diode, what do you mean?

A. I mean, that above a certain threshold voltage, it conducts current, and below such a threshold voltage, it doesn't. It blocks the current until it breaks.

Q. Okay. Does the fact that a Schottky contact behaves like a diode tell you anything about whether the p-GaN layer is conductive or not conductive?

A. Yeah, it does, because a volt is a threshold voltage since it stop conductive current. The GaN semiconductor material below it is necessarily conductive.

Q. Do you recall whether or not IMEC's p-GaN layer was conductive?

A. Yes, it was conductive.

Q. How do you know?

A. We have measured it by means of a Hall measurement at the beginning during the development phase. So we really measure the Hall concentration that contribute

to the conductivity of the p-GaN, and then in a second stage, my Ph.D. student developed a metal to method to extract the amount of magnesium activation from simple CV measurement based on a back-to-back diode theory that he has developed.

Q. Did anyone else in the field start to do those types of CV measurements to evaluate conductivity?

A. Yeah, I think companies like --

CHIEF JUDGE CHENEY: Sir, sorry, we lost you. Can you start your --

THE WITNESS: Yeah.

A. So I think that people starting using the same method to extrapolate the amount of active magnesium in the p-GaN.

Q. And if you remember, ballpark, orders of magnitude, do you remember roughly what you found when you performed these measurements at IMEC?

A. Yeah, that was, I say, above one times 10 to the 18, up to, let's say, three times 10 to the 19 auto centimeter of cubic.

Q. And, sorry, what were you measuring there?

A. So the amount of active magnesium concentration.

Q. Okay. What's an active magnesium concentration?

A. Yeah. That is the amount of -- active magnesium concentration is the electrically active magnesium that contribute to the Hall for the conductivity of the p-GaN.

Q. Okay. Do you recall why IMEC used Schottky gate contacts for its p-GaN HEMTs?

A. Yeah, that's what we have introduced in order to obtain low gate leakage characteristic, which is preferential for reliability, which is preferential to using with a gate driver and also to lower the power consumption.

Q. What do you mean by "reliability"?

A. "Reliability" means that you need to guarantee that the device maintain certain amount of performance for a defined period of time, let's say 10 years, for instance.

Q. And were IMEC Schottky p-GaN HEMTs reliable?

A. Yes, we have performed lifetime extrapolation on the accelerated lifetime testing under for what bias condition at high temperature, and we have extrapolated, if I remember well, like 10 years' lifetime for 1 percent of the failure was a guarantee for volts, 6-volt.

Q. Is that good?

A. That is good within the spec of the device. It means that the device can sustain continuous 6-volt operation, which is the specifications for a period of 10

years' lifetime, and take into account normally the device is not always in plus 6 volts, so actually it's even longer, the lifetime.

Q. How does that compare -- well, strike that. New question.

Is that good enough for a commercial device?

A. That is good enough for commercial devices for sure.

Q. And remind me again, what was your Ph.D. topic?

A. My Ph.D. was on reliability of GaN-based devices.

Q. I think you mentioned gate drivers in one of your previous answers. Could you explain to us what you meant when you referred to the gate drivers?

A. Yeah. I meant that IMEC gate with a Schottky contact is -- could be driven by standard driver that have voltage operating, let's say, which was different than other device, like the GIT device that was -- that has normally a contact as a gate and required a gate driver that operates in current -- a current driven driver, as we say.

Q. You said G-I-T, did I hear right?

A. Yes.

Q. What is a GIT device?

A. GIT device was a device published in the past

and it stands for gate injection transistor, and it's also normally off device featuring a conductive p-GaN layer, but it has an ohmic contact as a gate instead of other type of contact.

Q. Do you remember what the gate leakage was like in GIT devices?

A. I don't remember the exact number, but I remember it was very high. And this is because, yeah, you have a strong, let's say, current injections through the gate, and being a normal contact, there is nothing that blocks for the current injection, so.

Q. How did you first hear about GIT devices?

A. When a time we started exploring E-mode operation, normally off operation, the GIT device is one of the device that we have examined.

Q. Okay. How would you explore a device that had such bad leakage?

A. That's correct. We -- so the device has a feature to be normally off by using the conductive p-GaN, and we saw we could have a way to improving on that, to get a lower gate leakage.

Q. And so how did you approach that problem at IMEC when you started looking at these?

A. Simple terms, let's say we changed from the ohmic to the Schottky contact, and what we had in mind is

that the Schottky contact on top of it would be reversibly bias under positive gate voltage, and these will block the current.

Q. Did that approach work?

A. That worked. As we have published I think in that first paper we have before, we showed that our gate leakage was order of magnitude lower than the GIT device above that in literature, and we could have, let's say, a very flat behavior, up to 8-volt, meaning that the breakdown was beyond 8-volt.

Q. Okay. So let me just make sure I understand. So what was the gate leakage like in the device you're describing from IMEC?

A. We were, I said before, between 10 to the minus 11 ampere millimeter, and then lately we relax it from 10 to the minus 6 ampere millimeter, which was still all to lower with respect to the GIT device.

Q. So once IMEC found that it could address this problem with a Schottky contact, did that have any effect on the trajectory of the research at IMEC?

A. Yes. We have -- once we have the first test on this, let's say, we have developed very extensive theory on how the E-mode device with the conductive p-GaN with the Schottky contact works, and we had verified that experimentally to make sure that it was correct.

Afterwards, once we handle, let's say, the theory, we understand how the things works, we have filed or optimized the device technology until it was commercially viable.

Q. Did you keep that a secret from the world?

A. We have published that. Something we are very, very proud of. There are many publications showing the result of the IMEC device, and that was a big, big success for us. We achieved something that we thought in the beginning was not possible, and then we made it happen.

Q. So did other people in the world know what IMEC was doing and how it was doing it?

A. Yes. We have extensive publication, let's say, and invited to talk where we present our result, and we have also published on the theory. There are some nice paper really explaining the back-to-back diode theory where I have on top of the Schottky gate contact, how it works in blocking the current, how the CV, you need to -- for extracting the whole measurement, which is all around the same theory, and that has been developed.

Q. Okay. I'll refer you now to RDX8 and refer you to CX35, which I'm showing you here on the screen.

Do you recognize this document?

A. Yes.

Q. What is it?

A. So this is a joint paper between IMEC and Innoscience, 650-volt dispersion free E-mode GaN-on-Silicon HEMT processed in a 200-millimeter CMOS fab, and this was just few years before I joined Innoscience.

Q. Okay. Were you a coauthor of this paper?

A. I was a coauthor of this paper.

Q. What do you remember about this paper?

A. I was not deeply involved, let's say, on this -- on this paper. I was there because I facilitated the collaboration, but I do remember it was the result of the collaboration between Innoscience and IMEC.

Q. So at a high level, just so the record is clear, what is CX35 to the extent you know?

A. Yeah, so this describes aspects of IMEC 8-inch GaN-on-Silicon p-GaN technology with a Schottky gate.

Q. And I'm going to direct you to a sentence, the sentence at the top of the right-hand column at the first page of CX35. Do you see the sentence that I'm showing you here in RDX9?

A. Yeah.

Q. Do you see where it refers to IMEC 200-millimeter CMOS pilot line?

A. Yes.

Q. What does that talk about?

A. So that refers to IMEC 8-inch processing line

where the 8-inch GaN-on-Silicon p-GaN HEMT described in the paper where processed.

Q. Okay. I noticed that it says: 200 millimeters. You keep saying 8-inch. Could you clarify for the record what you mean?

A. Yes. So in Europe, indeed, we use millimeter, here, inches. So 200-millimeter refer to the wafer diameter, which correspond to 8 inches.

Q. Okay. I'm going to now go to slide RDX10.10 and refer you to RX284.

Have you seen RX284 before?

A. Yes.

Q. What is it?

A. This is an interview that I gave to a magazine called, everything PE.

Q. Okay. When did you give this interview to everything PE?

A. A little bit before the publish date in December 2022.

Q. Okay. At that time you were at IMEC or had you joined Innoscience?

A. I was already with Innoscience.

Q. Okay. And whose technology are you discussing in this interview?

A. Innoscience technology.

Q. Okay. I'm going to go to slide 11 in RDX10 now and refer you to page two of RX284.

Do you see where the interviewer asks: Can you tell us about your 8-inch GaN-on-Silicon device technology?

A. Yes.

Q. Okay. And, again, whose technology is this referring to?

A. This refer to Innoscience technology.

Q. Okay. And I want to refer you to the last sentence in the response again. This is on page two of RX284. I'm going to show it to you in slide 12 of RDX10.

Do you see that sentence on the screen?

A. Yes.

Q. Could you explain to me what that sentence says, what it means?

A. It describes a sum up Innoscience technology that these are normally of, that is normally of E-mode operation, and this is realized by using a Schottky contact gate contact on top of the p-GaN layer underneath it.

Q. And do you know where that sentence comes from?

A. Yeah, actually, it comes from Innoscience website, and I was asked about this also during the deposition, and so I checked and it does come from the Innoscience website.

Q. Okay. So let me refer you now to slide 13 and

I'll refer you to CX3, page three.

Do you see the sentence that I've put up?

A. Yes, I see it.

Q. Okay. And how does that sentence compare to the sentence you just discussed from your interview?

A. It's exactly the same sentence as reported in everything PE. Like power.

Q. So is the sentence we see on RDX13 how you described Innoscience's 8-inch GaN-on-Silicon HEMP technology to everything PE in your interview?

A. Yes, this is exactly the same sentence.

Q. Is that how Innoscience describes its 8-inch GaN-on-Silicon HEMT technology in its website?

A. Yes, and fundamentally, this is how the technology works, and that's how Innoscience describe it and how we have the time, the time how we have described it as well, and explain it with theory verify experimentally.

Q. Okay. Let's go now to slide 14 of RDX10 and I want to refer you to CX935C.

Have you seen this document before?

A. Yes.

Q. What is it?

A. This is a presentation that I gave to APEC last year.

Q. Just so the record is clear, could you just

spell that for the court reporter?

A. Yeah, APEC is A-P-E-C.

Q. And who prepared the slides?

A. I prepared the slides.

Q. What is APEC?

A. So APEC is a conference focused on power electronics that happens every year in U.S., and is actually happening this week.

Q. I'm sure you'd rather be with us; right?

A. Not really.

Q. Okay. When did APEC take place last year?

A. It takes place in March 2023 in Orlando.

Q. Okay. And why did you give a presentation at that conference?

A. I was invited by the chair of the industrial session, where I presented this with, by the way, an employee of APC.

Q. Okay. Let me go now to slide 15 of RDX10 and I want to refer you to page seven of CX935C.

Could you just briefly explain to us what this slide shows?

A. Yes. This slide shows the optimization we had performed at Innoscience on our gate Schottky contact to obtain low gate leakage characteristic.

Q. And I want to refer you just to the picture on

the left side that we see on page seven of CX935C. I'll show you sort of a bigger version here on RDX10, slide 16.

Could you just explain what this figure shows?

A. Yeah. So this is in line with the theory that I mentioned before published by IMEC on how this technology works, and basically it explain that the gate of this E-mode GaN HEMT can be modeled like a true back-to-back diode in series, being the one on top, the Schottky diode, form by the gate metal on top of the conductive p-GaN below it, and the way that it works is that in the forward, once you apply a forward gate voltage, such as Schottky contact is adversely biased, and, therefore, it blocks the current, and with that you obtain low gate leakage characteristic.

Q. And is that how you understand this technology works?

A. This is how I understand the technology works and how we have developed it also at IMEC.

Q. Okay. But you are not an engineer at Innoscience; right?

A. That's true. I'm not an engineer at Innoscience.

Q. So you don't know for sure what approach Innoscience takes; right?

A. Yes, I don't know the details of Innoscience technology itself.

Q. Okay. But what is your understanding of how it works and why?

A. Yeah, I --

Q. Strike that. Let me ask again.

What is your understanding of how it works?

A. This is my understanding on how the technology works, how we have described at IMEC is really from the mantel to the technology on which we have worked, which I worked when I was at IMEC, and that Innoscience I think is also commercializing, and it is fundamental on how the technology works, so I would not describe it otherwise, and this is how Innoscience describes it on the internet site and I wouldn't see it otherwise.

Q. Thank you for your testimony today, Dr. Marcon. I appreciate you being with us.

MR. LONG: And I'll pass the witness.

CHIEF JUDGE CHENEY: Is there cross-examination?

MR. ZEINEDDIN: Yes, Your Honor.

THE WITNESS: Can I have a bit of water?

CHIEF JUDGE CHENEY: Yes. Let's go off the record for a moment.

(Whereupon, a discussion is held off the record.)

CHIEF JUDGE CHENEY: We're back on the record

now.

Dr. Marcon, have you been able to get a drink of water?

THE WITNESS: Yes. Thank you, yes.

CHIEF JUDGE CHENEY: Good.

THE WITNESS: I appreciate it.

CHIEF JUDGE CHENEY: Mr. Zeineddin, please proceed, when you're ready.

MR. ZEINEDDIN: Thank you, Your Honor.

I just want to make sure that we have the binders for Mr. Marcon.

CHIEF JUDGE CHENEY: Okay. Let's go off the record for a moment.

MR. ZEINEDDIN: Thank you, Your Honor.

(Whereupon, a recess is taken.)

CHIEF JUDGE CHENEY: Okay. We're back on the record now after taking a moment to prepare for cross-examination.

Please proceed when you're ready, Mr. Zeineddin.

CROSS-EXAMINATION

MR. ZEINEDDIN: Thank you, Your Honor.

BY MR. ZEINEDDIN:

Q. Good morning, Dr. Marcon.

A. Hello.

Q. We have not met before today; have we?

A. No, not that I recall.

Q. Dr. Marcon, you testified on direct that IMEC and Innoscience have had intellectual property and technology know-how transfer agreements; is that correct?

A. The problem that I have is that I don't know what I can say in public of that collaboration and what I cannot say in the confidential.

Q. I'm grateful you told me that.

MR. ZEINEDDIN: Can we go on the confidential record, Your Honor, Innoscience's confidential record.

(Whereupon, the hearing proceeded in confidential session.)

1 O P E N S E S S I O N
2
3 CHIEF JUDGE CHENEY: Please take your seats.
4 We're back on the record now in the 1366
5 investigation. We're on the public record now.
6 We completed the cross-examination of
7 Respondent's expert, Dr. Marcon, before the morning break,
8 and, Mr. Marcon, I remind you you're under the same oath
9 that you took this morning as we hear -- as the Commission
10 Investigative Staff continue the examination.
11
12 EXAMINATION BY COUNSEL FOR ITC STAFF
13 BY MR. WINSTON:
14 Q. Good morning, Dr. Marcon.
15 A. Good morning.
16 Q. I just have a few questions for you.
17 You do not know the epitaxial structure of the
18 Innoscience products; do you?
19 A. No, I don't.
20 Q. And you're not involved in the manufacture of
21 the Innoscience gallium nitride power devices?
22 A. No, I'm not involved.
23 Q. And you're not involved in the research and
24 development of Innoscience gallium nitride devices?
25 A. No.

Q. And you do not know the manufacturing process of Innoscience devices?

A. No.

MR. WINSTON: Thank you. I have no further questions.

CHIEF JUDGE CHENEY: I have no questions for this witness.

Is there any redirect?

MR. LONG: No, Your Honor.

CHIEF JUDGE CHENEY: Okay. I misspoke earlier. I called this witness an expert. I have no doubt that you have expertise, but in the legal context of this case, you are not an expert witness, and I just want the record to reflect that.

Thank you for coming in. Your testimony has helped me to understand the case. You may step down.

THE WITNESS: Thank you.

I leave the binder here, Your Honor?

CHIEF JUDGE CHENEY: Leave everything as it is.

(Witness excused.)

CHIEF JUDGE CHENEY: Let's go off the record for a moment.

(Whereupon, a recess is taken.)

CHIEF JUDGE CHENEY: Back on the record now.

Do the Respondents have another witness to

call?

MR. LAVENUE: Your Honor, next, we call Todd Schoettelkotte.

CHIEF JUDGE CHENEY: We will let the hearing room get settled. Then I'll administer the oath.

Mr. Schoettelkotte, please raise your right hand.

Do you solemnly swear or affirm the testimony you're about to give in this matter will be the truth, the whole truth, and nothing but the truth under penalty of perjury?

THE WITNESS: I do.

CHIEF JUDGE CHENEY: Thank you. Please be seated.

Counsel, please introduce yourself.

MS. FULTON: Amy Fulton for Respondents Innoscience.

CHIEF JUDGE CHENEY: Welcome to the lectern, Ms. Fulton.

MS. FULTON: Thank you.

CHIEF JUDGE CHENEY: Please proceed when you're ready.

T O D D S C H O E T T E L K O T T E,

Having been first duly sworn or affirmed on his

oath, was thereafter examined and testified as follows:

DIRECT EXAMINATION

BY MS. FULTON:

Q. Good morning, Mr. Schoettelkotte.

A. Good morning.

Q. Would you please state your full name for the record.

A. William Todd Schoettelkotte.

Q. And did you prepare any demonstratives to aid in your testimony this morning?

A. I did, that's correct.

MS. FULTON: Could we put up slide deck RDX0011C.

Q. What are these exhibits?

A. These are the exhibits that I reviewed in preparation of my report in this case. I was deposed on these exhibits and I prepared this presentation to assist my testimony.

Q. These demonstrative slides identify sources on each demonstrative exhibit. Are the documents you relied on in preparing your demonstratives and your analysis for this investigation on these slides?

A. Yes, that's correct.

Q. Turning to slide two, Mr. Schoettelkotte, where are you currently employed?

A. I work for the firm called Ocean Tomo, a JS Held Company in Houston, Texas.

Q. And what's your current role with Ocean JS Held?

A. I am the intellectual property practice lead, and I'm a senior managing director, essentially working with colleagues and clients to value intellectual property for purposes of litigation in District Courts and also for assisting the Commission with issues, such as domestic industry bond and remedy in 337 cases.

Q. How would you describe your professional experience?

A. It's largely around, as I mentioned a moment ago, valuing intellectual property. Certainly patents and all other forms of intellectual property as well.

In addition to that, I'm often involved in assisting clients with their valuation for purposes of commercializing those assets and then finally in assisting clients in their licensing negotiations with third parties.

Q. How many times have you testified at the ITC?

A. It's just under 20.

Q. And how would you describe your educational background?

A. I graduated with a degree in business management from Rice University. I also earned a master's

in accounting from Rice University.

Q. Do you hold any professional certifications?

A. I do. I'm a Certified Public Accountant. I'm licensed in the State of Texas. I'm also a Certified Valuation Analyst with the NACDA. The focus of the valuations that I do are intellectual property.

Q. How many times total have you testified in a legal proceeding?

A. I think it's at or around 50 times, both at the ITC hearings, as well as District Court.

MS. FULTON: And turning to slide three, I'll be referring to RX0670, that's also in your binder, and it's on the first page, the first page is displayed on the screen.

Q. Do you recognize this document?

A. I do. This is my r⊖sum⊖ or CV, which was attached to the report that I issued in this case.

MS. FULTON: Your Honor, at this time, I'd like to proffer Mr. Schoettelkotte as an expert in economics, particularly with respect to issues relevant to section 337 investigations.

CHIEF JUDGE CHENEY: Is there any objection?

MR. KOPSIDAS: No objection, Your Honor.

MR. WINSTON: No objection, Your Honor.

CHIEF JUDGE CHENEY: Mr. Schoettelkotte will be

accepted as an expert in the field offered.

Please continue, counsel.

BY MS. FULTON:

Q. Mr. Schoettelkotte, what materials did you consider in forming your opinions in the investigation?

A. I prepared this slide. This is a slide essentially identifying the various materials. It would have included things such as EPC financial information, certainly presentations, market studies, things of that nature.

I also had the opportunity to review patent licensing term sheets, as well as deposition testimony-related exhibits and things of that sort.

Q. And this slide refers to RX0671C, which is the documents and other materials considered of Mr. Schoettelkotte.

Is this the list you prepared of materials that you considered that you just referenced in your testimony?

A. Yes, it is.

MS. FULTON: At this point, Your Honor, we'd like to go onto the confidential record. Some of Mr. Schoettelkotte's opinions contain information regarding EPC's CBI.

CHIEF JUDGE CHENEY: If you're not authorized to view EPC confidential information, please leave the

hearing room.

(Whereupon, the hearing proceeded in confidential session.)

O P E N S E S S I O N

CHIEF JUDGE CHENEY: We're now back on the public record.

BY MS. FULTON:

Q. Why do you propose a bond of 0 percent?

A. Well, first, I'll turn back to something that I identified earlier as part of my analysis. I did not hear any evidence from Complainants in this case or Dr. Vander Veen about bond.

It's my opinion that EPC has failed to establish the need for a bond or the amount to protect EPC from potential injury from Innoscience, and I understand that while this is the Commission's purview and their decision to make these rulings, I have seen rulings suggesting that to the extent the Complainants are or should be aware that such failure to satisfy their burden to support bonding may result in no bonding at all.

Q. Thank you for your testimony today, Mr. Schoettelkotte.

MS. FULTON: And I can pass the witness.

CHIEF JUDGE CHENEY: Is there cross-examination for this witness?

MR. KOPSIDAS: No cross-examination, Your Honor.

CHIEF JUDGE CHENEY: From the Staff?

MR. WINSTON: I have a brief -- brief question.

CHIEF JUDGE CHENEY: Okay. Please proceed.

EXAMINATION BY COUNSEL FOR ITC STAFF

BY MR. WINSTON:

Q. Mr. Schoettelkotte, you just testified about if in the event that the Commission determines that a bond should be set, that it's your testimony that it should be set based on some terms from a term sheet; is that correct?

A. I guess I would say it slightly differently, if I may?

Q. Please.

A. My opinion would be that a bond rate of 0 percent would be appropriate. However, if the Commission determines that a bond were to be appropriate in this case, I believe that the term sheets, while not patent license agreements, would provide an indication of what was being offered by EPC to competitors. I believe those might be indicators of value for the Commission to consider from a royalty licensing perspective.

Q. In your opinion, are those term sheets that you've referred to, are they sufficient in and of themselves to establish a reasonable royalty rate?

A. Certainly do think that they provide guidance

to the Commission, so yes, I would say they're sufficient in that they provide that guidance.

Q. I'm asking a slightly different question, not whether they'd provide guidance to the Commission, but whether they are sufficient to establish a rebuttal royalty rate?

A. I believe they are, among other factors, yes.

Q. Okay. Thank you.

MR. WINSTON: I have no further questions.

CHIEF JUDGE CHENEY: I have no questions for this witness.

Any -- I guess any redirect over the Staff's question?

MS. FULTON: No further questions from Respondents.

CHIEF JUDGE CHENEY: Okay. Thank you, Mr. Schoettelkotte.

THE WITNESS: Thank you, Your Honor.

CHIEF JUDGE CHENEY: You're excused.

(Witness excused.)

CHIEF JUDGE CHENEY: Will the Respondents please call their next witness.

MR. LAVENUE: Your Honor, our next witness is Dr. Michael Lebby.

CHIEF JUDGE CHENEY: Let's go off the record

for a moment while we prepare the hearing room for Dr. Lebby.

(Whereupon, a recess is taken.)

CHIEF JUDGE CHENEY: We're back on the record.

Dr. Lebby, please raise your right hand.

Do you solemnly swear or affirm the testimony you're about to give in this matter will be the truth, the whole truth, and nothing but the truth under penalty of perjury?

THE WITNESS: I do.

CHIEF JUDGE CHENEY: Thank you.

Please be seated.

CHIEF JUDGE CHENEY: Counsel, please introduce yourself.

MS. SPECHT: Thank you, Your Honor.

Kara Specht from Finnegan for Respondents in this case.

CHIEF JUDGE CHENEY: Welcome to the lectern, Ms. Specht.

Please proceed when you're ready.

MS. SPECHT: Thank you.

M I C H A E L L E B B Y,

Having been first duly sworn or affirmed on his oath, was thereafter examined and testified as follows:

DIRECT EXAMINATION

BY MS. SPECHT:

Q. Dr. Lebby, can you please state your full name for the record.

A. Michael Lebby, L-E-B-B-Y.

B as in boy.

Q. What is your role in this investigation?

A. I was hired as an independent consultant to review the '294 and the '508 patents.

Q. Did you prepare any presentations to assist you with your testimony in this investigation today?

A. Yes, I did. The slide deck in front of me is the first page, I believe.

MS. SPECHT: And for the record, the slide deck Dr. Lebby is referring to is marked RDX0013 and we're beginning on page one.

Let's turn to page two.

Q. Dr. Lebby, can you please briefly discuss your educational background.

A. Yes. I have 4 degrees. I have two doctorates. My second doctorate has been awarded in the U.K. It's a higher doctorate. The first doctorate was focused on electronic semiconductor devices, including HEMTs and heterostructure FETs, HFETs, and their associated characterization.

(Stenographer clarification.)

A. H-F-E-Ts, HFETs, that's a heterostructure FET.

And the second degree was focusing more in optoelectronics.

MS. SPECHT: Let's go to slide three.

Q. Dr. Lebby, can you explain your industry experience that's relevant to this investigation.

A. I've worked at a number of companies. As you can see from this list, time in the U.K. and then Bell Labs in the 1980s. I've highlighted some of the experiences in yellow. Those are the experiences that pertain to this litigation.

MS. SPECHT: Let's go to slide four.

A. So in this --

Q. Let me ask you a question, Dr. Lebby, so we can make sure the record is clear.

Can you highlight any portions of your industry experience that's relevant to the work you performed in this investigation?

A. I can. Surprisingly, I've had about 40 years of experience in III-V, III-N, and silicon semiconductor fabrication design of devices and operation. Out of those 40 years, about 20 of those years were involved in gallium nitride, and those are some of the things I did for epitaxial growth, device design, and fabrication thereof.

I've been an inventor in a number of patents, published articles, and I give even currently technical presentations.

MS. SPECHT: Let's go to slide five.

Q. You mentioned, Dr. Lebby, that you have a lot of patents. Can you explain any of the awards that you've received and particularly ones related to the amount of patents you have?

A. So the award at the bottom was actually the first award. That was a citation by the USPTO as being a prolific inventor in the late 1980s, early 1990s.

Q. Are there any other awards you'd like to highlight?

A. Well, these represent the professional -- I guess professional associations. The second one there I was awarded an entrepreneurial and business leader at a conference. I guess that was six years ago.

Q. Have you testified as an expert at the International Trade Commission before?

A. Yes, I have.

Q. About how many times?

A. I believe it's under 10, but it's close to 10.

MS. SPECHT: Your Honor, at this time we would like to offer Dr. Lebby as an expert in the field of III-V semiconductors, HEMT devices, and microfabrication.

CHIEF JUDGE CHENEY: Any objection?

MR. DAVIS: No objection, Your Honor.

MR. WINSTON: No objection, Your Honor.

CHIEF JUDGE CHENEY: Dr. Lebby will be accepted as an expert in the field of III-V semiconductors, HEMT devices, and microfabrication.

MS. SPECHT: Let's go to slide six.

BY MS. SPECHT:

Q. Dr. Lebby, what were you asked to do in that investigation?

A. So I was asked to analyze from the perspective of a person of ordinary skill in the art whether the first three claims, claims one to three of the '294 patent, as well as the first claim of the '508 patent, are valid.

MS. SPECHT: Let's go to slide seven.

Q. Dr. Lebby, what is your opinion of what the level of ordinary skill would be for the patents at issue in this case?

A. So on this slide, which is slide number seven on the left-hand side, I've got my opinion of what a person of ordinary skill in the art should be.

I've also included on the right-hand side what our opposing experts' opinion of what a person of ordinary skill in the art should be. The takeaway at the bottom of this slide is that a person of ordinary skill in the art at

the time of the invention would certainly have a pertinent bachelor's degree in the relevant field and we can see some slight differences here.

Q. So your definition is a bachelor's degree in electrical engineering, chemical engineering, physics, or materials science, or a closely related field, and at least two years of experience in semiconductor device design or fabrication; is that correct?

A. That is correct.

Q. Are the opinions that you've rendered in this case the same under both your definition and Dr. Schubert's definition?

A. Absolutely. I've looked at both definitions and my opinions don't change.

Q. And are you a person of ordinary skill in the art under one or both of the definitions you've put on slide seven?

A. Yes, I am.

MS. SPECHT: Let's go to slide eight.

Q. What methodology did you apply in performing your analysis of the validity of the '294 and '508 patents?

A. So the methodology is shown in the four bullet points on this slide. I've reviewed the patent specification and drawings, the claims, the file histories, the file wrappers. I studied the scope and the content of

the prior art, and I'm going to cite some of the prior art today.

I compared the prior art with the patent claims, claims one to three of the '294 and claim one of the '508, and I did that from the perspective of a person of ordinary skill in the art at the time of the invention, and I certainly analyzed opposing experts' rebuttals and expert reports, and I've also considered the secondary considerations of obviousness.

MS. SPECHT: So if we turn to slide 10.

Q. If you'll give us a preview, what was your conclusion as to whether the claims of the '294 patent were valid?

A. So the '294 patent, I actually -- for today, I've put together two grounds. The first ground is based on a prior art called Beach189. We heard from Dr. Beach earlier in this trial, and I've done that one in view of another piece of prior art called Kigami.

On the second ground, which is based on a single reference, that's based on Uemoto, a Japanese paper.

And for both of these grounds, all of the limitations of claims one, two, and three of the '294 I found invalid.

MS. SPECHT: Let's go to slide 11.

Q. Dr. Lebby, what do you understand the '294

1 patent to be directed to?
2 A. The '294 patent is a gallium nitride FET. It's
3 a conventional FET, which you can see with a source trained
4 in gate. We can see the front page of the patent on the
5 left-hand side of slide 11, and section 54 of the patent
6 gives the title. It's a compensated gate MISFET. Stands
7 for metal-insulator-semiconductor FET and method of
8 fabricating the same. Just below that in section 57, I
9 give an abstract and a cross-section of a typical
10 embodiment, and so it is a -- '294 discloses a MISFET
11 gallium nitride FET.
12 MS. SPECHT: Let's go to slide 12.
13 Q. What are the claims of the '294 patent that you
14 analyzed during your validity analysis?
15 A. So I analyzed claims one, two, and three. One,
16 the independent claim; two depends on one; and three
17 depends on two, so both two and three depend from one. We
18 can see here I've highlighted one of the areas of focus
19 that I'm going to analyze, and so yes, I looked at the
20 asserted claims one to three of the '294.
21 Q. And I notice you have one element highlighted
22 here.
23 MS. SPECHT: So let's go to slide 13.
24 Q. Dr. Lebby, what feature of the claim does the
25 patent identify as the allegedly novel feature?

A. The allegedly novel feature is underlined in red on the right-hand side of this slide, which is slide 13. Quote: A compensated GaN layer above the barrier layer, comma, and. And so that claim element is the disputed element. The other elements I've colored or annotated in different colors can be seen on the left-hand side of this slide, which is figure one of the '294, which is in brackets or parentheses, prior art. And so we can see the undisputed claim elements that are annotated, the one I've underlined is the disputed one.

Q. And to backtrack for just a second, when we're talking about the '294 patent, we're referring to exhibit JX0014 as it's shown on this slide; correct?

A. That is correct.

MS. SPECHT: Let's go to slide 14.

Q. You also mentioned that you analyzed claims two and three of the '294 patent. What are these dependent claims directed to?

A. So on slide 14, the dependent claim two is actually highlighted in a red dotted line, and dependent claim three is highlighted in a blue dotted line. Claim two involves hydrogen passivation, and claim three involves the use of magnesium as an acceptor.

MS. SPECHT: Let's go to slide 15 of the presentation you prepared.

Q. On this slide, it looks like you've prepared a chart with each of the grounds that you testified and analyzed laid out in the various rows. Are you prepared to walk through and complete this chart through the remainder of your testimony?

A. Yes, I'm going to show you my analysis for both these grounds, Beach189, as well as Uemoto, and I'm going to analyze element by element going through claim one, claim two, and claim three. The interesting thing about the first ground, which is the one I'm going to go through first, is that Dr. Beach was in the courtroom just earlier this week. He's also an inventor on the '294 and -- sorry, and I'm going to analyze one of his pieces of prior art, which he did at his previous company, International Rectifier, as it aligns to each of the claim elements of ground one -- sorry, of claim one of the '294.

Q. Did you analyze any prior art in your invalidity assessment beyond these two references on the screen?

A. Yes, I did. Ground one is Beach189 in view of Kigami, and I use Kigami for claims two and three, and Uemoto is a single reference ground.

MS. SPECHT: So for the record, as we walk through the rest of the grounds, Beach189, that Dr. Lebby is referring to, is exhibit RX0011, and Uemoto is exhibit

number RX0073. With that, let's turn to slide 16.

Q. And let's start with the Beach189 ground, and turning to your slide 17, Dr. Lebby, can you describe what the Beach189 reference is directed to?

A. So the Beach189 is prior art in my opinion. I believe it's established prior art. We can see the face page of Beach189 on the left-hand side. We also have an abstract, which is section 57 of the patent application publication, and also paragraph 26.

I note that Beach189 is undisputed prior art. It has the same inventor as one of the inventors of the '294 patent, and as far as I'm aware, it was not disclosed during examination.

MS. SPECHT: Let's turn to slide 18.

Q. How did you conduct your analysis of claim one during your validity investigation?

A. So in slide eight, I show a table of the claim elements of claim one starting with 1P, going all the way down to 1F, so I'm going to show you element by element my analysis of going through these claims.

As we can see from the left-hand side of the slide, all of the elements, bar one, were not disputed. Claim element 1E was disputed, and in my opinion, I'm going to show you the analysis that, when I come to my conclusion, is that the prior art, Beach189, discloses all

elements of claim one and invalidates claim one.

MS. SPECHT: Let's go to slide 19. And start walking through each element of claim one.

Q. Dr. Lebby, in your opinion, does Beach189 disclose the preamble of the '294 patent?

A. Yes, it does. What I have in this slide is the -- excuse me a second. Is the claim element one pre. That is not disputed. I've annotated in an orangy color. What it is, is at column III nitride transistor, and in the background of the invention, paragraphs two and three, which I've annotated two, these are known features of a transistor, and so the takeaway at the bottom of slide 19 is that Beach189 discloses the III nitrite transistor.

MS. SPECHT: Let's turn to your slide 20.

Q. Does Beach189 in your opinion disclose element 1A of the '294 patent?

A. Yes, it does. Element 1A is a substrate. This is not a disputed claim. I've annotated in red parts of claim one, paragraph 41, and in the lower right-hand side of slide 20, figure four, the substrate, and so the red shows the annotations of the substrate, and the takeaway at the bottom of the slide is that Beach189 discloses a substrate.

MS. SPECHT: Let's go to slide 21.

Q. Dr. Lebby, in your opinion, does Beach189

disclose element 1B of the '294 patent?

A. Element 1B is consistent of III-N transition layers above the substrate. This is not a disputed claim. I've highlighted and annotated in yellow transition layers from claim one and also paragraphs 41 and 42 of Beach189, as well as figure four in the lower right-hand side of slide 21, and so the takeaway is, is that Beach189 discloses a set of III-N transition layers above the substrate and invalidates this claim element.

MS. SPECHT: Let's go to slide 22.

Q. Dr. Lebby, in your opinion, does Beach189 disclose element 1C of the '294 patent?

A. Element 1C is a III-N buffer layer above a set of transition layers. This is not a disputed claim element.

We can see in paragraph 40 in the top right-hand corner I have annotated in green where I found that in Beach189. That's clearly seen in the lower right-hand corner, which is a cross-section of figure four, and so the takeaway is that Beach189 discloses a III-N buffer layer above a set of transition layers and invalidates this claim element.

MS. SPECHT: Let's turn to slide 23 of your presentation.

Q. Does Beach189 in your opinion disclose element

1D of the '294 patent?

A. Element 1D is a barrier layer above a buffer layer. This is not a disputed claim element. I've annotated in blue where I thought the pertinent parts of the Beach189 is, and we can see in the top right-hand corner from paragraph 25, and also from the bottom right-hand corner where I've annotated in blue the AlGaN barrier layer on figure four, and so the takeaway is, is that Beach189 discloses a III-N barrier layer above the buffer layer, and that's been shown in slide 23.

Q. And for all the elements that we've addressed so far, one preamble through 1D, you've noted that they're not disputed. How do you know these elements are not disputed?

A. I saw that these elements were not disputed from the opposing expert as I reviewed the opposing expert's expert report rebuttal and then reviewed the pretrial brief.

Q. Okay. So let's turn to slide 24 and focus on the disputed limitation 1E, and this is the limitation that includes the compensated GaN you previously identified as the allegedly novel feature of the '294 patent.

In your opinion, does Beach189 disclose element 1E of the '294 patent?

A. Claim element 1E is a, quote: Compensated GaN,

1 end quote, layer above the barrier layer, and this is the
2 disputed element, at least for claim one of the '294, and
3 I'm showing on the left-hand side an annotated colored
4 cross-section figure four from the Beach reference.
5 What I've highlighted on the left-hand side is
6 layer 25, which is annotated in purple, and on the top
7 right-hand side of this slide in paragraph 26, I've also
8 annotated in purple where that comes up in Beach189.
9 We can see the words "compensated GaN," is
10 exactly and explicitly disclosed in Beach189, which was
11 before the '294 patent. Actually, it was when Beach was
12 working in a prior company, and though I've seen the word
13 "compensated" used, I know there was discussion earlier in
14 this trial about the use of the word "compensated" in the
15 semiconductor field, but I haven't used words or I haven't
16 seen the word "compensated GaN," and so when I saw this
17 actually being explicitly said, it really sort of colored
18 my opinion, and we can see here that there is really good
19 descriptions of what this layer 25 is.
20 So the takeaway from this slide, which is slide
21 24, is that Beach189 explicitly discloses the layer 25,
22 actually has a property, which is ultra resistive, and
23 that's electrically resistive, and is formed with
24 compensated gallium nitride.
25 MS. SPECHT: Let's turn to slide 25.

Q. And you started to get to this in your last response, Dr. Lebby, but let's elaborate. How does Beach189 describe the characteristics of the compensated GaN layer in paragraph 26 of the reference?

A. So as I looked through and read through Beach189 prior art, I was intrigued to look into what the properties were for layer 25, because layer 25 is actually called out to be, quote: Compensated GaN, end quote, and the properties are that it's ultra resistive and it's highly electrically resistive material, and it also gives an alternative embodiment as well, which was another material called silicon nitride, but the takeaway from looking at layer 25 is, is that it's formed with compensated gallium nitride and the properties, the material properties are that it's very highly resistive.

Q. You mentioned you've been listening to the testimony rendered so far in this case. Did you listen to Dr. Lidow, Dr. Beach, and Dr. Schubert?

A. Yes, I have.

Q. And did you hear anything in the testimony of these three witnesses about the characteristics of compensated GaN in the '294 patent?

A. So as I highlight in the bottom right-hand corner of this slide, a highly electrically resistive material, I don't see this having a conductive function.

So I'm not talking in the absolute senses here, but this is not designed to be conductive, and so when I look at the material properties of compensated GaN in Beach189, which is prior to the '294, and I get a really good understanding of what these properties are, especially in relation to what's been said earlier in this trial.

MS. SPECHT: Let's turn --

Q. Actually, before we turn to slide 26, one additional question for you, Dr. Lebby.

Does the fact that paragraph 26 of the Beach189 reference use the term "ultra resistive field plate" impact your analysis at all?

A. It doesn't impact the analysis, because what I'm really looking at is claim one of the '294, and we can see here that Beach189 uses the term "field plate" and there is various embodiments in Beach189 that have a number of different designs, and I remember from my deposition there is a number of different embodiments that can be impacted from the term "field plate," but really what we're really looking at is the properties of this material, and the properties of this material is actually it's highly resistive, and the fact that it is explicitly called "compensated GaN," really makes me sort of align with the fact that this is clearly prior art, and this prior art aligns very nicely with what is said in the claims of -- at

least claim one of the '294, and that means to me that this piece of prior art here completely invalidates the compensated GaN element, which is 1E of the '294.

MS. SPECHT: Let's turn to slide 26 and talk about field plates a bit more.

Q. Dr. Lebby, are field plates in your opinion typically nonconductive?

A. I've put in the bottom of this slide: Field plate structures. Field plate structures are used in power GaN FETs, and I indicated in my deposition that the role of a field plate is to shape or modify the field, and actually affects the performance of the FET, and, in fact, if you design them correctly, you can have the FET operate with a higher breakdown voltage, and you can protect some of the gate features. They don't have to be conductive, although there is a number of different materials that have been used.

In fact, I remember one of my colleagues wrote a book when I was working at Bell Labs, Steve Pearton, and he showed that field plates could be silicon dioxide, which is an insulator, and insulators, as well as conductors, can affect the field, and so field plate structures can be formed from a number of different materials.

CHIEF JUDGE CHENEY: Before we begin, there is an objection.

MR. DAVIS: Objection, Your Honor.

Dr. Lebby's testimony on field plate is outside the scope of his expert report and deposition.

CHIEF JUDGE CHENEY: Okay. Someone show me the support for the testimony elicited in the deposition or expert report.

MS. SPECHT: Your Honor, if I may put the deposition transcript on the screen, I think that would best elaborate the extensive nature of Dr. Lebby's testimony on this point.

CHIEF JUDGE CHENEY: Okay.

MS. SPECHT: And it begins on page 85, line 21, at the very bottom, and you can see the question here is: Generally speaking, can a field plate be made of a metal? It continues onto the next page, and Dr. Lebby's answer, which spans the majority of that page, is exactly on point with the testimony he's giving here today: Whether a field plate is something that can conduct an electric field, the conductivity of that field plate, the resistivity of that field plate, and whether compensated GaN can be a field plate, which is exactly what he's opining on now, and I'll note that that question was asked by counsel for EPC. I know yesterday you asked for us to provide that information.

CHIEF JUDGE CHENEY: Mr. Davis, your response?

MR. DAVIS: Withdraw the objection, Your Honor.

CHIEF JUDGE CHENEY: Okay. Please continue, counsel.

BY MS. SPECHT:

Q. So I've forgotten where I was at, but, Dr. Lebby, let's go back to the issue of field plates, and you had mentioned a textbook that you were aware of that supported your opinion on the conductive versus resistive nature of field plates. Can we go back to that, and can you revisit that response you gave previously?

A. The textbook I was thinking of, because in my deposition I referred to some extrinsic evidence, and that was the one that came to mind, although I didn't really talk about that expressly during my deposition, but Steve Pearton wrote a textbook that talked a little bit about field plate technologies, and the example that he gave --

CHIEF JUDGE CHENEY: Objection, Mr. Davis?

MR. DAVIS: Objection, Your Honor. Outside the scope of Dr. Lebby's expert report and deposition. This textbook specifically was part of the objections that we had to his demonstrative exhibits, and counsel for Innoscience, in fact, removed the portion of the slide that referred to this textbook.

CHIEF JUDGE CHENEY: Your response, counsel?

MS. SPECHT: Your Honor, what we agreed to with

1 EPC is that we would remove the citation and the figure of
2 the textbook from Dr. Lebby's slides. We are not seeking
3 to introduce that book into evidence anymore, but Dr. Lebby
4 just opined that he had looked into extrinsic evidence, and
5 if we look at his deposition testimony, page 38, 19 to 22,
6 when he was asked about potential extrinsic evidence, he
7 responded that he suspected that if we looked -- and I love
8 his phrasing: I daresay if we looked with extrinsic
9 evidence, we may find field plates being composed of
10 different material.
11 He is trying to verify --
12 CHIEF JUDGE CHENEY: Could you read the next
13 line from the deposition for me?
14 MS. SPECHT: But that's not something I've
15 looked into.
16 CHIEF JUDGE CHENEY: Okay. So he didn't
17 consider this when formulating his opinions, and you didn't
18 give notice to the other side that he had considered it
19 when formulating his opinions?
20 MS. SPECHT: Your Honor, Dr. --
21 CHIEF JUDGE CHENEY: It's a yes-or-no question.
22 MS. SPECHT: No, sir.
23 CHIEF JUDGE CHENEY: Okay. Then the objection
24 is sustained.
25 Please continue.

MS. SPECHT: Let's move on to slide 27.

BY MS. SPECHT:

Q. Dr. Lebby, in your opinion, is the compensated GaN listed expressly in the Beach189 reference the same as the compensated GaN in the '294 patent, claim one?

A. So what I've looked at is the -- to -- the inventor is the same, albeit the inventor worked at a different company, but the inventors used words that I haven't seen that generally in my experience.

As I've already indicated, I've seen "Compensated" used a lot, but not the term "compensated GaN." So when something comes up, that's exactly the same in prior art, it certainly got my attention. So if you look at it even more closely, the properties of compensating GaN for Beach189 versus '294 is the same, and so Beach189 in the '294 patent include the same inventor and the same material.

MS. SPECHT: Let's go to slide 28 of your report -- I mean, of your slides.

Q. How does Dr. Beach describe the compensated GaN in each of the '294 and 189 references?

A. So in this slide on the right-hand side, I've annotated in blue sections from the '294 patent on the top right-hand corner and below that from Beach189, and on the top right from the '294 patent, I've annotated in blue,

quote: A compensated GaN layer below the gate contact and above the barrier layer, end quote, and I've also highlighted in blue further down, quote: Semi-insulating layer, end quote.

And in the lower section, the lower paragraph, paragraph 26 from Beach189, I've actually annotated in blue, quote: Ultra resistive field plate 25 formed with a highly electrically resistive material, such as, end quote, and so the takeaway from the slide is that both Beach189 and the '294 patent describe compensated gallium nitride in the same way.

MS. SPECHT: Let's go to slide 30 -- I'm sorry, let's go to slide 29.

Q. Dr. Lebby, moving to the last element of claim one of the '294 patent, in your opinion, does Beach189 disclose element 1F?

A. Element 1F is gate contact above a compensated GaN layer. This is not disputed. I've annotated this in pink. We can see from paragraph 25 on the right-hand side and also on the lower left-hand corner where the gate is gate number 22 or element 22 on figure four. The takeaway from slide 29 is that Beach189 discloses a gate contact above a compensated gallium nitride GaN layer.

MS. SPECHT: Let's go to slide 30.

Q. Dr. Lebby, is the compensated GaN layer element

25 in Beach189 gate material in your opinion?

A. So I've got on slide 30 an annotated and colored figure four showing where gate 22 is colored in pink and layer 25, which is the compensated GaN, and layer 25 is above the AlGaN, aluminum gallium nitride, layer 16 and is below the gate 22. So layer 25 is -- which is compensated GaN, is below the gate.

MS. SPECHT: Let's turn to slide 31 of the slides you've prepared.

Q. Dr. Lebby, you created a chart that summarizes your findings, and that's what's shown here; is that right?

A. That is correct. Slide 31 is a table of the claim elements of claim one. We can see all elements bar one are not disputed. The disputed one is 1E, but in summary, I've used Beach189 prior art to show that Beach189 discloses all elements of claim one.

MS. SPECHT: Let's turn to slide 22 -- 32, excuse me.

Q. So this next slide goes back to this chart that we previewed earlier in your testimony, and it reflects your opinion as to claim one of the Beach189 reference?

A. That is correct. We've just gone through in ground one, using Beach189, to review all the claim elements of claim one, and as I've indicated in the takeaway at the bottom of slide 32, Beach189 anticipates

all elements of claim one. I'm now going to look at claim two and claim three.

Q. What grounds do you propose for claims two and -- for claims two and three?

A. The ground I'm using is Beach in view of a Japanese patent with the author's name Kigami.

MS. SPECHT: Let's go to slide 33.

Q. In your analysis for claims two and three, what portion of Kigami is teaching?

Let me try that again.

In your analysis for claims two and three, what is Kigami adding to what we've seen in the Beach189 reference?

A. So what we've already completed in the Beach reference is all the elements of claim one. So what Kigami is adding is dependent claim two and dependent claim three, and we can see Kigami discloses hydrogen passivation and magnesium as acceptor for dependent claims two and three, and I'm going to show you that analysis in the next couple of slides.

MS. SPECHT: Let's go to slide 34.

Q. Dr. Lebby, can you briefly describe what the Kigami reference is about?

A. Kigami reference is concerned with gallium nitride based III-N transistors, specifically HEMTs, and we

can see the face of the Kigami patent on the left-hand side of slide 34. It is undisputed prior art. It was published in 2006, and it discloses techniques for forming highly resistive gallium nitride layers in III-N transistors or III-N HEMTs, and as far as I'm aware, it was not disclosed during examination. So it's my understanding that Kigami is undisputed prior art and discloses elements of dependent claims two and three of the '294.

MS. SPECHT: Let's turn to slide 20 -- 35.

Q. In your opinion, Dr. Lebby, would it have been obvious to a person of skill in the art to combine Beach189 and Kigami?

A. Yes, it would, and this is a little complex slide. So I'll start from the top. It was certainly obvious to me as a person of ordinary skill in the art to implement Kigami's techniques to forming a compensated GaN layer and apply that to Beach189.

So if we go to the cross-section of the figure on the right-hand side, we can see a cross-section of Kigami's gallium nitride FET, and we see I've annotated in purple is where Kigami teaches the use of hydrogen, which is the H plus signs that actually help form the compensated gallium nitride layer, and that technique of implementing hydrogen into Beach189 helps form layer 25 to be a compensated GaN layer, and the reason I've done this is

because Beach189 doesn't really teach how compensated GaN is electrically ultra resistive. It doesn't give any technique. It just says the properties, and so I had to look to another prior art to understand how to get to those properties, and so the takeaway from this slide at the bottom is, is that the techniques in Kigami can be used to form layer 25 as described in Beach189.

MS. SPECHT: Let's turn to slide 36 of the slide you prepared.

Q. Dr. Lebby, are you aware of any testimony from Dr. Beach, the inventor of the '294 patent and the inventor of Beach189, that's relevant to your motivation to combine Beach189 and Kigami?

A. Oh, yes, I am, and I've highlighted that in the yellow box on the right-hand side of slide 36. Dr. Beach, who was the inventor of Beach189, as well as the '294 patent, testified any -- quote: Anybody skilled in the art would know how to grow a compensated gallium nitride layer, end quote. And I agree with him. I looked at this and it was obvious for me.

MS. SPECHT: Let's turn to slide 37.

Q. Have you formed an opinion as to whether one skilled in the art would have been motivated to combine Beach189 and Kigami?

A. So, yes, I have formed an opinion and, no, I'm

not a patent or an IP lawyer, but there are rules you have to look at when you combine prior art together to make a ground, and what I have in this slide is my motivation to combine Beach189 with Kigami, and so at the top left-hand side, I've got analogous art in green. You can follow the top part of this slide over to the right, and we can see number one in the top middle of this slide, Beach189 is a III nitride power semiconductor FET device.

So that art is the same and Kigami is the same too. That is a gallium nitride compound semiconductor FET device. And so that art is similar, and I have colored those comments in green.

As you work down the slide and starting on the left-hand side, the next point is actually quite important. Combining the prior art elements to your predictable results, as well as the fact that you don't want to have lots of experimentation, and so if you look at Beach's 189 -- Beach189's high resistance compensated GaN layer transistor and you couple that with Kigami's high resistance process using hydrogen, then you can combine two similar prior arts and you would -- you would predictable results, and then lastly in sort of a yellow color, applying a known technique to a known device ready for improvement. Well, Kigami is a known technique. Kigami teaches how to get a compensated gallium nitride with the

material properties of being ultra high resistive, and if you apply that technique into a known gallium nitride FET device, then you can create layer 25 to be ultra highly resistive and to be compensated gallium nitride.

So the motivation to combine, at least from my perspective, is you've got to take into account analogous art and you've got to be able to achieve predictable results and you have got to be able to use known techniques, and all of these align very nicely to use Beach189 in view of Kigami to invalidate the dependent claims of the '294, two and three.

Q. Okay. So let's step away from the motivation to combine and come back to the substantive limitations in the claims.

MS. SPECHT: And let's turn to slide 38.

Q. In your opinion, Dr. Lebby, does Kigami disclose the elements of claim two?

A. Claim two, absolutely, Kigami discloses forming a highly resistive compensated gallium nitride layer with hydrogen passivation, which inactivates magnesium.

So the takeaway I've got at the bottom of this slide is Kigami teaches to increase gallium nitride resistance in HEMTs by incorporating hydrogen passivation, and this is in slide 38.

MS. SPECHT: Let's go to slide 39.

Q. Does Beach189 in combination with Kigami invalidate claim two in your opinion?

A. Yes, I just showed through the element analysis that Beach189 invalidates claim two with Kigami.

Q. So let's turn to slide 40 of your slide deck and talk about claim three.

Dr. Lebby, does Kigami disclose the elements of claim three?

A. So we can see from claim three, claim three relates to acceptor-type atoms accepting -- selected from the group consisting of at least magnesium, and we can see that Kigami discloses forming a highly resistive compensated GaN layer with passivation using magnesium, and magnesium is an acceptor, so the takeaway from slide 40 is Kigami teaches using magnesium as an acceptor.

Q. In your experience, how common is it to use magnesium as an acceptor-type dopant in a III-V semiconductor device?

A. Magnesium is a very popular accepted dopant for these material systems, and certainly has been since the mid-1990s when Nakamura did his original work on gallium nitride LEDs. At that point, it was like a lightbulb going off for the whole industry, and the whole industry really looked deeply into magnesium and gallium nitride, and yes, it's a popular dopant.

Q. Did you review Dr. Schubert's rebuttal reports for claims two and three?

A. Yes, I did.

Q. And did Dr. Schubert disagree with Kigami disclosing magnesium as a dopant and hydrogen as an acceptor?

A. So Dr. Schubert agreed with my opinions that you can use hydrogen to inactivate or passivate magnesium, and so I don't fully understand your question, but my understanding is, is that Dr. Schubert aligned with my opinions.

MS. SPECHT: Let's go to slide 41.

Dr. Lebby, does Beach189 in combination with Kigami invalidate claim three in your opinion?

A. Beach189 in combination with Kigami invalidates claim three, yes.

Q. Let's turn to your second group, the Uemoto reference.

MS. FULTON: And move to slide 42. And let's turn ahead to slide 43 as well.

Q. Dr. Lebby, can you briefly describe the Uemoto reference you use in your second ground?

A. Yes, there is the front page of the Uemoto patent application publication on at least the cover page on the left-hand side. I've annotated in yellow what

1 Uemoto describes. That's a III-N transistor using multiple
2 III-N on nitride layers.
3 MS. SPECHT: Let's turn to slide 44 of the
4 slides you prepared.
5 Q. Dr. Lebby, how did you conduct your claim
6 analysis for claim one in your invalidity analysis?
7 A. So for claim one of the '294, here is my table
8 showing the claim elements of claim one. So as we can see
9 from this slide, five of the elements are not disputed.
10 The last two elements are disputed, which is 1E and 1F, and
11 I'm going to show that Uemoto on its own discloses all
12 elements of claim one.
13 MS. SPECHT: Let's turn to slide 45.
14 Q. And let's start going through each element of
15 claim one yet again with your second ground.
16 Dr. Lebby, in your opinion, does the Uemoto
17 reference disclose the preamble of the '294 patent?
18 A. We can see that the preamble claim element is
19 not disputed, and I've actually annotated in orange and
20 brought through on this slide paragraph 32 from Uemoto, and
21 we can see that Uemoto discloses the III-N transistor, and
22 so yes, it invalidates the preamble claim element.
23 MS. SPECHT: Let's turn to slide 46.
24 Q. Dr. Lebby, does Uemoto disclose element 1A of
25 the '294 patent?

A. Element 1A of the '294 claim one is a substrate. It's not disputed, and Uemoto discloses the substrate, and we can see from this slide, I've brought in parts of paragraph 31, which I've annotated in red, and also parts of figure seven, which I've annotated in red showing a substrate, and yes, Uemoto invalidates claim 1A.

MS. SPECHT: Let's turn to element 1B on slide 47.

Q. Dr. Lebby, does Uemoto disclose element 1B of the '294 patent?

A. Element 1B is a set of III-N transition layers. This is not disputed, and I've also brought in on the top right-hand corner of this slide paragraph 31. I've annotated in yellow, as well as parts of figure seven, and yes, Uemoto discloses a set of III-N transition layers that are above the substrate, and this invalidates claim element 1B of the '294.

MS. SPECHT: Let's turn to slide 48.

Q. Dr. Lebby, in your opinion, does Uemoto disclose element 1C of the '294 patent?

A. Element 1C is a 3M buffer level above a set of transition layers. This element is not disputed. I've actually annotated in green and shown parts of paragraph 32, as well as figure seven, and the takeaway at the bottom of slide 48 is Uemoto discloses a 3M buffer layer above the

set of transition layers and invalidates this claim element 1C of the '294.

MS. SPECHT: Let's turn to slide 49.

Q. Dr. Lebby, in your opinion, does Uemoto disclose element 1D of the '294 patent?

A. Element 1D is a 3M barrier layer above the buffer layer. This is not a disputed element. I've got partial extraction, or part of paragraph 32 in the top right-hand corner, I've actually annotated in blue the important areas, and below that in figure seven, and the takeaway from slide 49 is that Uemoto discloses a III-N barrier layer above the buffer layer and invalidates this claim element 1D of the '294.

MS. SPECHT: Let's turn to slide 50.

Q. Dr. Lebby, in your opinion, does Uemoto disclose element 1E of the '294 patent?

A. Element 1E is the compensated GaN layer above the barrier layer. This is the disputed claim element, and I've got on the left-hand side of this slide in figure seven and I've highlighted element 15B in purple. I've actually put a red box around part of 15B, and I've also got partial paragraph of 33 from Uemoto, and I've actually annotated in purple the important parts of paragraph 33 that address this claim element.

And we can see here that Uemoto discloses a III

nitride layer with a high resistive region in which magnesium is not activated, and this high resistive region is noted in figure seven as layer 15B.

MS. SPECHT: Let's turn to slide 51.

Q. Dr. Lebby, we've covered compensated, but does Uemoto also disclose a GaN layer?

A. So claim element 1E also incorporates the material for this compensated layer, which is gallium nitride. This is a disputed element, and we can see here from the part of paragraph 54 that Uemoto does describe gallium nitride. It's explicitly disclosed, and this III-N nitride layer is made of gallium nitride.

MS. SPECHT: Let's turn to slide 52.

Q. So, Dr. Lebby to put both pieces together, what in your opinion makes Uemoto's GaN layer compensated?

A. Well, Uemoto teaches very clearly that magnesium combined with hydrogen becomes highly resistive. It's a compensated GaN layer, and so Uemoto discloses that the region 15B is compensated GaN because it contains magnesium combined with hydrogen.

And we can see this from paragraph 49 and 59, which I've highlighted in purple or annotated in purple in the top right-hand corner of this slide 52. I've also put in excerpts from figure seven, and I've annotated layer 15B, which is the compensated GaN layer in the Uemoto.

Q. And does Uemoto disclose the purpose of its highly resistive region 15B?

A. The purpose is given in paragraph 59 on the middle right-hand side of this slide, and that is to reduce leakage current, and that's the same reason that the '294 gives for the compensated GaN, so not only are the material properties the same, but the purpose is the same too.

MS. SPECHT: Okay. Let's turn to slide 53.

Q. Dr. Lebby, in your opinion, does Uemoto disclose element 1F of the '294 patent?

A. So element 1F is a gate contact above the compensated GaN layer. This is a disputed element, and on this slide, on the top right-hand corner, I've got a partial part of RX73, which is Uemoto, and I've also got figure 27, and I've annotated in pink where the gate is, the gate electrode, which is element 20 in figure seven in the lower right-hand side, and the takeaway from slide 53 is Uemoto discloses a gate contact, which is above the compensated GaN layer, so in my opinion this gate layer 20 is above 15B.

MS. SPECHT: Let's turn to slide 54.

Q. Dr. Lebby, in your opinion is the gate contact above the compensated GaN layer as required by 1F?

A. So in this slide, I've got an enlargement of figure seven that was on the preceding slide. This slide

is slide 54, and I've annotated element 20, which is the gate contact in pink, and I have annotated in purple, which is the highly resistive region of gallium nitride that is what I'm terming compensated GaN, and we can see that the element 20, the gate is actually directly above 15B, and, in fact, in those green boxes, it's actually in contact with region 15B, and if you read Uemoto in more detail, you'll find that this overlap continues all the way through the device. If you look into the screen and you look out to the screen, then this overlap doesn't change.

And so the conclusion I've come to is Uemoto discloses that a portion of gate 20 is above and in contact with region 15B and, therefore, invalidates claim element 1F.

MS. SPECHT: Let's turn to slide 56.

Q. Dr. Lebby, is it your opinion that Uemoto discloses all elements of claim one, even the disputed elements?

A. So in this slide, I've got all the elements listed in a table, and five of the elements of 1 pre to 1D are not disputed. I've just shown you my analysis for elements 1E and 1F, which are the disputed elements, and so I believe I've shown you that all elements of claim one by Uemoto are disclosed and invalidates these elements of claim one for the '294, and this is on slide 56.

MS. SPECHT: Let's turn to slide 57.

Q. What was your analysis with regard to Uemoto and dependent claims two and three of the '294 patent?

A. So I'm going to show you that Uemoto also invalidates claims or dependent claims two and three of the '294, and I'll do that in the next couple of slides.

Q. Before you do, to be clear, do you need a secondary reference for claims two and three in this ground?

A. No, I do not. As we saw from the original ground table that I had showed in an early slide, I'm using Uemoto as a sole reference to invalidate not only claim one, as well as dependent claim two and dependent claim three.

MS. SPECHT: Let's turn to slide 58.

Q. On slide 58, it looks like you've grouped claim two into two different requirements. What requirements have you identified in claim two?

A. So in claim two, I've highlighted two important parts of the dependent claim two. One is the dopant atoms, and the type of dopant atoms, which I call requirement one, and whether those atoms are passivated, and that's requirement two. And so what we see on this slide, this slide shows you requirement one. The next slide I'm going to show you in a minute would be requirement two. But just

for the minute, requirement one, does the compensated gallium nitride GaN layer contain accepted-type dopants, and we can see from paragraph 46 of Uemoto, and I've annotated in red, that Uemoto does disclose accepted-type dopant atoms in region 15B, which are magnesium.

MS. SPECHT: Let's turn to slide 59.

Q. For the second requirement, Dr. Lebby, is it your opinion that Uemoto also discloses the second requirement?

A. The second requirement is to do with passivation, and we can see from requirement two from the center of this slide, accepted-type dopant atoms passivated with hydrogens, so we can see that from paragraph 49 of Uemoto, and we can see that annotated in red, and we can see that magnesium is inactivated with hydrogen, and so the takeaway from slide 59 at the bottom is Uemoto discloses passivating, in brackets or parentheses, inactivation of magnesium, and which is an accepted dopant atom using hydrogen.

MS. SPECHT: Let's turn to slide 60.

Q. So in your opinion, Dr. Lebby, does Uemoto alone invalidate claim two?

A. Yes, it does, and we can see from the table here, I've given a green tick mark under ground two, Uemoto, on the horizontal, and on the vertical claim two,

which is hydrogen passivation.

MS. SPECHT: Let's go to slide 61.

Q. Dr. Lebby, in your opinion, does Uemoto disclose the elements of claim three?

A. Dependent claim three is where accepted-type atoms are selected from a group consistent of at least magnesium, and we can see claim three, which I've actually annotated in blue, with a partial copy of paragraph 33, that magnesium is used in Uemoto. So Uemoto does disclose that the acceptor-type dopant atom is magnesium and, therefore, invalidates claim three of the '294.

Q. And just like for the first ground, did you read Dr. Schubert's rebuttal reports for claims two and three of the Uemoto ground?

A. Yes, I did.

Q. And did Dr. Schubert agree with your analysis of claims two and three with regard to Uemoto?

A. So the part I understand is Dr. Schubert agreed with me, in fact, that hydrogen does passivate magnesium. So, yes, from that standpoint, I believe our opinions are aligned.

MS. SPECHT: Let's turn to slide 62, and wrap up the '294 patent.

Q. Dr. Lebby, in your opinion does Uemoto teach all elements of claims one through three of the '294

patent?

A. Yes, what I've shown in this table is I've got two grounds: Beach in view of Kigami invalidates one, claims one, two, and three, and your question pertains to Uemoto, which is ground two. Ground two, we're using Uemoto alone, invalidates claims one, two, and three.

MS. SPECHT: Let's turn to slide 63.

CHIEF JUDGE CHENEY: This is probably a good place for us to take our lunch break.

So, Dr. Lebby, please don't discuss your testimony with anyone during the lunch break.

We're off the record for one hour.

(A luncheon recess was taken at 12:29 p.m., after which the proceedings resumes at 1:30 p.m.)

CHIEF JUDGE CHENEY: Please take your seats.

We're back on the record now in the 1366 investigation.

Before the lunch break today, we were listening to testimony under direct examination of Respondents' expert witness, Dr. Lebby.

Counsel, please continue.

MS. SPECHT: Thank you.

And we were at slide 63. So let's go ahead and turn to slide 64 of Dr. Lebby's presentation.

BY MS. SPECHT:

Q. And, Dr. Lebby, we're now moving into the '508 patent. So can you explain what the '508 patent is directed to?

A. The '508 patent we can see the cover page on the left-hand side of this slide is -- the '508 discloses a method for forming a conventional gallium nitride device with a self-aligning gate process. You can see I've highlighted parts of that in yellow on the right-hand side of slide 64.

MS. SPECHT: So let's turn to slide 65.

Q. And like I asked you for the '294 patent, does the '508 patent also discuss its alleged point of novelty?

A. The alleged point of novelty for the '508 patent is creating gate metal and GaN layer or gallium nitride layer that are self-aligned by etching using a single photo mask and I've exerted on the right-hand part of this slide section 57 from the '508, which is the abstract and I've highlighted in yellow the pertinent pieces. So it's a self-alignment process is the alleged novelty of the '508 patent.

MS. SPECHT: Let's turn to slide 66.

Q. Can you explain your understanding of self-alignment, Dr. Lebby.

A. Self-alignment is a concept that's been in the

semiconductor industry since at least the 1970s. I know I was working on self-alignment HEMTs and H vats at Bell Labs in the 1980s, but as you can see from figure 3C on the right-hand side, which is from the '508 patent, self-alignment is the same dimensions from the bottom of the gate metal, which is the pink annotation, and the top of the gate compound, which is the top of the purple.

You can see the red circles I've put in to show there is self-alignment between the gate and the semiconductor layer below. And that is shown clearly on the left-hand side of this slide from the abstract where I've highlighted in yellow and underlined in red. And I'll read, quote: Where the gate 35 compound and the gate metal --

MR. DAVIS: Your Honor. Excuse me.

CHIEF JUDGE CHENEY: Yes, Mr. Davis?

MR. DAVIS: This testimony is outside the scope of Dr. Lebby's expert report and deposition.

CHIEF JUDGE CHENEY: In particular, what is beyond the report?

MR. DAVIS: Beyond the report is the idea that self-alignment is the same dimensions from the bottom of the gate metal and top of the gate metal.

CHIEF JUDGE CHENEY: Okay. Let me just take a look at the testimony for just a minute before anyone

speaks.

Okay. Your response, counsel?

MS. SPECHT: Yes, Your Honor.

Dr. Lebby has an entire section in his report about self-alignment in the gate in the p-GaN layers. He speaks about self-alignment. These are paragraphs 343 and 344. The figure on the right-hand side, in fact, is in Dr. Lebby's report at paragraph 334. The only addition to this figure are the circles and the annotations indicating gate contact layer and doped GaN layer.

To the extent that Your Honor requests specific support for the same dimension -- I guess wording, Dr. Lebby at paragraph 343 explains that photo masks contain alignment markers so each photo mask can be proper aligned and patterned on the wafer below.

That supports the idea of same dimension because each of those two layers is aligned based on the pattern and you can see these paragraphs from Dr. Lebby's report, the figure at paragraph 343 shows the same dimension based on his understanding of self-alignment, as does the figure in paragraph 344. So while we will acknowledge that he does not use the word "same dimension," the concept is certainly supported in his report and I understand at paragraph 131 of Dr. Lebby's report provides further support spoke this.

CHIEF JUDGE CHENEY: Can you show me the page in the report that has the similar diagram to the one that was just shown in your demonstrative?

MS. SPECHT: Yes, Your Honor. 334. And it's the figure on the bottom that says '508 patent at figure 3B, if we can call that out. On the right-hand side you can see the pink and the purple colored the same. The only thing missing are the circles.

CHIEF JUDGE CHENEY: And can you put up your demonstrative slide again?

MS. SPECHT: Can we go back to the demonstratives, please?

CHIEF JUDGE CHENEY: And the bubble and the arrows, right?

MS. SPECHT: Yes, Your Honor. That is not a part of the figure that's been excerpted from figure 3C. That is a summary of Dr. Lebby's understanding based on his report at paragraphs 131, 343 and 334 -- 344.

CHIEF JUDGE CHENEY: And the labels?

MS. SPECHT: Yes, Your Honor. The pink gate contact layer and the purple doped GaN layer, which are colored the same as in his report.

CHIEF JUDGE CHENEY: Okay. Mr. Davis, your response?

MR. DAVIS: Yes, Your Honor. My response is

that Dr. Lebby's testimony is attempting to limit the concept of self-alignment to the same dimensions from the bottom of the gate to the top, limit it to that and only that and that there would be no other way to have a transistor that is self-aligned, but different dimensions and the '508 patent very specifically has such embodiments.

CHIEF JUDGE CHENEY: Mr. Winston, your view?

MR. WINSTON: The Staff has no objection to this testimony.

CHIEF JUDGE CHENEY: Okay. That's a close issue. I'll allow Complainants to argue the weight that I should give it in the post-hearing briefing, but I'll let the testimony continue.

Certainly does seem different than what has been shown to me in the expert report in some ways.

Please continue, counsel.

MS. SPECHT: Let's go to slide 67.

BY MS. SPECHT:

Q. Dr. Lebby, which claims of the '508 patent did you analyze in your invalidity assessment?

A. I analyzed claim one of the '508 patent for my analysis.

Q. And you mentioned before that most of the disclosure --

MS. SPECHT: Actually, let's go to slide 68.

Q. Looking at claim one, have you analyzed claim one for the new and the old elements?

A. Yes, I have. As we've already indicated in this case, this is a claim -- a method claim with 19 elements. So it's a long claim. You can see in the left-hand side of this slide I've put in green boxes what I believe is the admitted prior art, and I'll show that in a future slide.

The alleged novelty is claim elements 1E to 1I and I have a red box around those and I'm going to show that those are disclosed by the prior art Beach624. So the takeaway of slide 68, there are five claim elements of claim one that is disputed for alleged novelty, but I'm going to show they are disclosed by Beach642 [sic].

MS. SPECHT: Let's go to slide 69.

Q. Dr. Lebby, how do you know that the elements one preamble through 1D and 1J through 1R which you acknowledged on the previous slide were admitted prior art, how do you know those elements are admitted prior art?

A. So as you read through the '508 patent, you quickly come to figure one, you can see on the left-hand side of this slide figure one has in parentheses prior art, and so you can see a cross-section of a gallium nitride FET, which is claimed to be prior art. I have annotated in different colors what I believe are the prior art essences

of that and I've shown two parts: One with a green arrow, which is undoped gallium nitride material 103, which is annotated in green and also in blue source only contact metal 109, drain ohmic contact metal 110 which I've given a blue arrow and so looking at figure one of the '508 patent shows the undisputed prior art elements.

MS. SPECHT: Let's go to slide 71.

Q. Dr. Lebby, how did the prior art references you have analyzed match to the elements of claim one?

A. So the way I've mapped prior art to claim one of the '508 is I've composed a ground. The ground is quoted of primarily Hikita in view of Sheppard and Beach624.

As we look at this table here we can see the 19 claim elements of claim one. On the left-hand side the first five elements I can show that are invalidated by Hikita and then there is another blue box with four elements, 1J to 1M, which are also by Hikita and the last element 1R, which is also by Hikita.

Now in the right-hand of this slide I'm showing and I use Sheppard for invalidating claim element 1A, which is transitionally and as I believe Sheppard is more of a belts and braces because transition layers are done for all types of gallium nitride FETs that are on dissimilar substrates.

And then on the right-hand side of this slide on slide 71, I'm using Beach624 for the gate formation and Beach624 for the ohmic formation to invalidate those green boxes, which is elements 1E to 1I from 1N to 1Q. And so this is ground one, and this is how I map everything out.

MS. SPECHT: Let's go to slide 72.

Q. The allegedly novel portion of the claim, the gate formation steps, is shown in green on your slide 72. Does EPC dispute that these elements are taught by the prior art references you've identified on the previous slide?

A. No. And the green box here is the gate formation from elements 1E to 1I. The dispute is in the red box.

MS. SPECHT: Let's go to slide 73.

Q. Why don't you agree with EPC's position?

A. So in my opinion, if you look at the claim one of the '508, it certainly allows for a gate formation to occur after or simultaneously with the ohmic formation.

If you look at the specification of the '508, that allows for gate formation to occur after or simultaneously with the ohmic formation and so the alleged invention of claim one is limited to a self-aligned gate formation and so for a person --

MR. DAVIS: Your Honor.

CHIEF JUDGE CHENEY: What is the objection?

MR. DAVIS: The objection is point three on the slide, the alleged invention and that Dr. Lebby just said alleged invention of claim one is limited to self-alignment gate formation.

To the extent that Dr. Lebby is now testifying that self-alignment gate formation requires a gate electrode and a GaN layer underneath to be the same dimension, it's outside the scope of his report and deposition.

CHIEF JUDGE CHENEY: Did he testify to that?

MR. DAVIS: Yeah, that's why I said to the extent that because we just had the slide a few ago that said -- where he talked about the same dimension for self-alignment. As long as they don't later argue that, I'm okay with the testimony.

CHIEF JUDGE CHENEY: Okay. So there is nothing really to object to right now because he has -- or I'm not following.

MR. DAVIS: It's -- so --

CHIEF JUDGE CHENEY: Are you just repeating your earlier objection that you don't think that they've given you notice that self-alignment means same dimensions from top to bottom of the gate?

MR. DAVIS: It's a bit different now in just

that he's throwing the claim in there, and I just wanted my objection on the record to let you know that they took an extra step.

CHIEF JUDGE CHENEY: Okay. Did you talk about this slide with the other side last night?

MR. DAVIS: This is one of the slides, Your Honor, you may recall actually from yesterday morning. So they sent us this slide two nights ago, night before last, and my partner, Mr. Kopsidas, mentioned that there are a number of slides and we deal with these on the fly.

CHIEF JUDGE CHENEY: Okay.

MR. DAVIS: This is one of the ones that we identified.

CHIEF JUDGE CHENEY: Let me hear from the Staff on this.

MR. WINSTON: Your Honor, the situation here is slightly different because the testimony that is identified on the slide relates to the scope of the invention. It relates to the scope of the claims, not to simply what the patent discloses and so this does not appear to be consistent or disclosed in his expert report or deposition testimony and so for purposes of limiting the claim the Staff is of the view that this is objectionable.

CHIEF JUDGE CHENEY: What I'm not following is can someone read to me the testimony that they're objecting

to? Or has it not been given yet?

MR. WINSTON: It's anticipated by the slides, Your Honor.

MR. DAVIS: One moment, Your Honor.

Your Honor, I think the issue is that as he started to speak I probably maybe a bit rudely interrupted him. So he said it, but it's not on the transcript.

CHIEF JUDGE CHENEY: Okay. So there is nothing for me to do on the transcript at this time.

MR. DAVIS: Correct.

CHIEF JUDGE CHENEY: If I need to do something let me know again. So for now the objection is overruled as premature.

Counsel, please continue.

MS. SPECHT: Thank you, Your Honor.

BY MS. SPECHT:

Q. Dr. Lebby, let's go back to slide 73 and I believe you made it through most of your opinions that you've stated on this slide.

You were interrupted before you got to number four. So let's start there. What is your fourth opinion about whether gate formation must be performed before ohmic formation?

A. So in point four of slide 73 when I'm giving my opinion is that forming the ohmic contacts before or

simultaneously with gate formation would not have prevented a person of ordinary skill in the art like myself from creating a transistor, again, a nitrite transistor that would operate and so all I'm saying for this is that the gate formation can occur after the ohmic formation.

MS. SPECHT: Let's go to slide 75.

Q. What grounds did you prepare in your invalidity assessment for claim one of the '508 patent?

A. So the ground I put together for the '508 claim one is the primary reference of Hikita in view of Sheppard and Beach624, and I'm going to show -- I'm going to find claim one is obvious in view of ground one, which is Hikita in view of Sheppard and Beach624.

Q. When you reference Hikita, that is exhibit RX0041. Sheppard is RX0288, and Beach624 is RX0286. So we can refer to these references by name going forward.

MS. SPECHT: Let's turn to slide 76.

Q. Dr. Lebby, what is the Hikita reference about?

A. Hikita is a gallium nitride FET. It's a method for growing a gallium nitride layer creating the source and drain. As we can see from the cover page on the left-hand side, the source and drain are 109 and 110 and performing thermal annealing. We can see the gate of that FET is number 111. I've put in partial extracts from paragraphs 33, five, and 60 to support the takeaway at the bottom of

1 the page, but on slide 76 Hikita is undisputed prior art.
2 And it really is a field-effect transistor a method and
3 fabrication of such.
4 MS. SPECHT: Let's turn to slide 77.
5 Q. What is the Sheppard reference about?
6 A. The Sheppard is a reference -- we can see the
7 cover page on the left-hand side of this slide. It's a
8 method for fabricating nitrite based transistors with a --
9 methods for fabricating nitride based transistors with a
10 capillary and a recessed gate.
11 And really what I'm using Sheppard for is
12 because Sheppard discloses conventional or multiple
13 transition layers when you grow gallium nitride on to
14 substrates such as silicon or sapphire or silicon carbide
15 and although Sheppard does talk about a transistor, but he
16 really particularly calls out these transition layers which
17 are quiet common in the industry today.
18 MS. SPECHT: Let's go to slide 78.
19 Q. What is the Beach624 reference about?
20 A. Beach624 is a reference. We can see the cover
21 page on the left-hand side of the slide. It's also has the
22 same inventor that we heard earlier this week in court,
23 Dr. Beach. This discloses a method for forming a
24 self-aligned gate, and it's a self-aligned gate fabrication
25 process with gallium nitride, and we can see I've put up

the inventor on the top right-hand corner of this page, the abstract and parts or excerpts of part -- paragraph 47.

MS. SPECHT: Let's go to slide 79.

Q. Dr. Lebby, does the Beach624 reference disclose both gate formation and ohmic formation?

A. Yes, it does and on this slide what I've done is I've taken parts of the figures from Beach624. That's figure 1D and below figure 1D I've put figure 1E and so if you think about this in terms of processing a transistor in terms of where -- what direction it goes through the fab, you start off with 1D and you'll move down to figure 1E and on the left-hand side of figure 1D is where the gate is being formed and the next step of the gate is if you go down and you follow the purple down and you'll see the gate formation and post etch. On the right-hand side part of these figures you see where the ohmic metal is formed. That's in green and then you move down to see the post etch of the ohmic metal.

Now, Beach discloses a process for self-aligned gate, which is on the left-hand side. You can see on the left-hand side you start off with a blue photoresist at the stop. That gets used to define the self-aligned etch and that etch is the metal, which is 15, and again, nitrite below. You can also see it etches it, the patent transfer is as per the abstract of the '508, which is the same

dimension and that's called out in abstract 57 of the '508 and that's the way I understand self-alignment and that's the way I learned it when I went to Bell Labs in the 1980s and everybody was referring to self-alignment as the same dimension of patent transfer down, and then on the right-hand side we have Beach624 shows how to fabricate ohmic metal contacts.

CHIEF JUDGE CHENEY: Okay. We have an objection.

Mr. Davis?

MR. DAVIS: Yes, Your Honor. It's the same objection. This time I made sure to wait until it was clearly on the record that he's arguing that self-aligned is limited to same dimension.

CHIEF JUDGE CHENEY: So what the transcript says is referring to self-alignment as the same dimension of patent transfer down.

MR. DAVIS: Yeah.

CHIEF JUDGE CHENEY: I don't even know what that means.

MR. DAVIS: I took it to mean he was referring to the '508 patent. If he's not then I withdraw the objection.

CHIEF JUDGE CHENEY: Does someone else know what it means?

(No response.)

CHIEF JUDGE CHENEY: Okay, because no one knows what it means, it's going to be stricken and we'll see what happens next.

MS. SPECHT: Your Honor, we're striking the objection or Dr. Lebby's testimony?

CHIEF JUDGE CHENEY: Dr. Lebby's testimony. I was asking if you know what it means you should tell me because I was asking if anyone knows what that means.

MS. SPECHT: It says that the -- his testimony, if I understand you right, says that the gate contact is formed by the dimension of the photo-resistant pattern. Is that correct?

CHIEF JUDGE CHENEY: No. Perhaps if one of your colleagues could help you with looking at the realtime transcript.

MS. SPECHT: Your Honor, I'm not sure it's critical, so I will not waste the time, and we can remove that from the record and I'll ask another question.

CHIEF JUDGE CHENEY: Okay.

Please continue.

BY MS. SPECHT:

Q. Dr. Lebby, in your opinion, does the Beach624 reference disclose a self-aligned process for its gate formation?

1 A. Yes, it does.
2 MS. SPECHT: And let's go to slide 80.
3 And, Your Honor, before we address this before
4 my colleagues object, we're going to skip this slide and I
5 will ask my questions without because the questions do not
6 call for the content that is on the slide, and I understand
7 Your Honor has already said you don't want him speaking
8 about same dimensions. So I'll head that off.
9 Let's go to slide 81.
10 CHIEF JUDGE CHENEY: I'm sorry. I don't want
11 you to misunderstand what my earlier ruling was.
12 My earlier ruling was that I would allow the
13 testimony and that I would allow the other side to argue
14 about its weight.
15 MS. SPECHT: Yes, Your Honor. I understood
16 from removing something that seemed to be suggesting that
17 in his testimony before that we couldn't understand what
18 was an implication of that, that perhaps you had --
19 CHIEF JUDGE CHENEY: I only ruled that there
20 was some testimony elicited. It was objected to. I asked
21 someone to explain it. No one could explain it, so I
22 struck it. That was not meant to imply that you can't have
23 your witness state what was earlier stated. Whether I'm
24 going to credit that is something yet to be seen when I
25 look at all the evidence after trial.

MS. SPECHT: Yes, Your Honor.

CHIEF JUDGE CHENEY: If you want to ask questions about slide 80, I am not stopping you.

MS. SPECHT: Thank you, Your Honor.

CHIEF JUDGE CHENEY: That's what I wanted to clarify.

MS. SPECHT: I appreciate the clarification. Let's go back to slide 80 then.

BY MS. SPECHT:

Q. How does the self-alignment process in Beach624 compare to the '508 patent's disclosure of self-alignment?

A. It's exactly the same. If you look here you've got the gate contact layer in pink on the left-hand side -- on the right-hand side in figure 1E. That's element number 15. And you look at the width of that, that gate is used to define the etching of the layer below it. So you use that as a mask and so the doped gallium nitride layer is exactly the same width. That's called out in the '508. It's black and white as I can see and this is self-alignment as I've known since the 1970s and on the left-hand side we've got figure 3C.

This is from the '508 patent. It's exactly the same. You see the etch process. You use the gate contact layer and the gallium nitride layer is aligned completely to the gate contact above. This is what is known as

pattern transfer as I indicated earlier. You use the photoresist to create the pattern and then you use that pattern to etch the gate and you etch the gallium nitride below it. It's in the same dimensions.

This is self-alignment. This has been in the silicon industry since the 1970s. Use it every day, and I'm surprised that we're really questioning it today.

Q. So let me ask you this, Dr. Lebby, just to be particularly clear where your position lies: If self-alignment did not require exactly the same dimensions for the gate metal and the GaN -- the doped GaN layer beneath it, would Beach624 still disclose a self-aligned process in your opinion?

A. If the -- if you look at Beach figure 1E you look at that pink section 15 and you look at the two vertical edges, if they don't align with the layer below that's not self-alignment. So, no.

It's got to have those vertical edges aligned and they're on top -- so if you look at that white box, which is the red rings are below the pink box, those vertical lines have to align to the one above.

MS. SPECHT: Let's go to slide 81.

Q. And now we're going to enter the part where we walk through all of the limitations.

So, Dr. Lebby, in your opinion, do the prior

1 art references teach element one preamble?
2 A. One preamble is taught by Hikita who discloses
3 a method of forming an enhancement mode, which is a
4 normally off gallium nitride transistor.
5 MS. SPECHT: Let's go to slide 82.
6 Q. And do the prior art references you relied on
7 teach element 1A?
8 A. Yes, Hikita discloses alumimum nitride buffer
9 layer 102, which is a transition layer and that is
10 annotated yellow 102 on the Hikita figure one on the
11 left-hand side and that's on a substrate 101, which is
12 annotated in red.
13 MS. SPECHT: Let's go to slide 83.
14 Q. Dr. Lebby, do the references that you've relied
15 on teach element 1B of the '508 patent?
16 A. Yes, Hikita teaches and discloses growing an
17 undoped gallium nitride, which is a III-N epi labor, which
18 is labeled element 103 annotated in green over the
19 transition layers 102 and so, yes, element claim -- element
20 1B of claim one is taught.
21 MS. SPECHT: Let's go to slide 84.
22 Q. And do the references disclose element 1C?
23 A. Element 1C, which is III-N nitride or III
24 nitrite barrier layer of the epilayer we can see from
25 figure one, which is -- I've annotated in blue, Hikita

discloses growing an undoped aluminum gallium nitride or a III-N barrier layer 104 over epilayer 102.

MS. SPECHT: And let's go to slide 85.

Q. Do the references you've relied upon teach element 1D?

A. Claim element 1D, which is growing a gallium nitride layer with acceptor-type dopants over the barrier layer. I've annotated that.

(Clarification requested by the court reporter.)

A. Acceptor-type dopants over the barrier layer. And we can see Hikita teaches and discloses growing a heavily doped p-type acceptor gallium nitride layer 105 and 106 over the barrier layer, which is 104.

MS. SPECHT: Let's go to slide 86.

Q. So grouping all of these together which you identified as admitted prior art previously, is it your opinion that Hikita teaches all of the preliminary elements 1P through -- one preamble through 1D?

A. Yes, Hikita does teach the first five elements of claim one that goes from 1P, one pre to 1D.

MS. SPECHT: Let's go to slide 87.

Q. Going back to element 1A quickly, you noted previously that the claim requires multiple transition layers. Would it have been obvious to a person of skill in

the art in your opinion to grow multiple transition layers within Hikita?

A. Yes, as I've indicated earlier, Sheppard is more of a belts and braces piece of prior art, but you can see from the excerpts of Sheppard, which I've put in this slide, slide number 87, especially the lower box, transition layers are normal and Sheppard discloses growing multiple transition layers, which are quite common in the industry.

MS. SPECHT: Let's go to slide 88.

Q. And in your opinion, would it have been obvious to a person of skill in the art to combine Hikita with the generic multiple transition layers of Sheppard?

A. Yes, because both Hikita and Sheppard are growing gallium nitride devices on dissimilar substrates. You can see the substrates here. It can range from silicon to sapphire to silicon carbide and so being able to grow gallium nitride on a different crystal structure means you have to have multiple transition layers and so it's quite conventional and pretty much everybody in the industry does it.

MS. SPECHT: Let's go to slide 89.

Q. And here we're grouping elements 1E through 1I. How does the '508 patent describe the process claimed in these five elements?

A. Well, these five elements are describing the '508's claimed self-alignment process for the gate formation and so this is described in elements 1E to 1I. I've shown figures 3B and 3C from the '508 and I've expanded figure 3C showing what I've just described earlier as self-alignment.

MS. SPECHT: Let's go to slide 90.

Q. And going back to the breakdown of all the limitations from earlier in your slide deck, you identified Beach 264 as disclosing all of these steps.

How does Beach 26 -- I believe it should be Beach64, how does Beach624 disclose element 1E?

A. So I'm going to show in the next two or three slides how Beach actually creates a self-aligned gate.

This is claim element 1E, which is deposited in the gate layer, a gate contact layer. You can see ohmic metal number 18 in pink. So Beach discloses -- deposited an ohmic material obtained on doped gallium nitride layer 16. So Beach discloses element 1E.

MS. SPECHT: Let's go to slide 91.

Q. Is it your opinion that Beach624 also discloses element 1F?

A. Claim element 1F is applying photoresist. We can see Beach624 discloses this in element 13 which I've annotated in blue. So that's the photoresist. That's the

pattern that's defined by the photoresist.

So Beach discloses patterning of photoresist 13 on ohmic metal 18 and so this element is disclosed and taught by Beach.

MS. SPECHT: Let's go to slide 92.

Q. Does Beach624 in your opinion disclose elements 1G through 1I?

A. Yes. Claim elements 1G to 1I all complete the gate definition using a self-alignment process. So you can see in figure 1D where I've annotated in purple, you can see the photoresist 13. That is used to etch the pink below it and then the purple below that. That's all part of the self-aligned gate process. So Beach624 discloses at least from my standpoint expressly the elements 1G to 1I, which is the self-aligned gate patterning.

MS. SPECHT: Let's go to slide 93.

Q. Would a person of skill in the art in your opinion have been motivated to combine Hikita and Beach's 624 self-aligned gate etching process?

A. Yes, I would see this as a clear motivation to combine at least from my standpoint. If I look at Hikita what Hikita teaches is, is a nitride device with a gate contact layer. Beach also -- Beach624 also teaches a nitride device with a gate contact layer, but Beach624 also teaches us a method in making a self-aligned gate.

MS. SPECHT: Let's go to slide 94.

Q. Does Hikita discuss techniques for gate formation?

A. So in terms of a motivation to combine, a person of ordinary skill in the art like myself, I certainly would look to Beach624 for a self-aligned gate formation, but on closer inspection, you know, as a person that's been in the field, you know, close to some 40-years in semiconductors, there are two techniques for gate formation that are popular. One is lift-off and the other one is etching.

Now, Hikita, if you look at Hikita in detail, it leaves open the possibility of doing both, but if you read it very, very carefully it only mentions etching the III-V nitrite semiconductor materials as well as the dielectric materials, but it's silent about the techniques of lift-off and it's silent about the techniques of metal etching. Beach624 on the other hand expressly discloses gate formation using metal etching.

So in terms of a person of ordinary skill in the art, what would I have done? I would typically have chosen metal etching. I've done both. I've designed voices with both lift-off and etching, mostly because metal etching is routine, conventional, and very well understood in the art. It's not to say lift-off isn't, but if you

look at the table of the pros and cons from metal etching you get much higher patterning precision and it's used in high volume production which includes, you know, all of silicon ICs and BLSI. There are some downsides, but lift-off is also used in small scale term production, but as a person of ordinary skill in the art Beach's 624 metal etching for me is an obvious design choice and that would certainly improve Hikita.

MS. SPECHT: Let's go to slide 95.

Q. Dr. Lebby, were self-aligned gate etching processes well-known in the art at the time of the '508 patent?

A. Yes, they were and, in fact, I mean, it's interesting, the opposing expert I used to work alongside in the claim room in Bell Labs in 1985, and that was the time when I was doing self-aligned HEMTs and heterostructure FETs, albeit those were in gallium -- sorry, yeah, it's a new term. "Gallium," one word, "arsenide," second word.

And so the concept of self-alignment has been well-known. What I'm showing in this slide is Beach624 discloses gate patterning using photoresist. And that was conventional in the art.

MS. SPECHT: Let's go to slide 96.

Q. Dr. Lebby, in your opinion, how would a person

of skill in the art have implemented Beach624 self-aligned gate process within Hikita?

A. So in terms of looking at the motivation to combine Beach624 with Hikita, what I have on the right-hand side of this slide is an excerpt of paragraph 61 from Hikita. And the Hikita says that the gate electrode, which is highlighted in yellow, may be formed before the formation of the silicon nitride film.

And so that means in Hikita, even though Hikita shows on the left-hand side the gate, which is in figure 8F, numbered 411, fabricated after the ohmic contacts, Hikita shows that there is another embodiment where you can design the gate to be put in the fabrication process before the ohmic contacts.

And so if you look now to the bottom right-hand corner, as a person of ordinary skill in the art looking for motivation to combine, I take Beach624, the gate formation process, which is shown in figure 1E and put that starting at figure 8A of Hikita. In figure 8A I can put the gate down on top of 406 and I can start the process from there, the gate will be done before the ohmic metals. And so Beach's 624 gate formation process can be used to form Hikita's device with a gate before the ohmics as opposed to the ohmics before the gate.

MS. SPECHT: Let's go to slide 98, and I know

we're skipping one, but here we're going to move back to the claim elements of claim one, and we're looking at elements 1J through 1M.

Q. Dr. Lebby, in your opinion, which references teach elements 1J through 1M?

A. Well, Hikita teaches the steps for depositing and patterning a dielectric layer of silicon nitride. We can see the dielectric layer is numbered 408 in figures 8D and 80 of Hikita. I've also give a partial extract of backgrounds 59 and 60 explaining that in slide 98.

Q. Was depositing and patterning a dielectric layer as Hikita discloses conventional at the time?

A. Yes, I think on the next slide I think I detail the deposition and patterning and the etching of dielectric layers has been known in the semiconductor industry since the 1970s. I think that's --

Q. Yes.

MS. SPECHT: Let's go to slide 99.

Q. I apologize for that. Thank you for giving the answer even without your slide.

MS. SPECHT: Let's go with slide 100.

Q. Which reference discloses element 1N?

A. So I'm using Beach624 to teach the element 1N can be invalidated and element 1N is depositing an ohmic contact metal. I'm showing this in figure 1C on the

right-hand side under the green box. That's where the ohmic formation is taking place.

MS. SPECHT: Let's go to element 1O. Sorry, slide 101 and element 10.

Q. Dr. Lebby, does Beach624 in your opinion disclose element 10?

A. Yes, it does. We can see the blue annotation box in figure 1B as the photoresist and that's part of element 10. So Beach624 does disclose applying metal photoresist 13.

MS. SPECHT: Let's go to slide 102.

Q. Dr. Lebby, in your opinion, does Beach624 disclose elements 1P and 1Q?

A. Yes, it does and I'm showing figure 1D where the resist is element 13 and that is being used to etch the ohmics on figure 1A, which is under the green box. We can see the metal in pink number 17 being etched. So Beach624 discloses etching away ohmic metal 18 and removing photoresist 13.

MS. SPECHT: Let's go to slide 103.

Q. Dr. Lebby, why in your opinion would a person of skill in the art have been motivated to combine Hikita and Beach624's ohmic formation process?

A. Yes, they would and their Beach624 ohmic formation is similar to the gate formation I talked about

earlier. So a person of ordinary skill in the art would implement Beach's 624 ohmic formation in Hikita for the same reasons I've just given for the gate formation.

Q. Okay.

MS. SPECHT: Let's go to slide 104.

Q. And the final element of this very long claim, Dr. Lebby, in your opinion, which reference teaches element 1R?

A. So Hikita would -- teaches element 1R, which is the thermal annealing to form the ohmic drain and source contacts and a person of ordinary skill in the art would use thermal annealing to create ohmic contacts that's conventional in the industry.

MS. SPECHT: Let's go to slide 105 and sum it all up.

Q. Dr. Lebby, in your opinion does Hikita in combination with Sheppard and Beach624 teach and invalidate all 19 elements of claim one?

A. Yes, it does. You can see from this box all 19 elements I've shown through my analysis have been invalidated by Hikita in view of Sheppard and Beach624.

MS. SPECHT: And with that, I have no further questions and will pass the witness.

CHIEF JUDGE CHENEY: Thank you.

Is there cross-examination for this witness?

MR. DAVIS: There is, Your Honor.

CHIEF JUDGE CHENEY: Please proceed when you're ready, Mr. Davis.

MR. DAVIS: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. DAVIS:

Q. Good afternoon, Dr. Lebby.

A. Good afternoon.

Q. It's good to see you again.

A. Likewise.

Q. We met during your deposition late last year. I did not ask you the questions that day, but today if you don't mind, I'm going to ask you a few questions.

Dr. Lebby, a depletion-mode transistor is normally on at 0 volts; correct?

A. Yes, it is.

CHIEF JUDGE CHENEY: Dr. Lebby, I'm sorry to interrupt. I think you've placed a binder over the microphone.

THE WITNESS: Oh, okay.

A. A depletion-mode transistor is on at 0 volts.

Q. And an enhancement vote transistor is normally off at 0 volts; correct?

A. That is correct.

Q. And a negative voltage at the gate turns the depletion mode transistor off; right?

A. That's my understanding. You said negative.

Q. Yes, I did.

A positive voltage at the gate turns an enhancement mode transistor on; correct?

A. That's my understanding, yes.

Q. Thank you.

And a depletion-mode transistor, two-dimensional gas remains intact at 0 volts; right?

A. Yes.

Q. And if I refer to the two-dimensional gasses 2DEG from here on out, will that be okay with you?

A. Yes, it will.

Q. All right. Dr. Lebby, right now I'm going to direct your attention to the Mishra, Mishra reference. That's RX298.

And just to orient you, Dr. Lebby, you used this reference or at least a figure from it and other material to provide background information in your expert report. Is that ringing a bell?

A. I believe I did. You'll have to remind me of the details.

Q. Well, let's just go ahead and turn to figure four.

A. Do I have this here?

Q. You should. It should I believe likely be in numerical order. So RX298 and then, of course, you have your screen, but feel free to look through your binder.

All right. The question is simply do you agree -- let me start again.

You agree, don't you, that the transistor depicted in figure four is a depletion-mode transistor; right?

A. I have no reason to disbelieve it. It's showing the 2DEG going from source to drain. It doesn't seem to be interrupted. Typically on an announcement mode it's shown to be interrupted.

Q. Correct. Correct.

So when the negative voltage would be applied to that gate and that figure, there would be no 2DEG directly under the gate; correct?

Are you unable to answer that question, Dr. Lebby?

(No response.)

Q. Let me ask another one.

You testified that a depletion-mode transistor at 0 volts when you apply a negative voltage, the transistor turns off; correct?

A. I did testify that, yeah.

Q. Yeah, and if the transistor on figure four is a depletion-mode transistor and you apply negative voltage to the gate, the 2DEG is going to have to be interrupted in order to turn off the transistor off; right?

A. Correct.

Q. Okay. And where it's interrupted is generally under the gate; correct?

A. That is correct.

Q. All right. Let me now direct your attention to the Suh reference. This is going to be RX43.

You recognize this reference; correct?

A. Yes, I do.

Q. You use it in your expert report?

A. I did.

MR. DAVIS: Let's turn to figure 1A, please.

Q. It's on your screen.

A. I don't see it on the screen.

Q. Oh. So do you agree, Dr. Lebby, that the transistor depicted in figure 1A is an enhancement-mode transistor?

A. Yeah, I'm just confirming in paragraph 33, figure 1A is an enhancement-mode transistor.

Q. All right. And at 0 volts there is no 2DEG directly underneath the gate structure as shown in figure 1A; right?

A. I'm just checking in the text to see what voltage this is at, but if there is 0 volts, yes, there is no 2DEG under the gate.

Q. And when a positive voltage is applied to the gate, the 2DEG that's directly underneath the gate there would be replenished; correct?

A. Well, generally speaking, yes. This is --

Q. Thank you.

Thereby turning the transistor on; right?

A. I didn't hear what you said.

Q. Thereby turning the transistor on; right?

A. Certainly you can turn the transistor on.

Q. Generally speaking, Dr. Lebby, p-GaN is GaN doped with acceptor-type dopant atoms; right?

A. That is correct.

Q. And that doping is what causes the 2DEG underneath the gate to be depleted; right?

A. Certainly the doping has a role in generating the fixed negative charge and it's the fixed negative charge that helps with the depletion.

Q. Okay. Thank you.

CHIEF JUDGE CHENEY: Is there an objection?

MS. SPECHT: Yes, Your Honor. This entire line of examination is outside the scope of the direct. The Suh reference didn't come up. There were no questions about

the 2DEG. It's irrelevant to the claims he was analyzing as well during his direct exam.

CHIEF JUDGE CHENEY: When you say this entire line of questions, I don't know where it begins and why didn't you object earlier?

MS. SPECHT: The question about how p-GaN is doped is certainly a fair question. The question about whether it depletes the 2DEG the last one, perhaps I'll limit my objection to that.

CHIEF JUDGE CHENEY: Okay.

MS. SPECHT: Which is clearly beyond the scope.

CHIEF JUDGE CHENEY: So the question was: And that doping is what causes the 2DEG underneath the gate to be depleted.

You're objecting to that question?

MS. SPECHT: Yes, Your Honor.

CHIEF JUDGE CHENEY: Your response, Mr. Davis?

What would be typical here is you just show me that this is in his expert report and we move on.

MR. DAVIS: I'm sorry. I couldn't hear you.

CHIEF JUDGE CHENEY: What would be typical here is you just show me that this is in his expert report so we can move on or just tell me you're going to withdraw the question.

MR. DAVIS: This figure is certainly in his

expert report and all sorts of discussion about enhancement-mode and 2DEG, I don't know if my colleague can help me, but I can ask my next question. That's okay.

CHIEF JUDGE CHENEY: And maybe I have misunderstood from context here.

Counsel for the Respondents, remind me of your name one more time.

MS. SPECHT: My name is Kara Specht, Your Honor.

CHIEF JUDGE CHENEY: Ms. Specht, were you objecting that you didn't go into this in direct?

MS. SPECHT: That's correct, Your Honor. I am not disputing that this figure appears in Dr. Lebby's report. In fact, he had an entire ground on the Suh reference related to the '508 patent, but the '508 patent is not about p-GaN. It is not about 2DEG.

So the scope of this question is both beyond the scope of Dr. Lebby's report and beyond the scope of my direct, so two objections, Your Honor.

CHIEF JUDGE CHENEY: Okay. And I apologize that I'm not as deeply familiar with the record as probably you are.

What's shown here on the screen is figure 1A from a reference that Dr. Lebby would like me to consider in determining patent validity, is that right?

1 MS. SPECHT: You're a bit muffled, Your Honor,
2 but I -- he considered it and presented the full ground on
3 it in his report for the '508 patent, which is about the
4 gate etching. He did not consider it or include it in his
5 report for the '294 patent in any grounds there, which is
6 what is about p-GaN doping depletion of the 2DEG. There
7 are two separate issues here and they're trying to mingle
8 them together in a way that is not supported by my direct,
9 but also not in his report.
10 CHIEF JUDGE CHENEY: Okay. I understand the
11 objection better.
12 Mr. Davis, any response?
13 MR. DAVIS: Well, one response, Your Honor, is
14 this line of questioning is wholly relevant to the claims
15 at issue in the '294 patent. It is EPC's position that the
16 claims despite Dr. Lebby's view are, in fact, directed to
17 enhancement-mode devices and this line of questioning will
18 lead us there.
19 CHIEF JUDGE CHENEY: Staff, do you have a view?
20 MR. WINSTON: Your Honor, I think what
21 Mr. Davis just explained, you know, where we sit right now,
22 this isn't directly relevant but it sounds like his line of
23 questioning is leading to something that is relevant to the
24 opinions set forth on direct.
25 CHIEF JUDGE CHENEY: Okay. So I'm going to

overrule the objection for now. Dr. Lebby has put this reference at issue in the investigation and I think it's fair to -- the line from the Federal Circuit is to consider the reference for all that it discloses.

So please proceed, Mr. Davis.

MR. DAVIS: Thank you, Your Honor.

BY MR. DAVIS:

Q. Dr. Lebby, you agree that magnesium-doped GaN that's passivated with hydrogen would produce an enhancement-mode device; correct?

A. Certainly we've heard in this trial.

Q. And you believe that?

A. Magnesium passivated with hydrogen can generate an enhancement-mode gallium nitride FET.

Q. I'm sorry, you said the word "can"? I couldn't quite hear you either. You said "can produce"?

A. Can.

Q. Can?

A. Yes.

Q. But you don't believe it would necessarily produce?

A. I have no reason to disbelieve it. Is that your question?

Q. Okay. I guess my question was a bit different, and that's because I know you had your deposition taken in

this matter, correct, in this matter, this ITC case?

A. Yes, yes, I had my deposition, yes.

MR. DAVIS: If we could see Lebby depo transcript at 50 -- page 50, lines 50 through 19, through 52, lines 15 through 19.

Q. And the question starting at page 50, line 15 is: So just going back to my original question, is it correct that you can't tell me sitting here today whether figure 2A of Smith would result in an operative enhancement-mode or depletion-mode transistor?

And in relevant part the answer, page 52, lines 15 through 19: If you passivate magnesium with hydrogen, you're going to see a highly resistive semi-insulating-type layer, and that to me would produce an enhancement-mode device.

Did I read that correctly?

A. You read it correctly.

Q. Thank you.

Let's talk about Beach189 a bit.

You rely on the embodiment disclosed in figure four of Beach189 to allege invalidity of the '294 patent. If I can get that up, please. This is RX11, Beach189.

MR. DAVIS: Figure four, please.

Q. This is the same figure we've been discussing or you've been discussing; correct?

A. That is correct.

Q. And you point to field plate 25 as allegedly teaching the claim compensated GaN layer; right?

A. Layer 25, yes, I agree with you.

Q. Am I correct in saying that in your view the transistor in figure four of Beach189 can be either depletion-mode or enhancement-mode?

A. So I believe in my deposition I did indicate that. I said it could be either depletion-mode or enhancement-mode.

Q. You did, indeed. Thank you.

A. But I wasn't finished with my answer.

Q. Your counsel can redirect you on that. I got the answer I needed. Thank you.

You earlier said depletion-mode has 2DEG intact at 0 volts, resulting in a normally on transistor; right?

A. I believe you recollected that correctly.

Q. And when negative voltage is applied to the gate, transistor turns off. This is a depletion-mode; right?

A. That's my understanding.

Q. Let's turn to paragraph three of Beach189. And there is some language in there. It says: To control the current in a high power application, a large negative voltage is applied to the gate electrode in order to change

the voltage at the gate electrode rapidly.

You agree that that language describes a depletion-mode transistor; don't you?

A. Paragraph three is in the background to the invention. I will agree with you that a negative voltage is typically one would expect from a deletion mode device --

Q. Thank you, Dr. Lebby.

And if Beach189 is depletion-mode, the 2DEG in the channel of the transistor of figure four would remain intact at two volts; right?

(Clarification requested by the court reporter.)

MR. DAVIS: Sorry. It actually doesn't matter. I'm going to jump ahead a couple of questions.

Q. Now, let's do something a little bit different, Dr. Lebby. If figure four --

MR. DAVIS: We can keep figure four of Beach189 up there, please.

Q. If figure four of Beach189 were to be an enhancement-mode transistor, at least a portion of the 2DEG channel would be removed so that the transistor is normally off, right?

A. As per paragraph 44 I would agree it's in enhancement-mode two.

Q. That did not answer my question.

If figure four of Beach189 is an enhancement-mode transistor, at least a portion of the 2DEG channel would be removed so that the transistor is normally off; correct?

A. So if the device in figure four was operated in enhancement-mode, I would expect the 2DEG not to be continuous between the source and drain. I think that's where you're going.

Q. Thank you.

And in order for the device in figure four to be an enhancement-mode device, the field plate 25 would need to have p-type doping; is that correct?

A. I would have expected it to be p-type as opposed to n-type, yes.

Q. And it's that p-type doping -- excuse me.

It's that p-type doping that would cause the 2DEG to be removed; right?

A. Well, the p-type doping as I've just indicated earlier to one of your earlier questions would be part of the fixed negative charge, which as you suggest would make the 2DEG discontinuous.

Q. Thank you.

Dr. Lebby, do you agree that if the field plate in figure four, which is field plate 25 has p-type doping,

the entire 2DEG between source and drain would be gone at 0 volts?

A. It's a reasonable assumption that if the negative charge is uniform across layer 25, the 2DEG between the source and drain will be discontinuous. So, yeah, I agree with you.

Q. Okay. All the way between source and drain?

A. Well, as I indicated in my deposition, we don't know the real distance here, but I would expect if there is negative charge in layer 25 that would deplete 2DEG and so, yeah, if there is negative charge all the way across, then, yes, it would be depleted all the way across.

Q. Okay. Let's take a look at the -- this is bringing things full circle. Let's take a look at the Suh reference that we discussed before except this time I'd like to look at figure 18.

You see in the upper left-hand corner, I'm going to call that 18A and then clockwise B,C, D, E, and F. I'm not certain why there is writing on there, but okay.

P-GaN is item 1808.

Do you see that?

A. I do see that.

Q. Okay. And if you look at figure 18D the p-GaN is all the way between source and drain; right?

A. 1808 is between source and drain. I agree with

you.

Q. Yeah, and 18D.

And there is no 2DEG underneath the gate at 18D all the way from source to drain; right?

A. That's what that figure in the lower right is showing. I agree.

Q. And if positive voltage were applied to the gate electrode, the 2DEG would be replenished directly beneath it; right?

"It" being the gate electrode?

A. If I understand your question, you apply a voltage to the gate then the 2DEG will only be replenished directly underneath the gate. Is that your question?

Q. That's my question.

A. It just depends on how much voltage you apply to the gate and what the characteristics of the materials are in between.

Q. Okay. So you don't know. All right.

MR. DAVIS: Let's look at figure four of Beach189 and figure 18D of Suh side by side. Thank you.

Q. If you assume that the deal plate 25 of Beach189 is p-type doping, it's similar, "it" being figure four, similar to 18D of Suh in several ways; right? Specifically there is a GaN layer all the way between source and drain connecting them; right?

A. I see what you're saying.

Q. Okay. GaN electrode on top of the GaN on both; right?

A. That's what I see.

Q. Okay.

MR. DAVIS: Let's go back to the bigger figure, 18, that has all the mini figures. Specifically 18E.

Q. You notice at 18E at the bottom there it says: Etch p-GaN and access regions?

A. I do see that.

Q. Okay. You understand that term, right, "access regions"?

A. I do see that, yeah, I understand that term.

Q. Yeah, that's a term that's normal in the art; right?

A. (Indicating.)

Q. Okay. Dr. Lebby, I'm about to talk about Uemoto for a little bit, but before I do that, I have a question, a more general question about GaN.

You believe that GaN that's doped with magnesium has a net positive charge; right?

A. Could you repeat that question again?

Q. You believe that GaN doped with magnesium has a net positive charge; correct?

A. I didn't give you that answer in my deposition.

Q. I'm sorry?

A. I didn't give you that answer in my deposition.

Q. Well, let's take a look. Let's take a look at deposition transcript page 14, lines four through nine.

MR. DAVIS: I think you need more than that. Yeah, sorry. I gave you the wrong quote. It's not -- it's not nine. It's 10.

Q. Question: And when gallium nitride is doped with magnesium, what is the net charge on that material? Answer: It's a p-dopant, so it's a positive charge.

Did I read that correctly?

A. That you read correctly.

Q. Thank you.

Let's talk about Uemoto, Dr. Lebby.

Dr. Lebby, you rely on the embodiment disclosed in figure seven to allege invalidity of the '294 patent and if we could pull up figure seven to assist him, we can refresh his memory here.

Correct?

A. I didn't hear the question. Sorry.

Q. Sorry. This is the embodiment on which you rely on, the embodiment of figure seven; correct?

A. Yes, I did.

Q. All right.

And you allege that region 15B is a compensated

GaN layer; right?

A. That is what I've indicated.

Q. Region 15A that's there, that is described by Uemoto as a control region; right? And we can take a look -- sorry. Let me reorient ourselves here.

MR. DAVIS: If we could take a look at Uemoto RX73 at paragraph 33. Okay. I'll try again. My apologies.

Q. Region 15A is described by Uemoto as control region; right?

A. So if I understood the question correctly, 15A is the control region as indicated by Uemoto.

Q. Right. And region 15A has magnesium? Region 15A has magnesium; right?

A. Yes, it does.

Q. And that magnesium is activated; correct?

A. It is activated as indicated in paragraph 33.

Q. And region 15A helps control the flow of current between the source and drain; right?

A. It is in the path of the current. The control of the current is by 15B to my understanding.

Q. Sorry, what did you say? Control the current is to 15B as you understand it?

A. Correct.

Q. Okay. 15B is described as a high resistive

region; right?

A. That is correct.

Q. You agree -- actually, let's first take a look at RX73, paragraphs 38. You agree that Uemoto describes that there is 2DEG directly underneath region 15B at 0 volts, right? I can orient you by suggesting you look at the second sentence that starts: In the region other than the control region. Second sentence. There you go.

A. So the question is whether there was a 2DEG created or not?

Q. Actually here is the question again. I'm going to re-ask it: You agree that there is 2DEG directly underneath region 15B at 0 volts; right? That's what it says.

A. But it doesn't say that at the bottom.

Q. Sorry?

A. The bottom of your excerpt, it doesn't say that.

Q. It says: That region other than the control region. Let's break it up.

You understand the region other than the control region to be talking about region 15B?

A. I need to see figure 2A and 2B because there is two parts to this paragraph 38. The top part talks about --

Q. Could you just focus on my question, please: Do you understand the region other than the control region to be region 15B?

A. I need to look at the figures.

MR. DAVIS: Can you show him figure 2 --

Q. Do you want to see 2B first or 2A or both?

A. Well, I have them in front of me.

Okay. I'm calibrated. So could you repeat the question?

Q. Sure thing.

You agree that there is 2DEG directly underneath region 15B at 0 volts; right?

A. So in figure 2B there is a 2DEG and I agree with you the 2DEG is -- is -- it looks like it's continuous.

Q. Thank you.

MR. DAVIS: Can we turn to JX14 in column three, lines 16 through 17.

Q. JX14, of course, is the '294 patent? This language says: Advantageously the high doping level of compensated layer 38 leads to enhancement-mode devices.

Did I read that correctly?

A. Yes, you did.

Q. You would agree that as described in those lines, there would be no 2DEG directly beneath the

compensated layer of the '294 patent; right?

A. In an enhancement-mode device at 0 volts there will not be a 2DEG underneath the gate.

Q. Thank you.

Let's talk about the Beach624 a bit. Thank you for bearing with me, Dr. Lebby.

MR. DAVIS: We can turn to paragraph 39 at Beach624, which is RX286.

Q. Do you agree -- let me ask it a different way.

You agree that this paragraph, paragraph 39 of Beach624 depicts a depletion-mode transistor; right?

I can specifically orient you to the second sentence. Just so you're clear, I'm not asking about this paragraph.

A. I understand your question.

Q. All right.

A. I will agree with you that paragraph 39 in Beach624 does refer to a normally on device, which is another term for a depletion-mode transistor.

Q. Thank you, Dr. Lebby.

MR. DAVIS: I'll pass the witness.

CHIEF JUDGE CHENEY: Okay.

Is there questioning from the Commission Investigative Staff?

MR. WINSTON: The Staff has no questions, Your

Honor.

CHIEF JUDGE CHENEY: Okay. I don't have any questions for this witness.

Is there any redirect?

MS. SPECHT: Yes, Your Honor.

REDIRECT

BY MS. SPECHT:

Q. Dr. Lebby, do you recall when counsel for EPC asked you about whether P dopants caused a net positive charge?

A. I do.

Q. And do you recall that he showed you your deposition transcript?

A. I do.

Q. And do you recall whether you clarified that response at a later time in your deposition?

A. I clarified that response at least four times later in the deposition from pages 40 to 68 and made it very clear in my description that I was talking about a negative charge. I misinterpreted the question because it was early on in the deposition.

Q. Thank you.

Dr. Lebby, does claim one of the '294 patent require an enhancement-mode transistor?

A. No, it does not.

Q. And I'd like to call up the '294 patent JX0014 at column four, lines 55 through 57, please.

Dr. Lebby, does the '294 patent disclose both an enhancement-mode and a depletion-mode device?

A. Yes, it does.

Q. And you testified that Beach189 like the '294 patent discloses both an enhancement-mode and a depletion-mode device; correct?

A. That is correct.

Q. Did you prepare any demonstratives on your opinion of how Beach189 discloses enhancement and depletion-mode devices?

A. I did.

MS. SPECHT: Can we pull up demonstratives RDX100? And let's go to slide three. So RDX100.3.

Q. Why does Beach189 in your opinion disclose both an enhancement and depletion-mode device?

A. We could see the cover page of Beach on the left-hand side of this slide, but on the right-hand side I've extracted paragraph 44. Paragraph 44 is interesting because the highlighted area, quote, the gate electrode may be exposed of n-type or p-type silicon and it goes on to say any design conductivity and so if you design a device with n-type material then it is a depletion-mode. If you

design a device with p-type material as we've heard in this litigation, it's enhancement-mode.

MS. SPECHT: So let's go to slide four now.

Q. And since the 2DEG has really been the star of the show throughout the cross-examination, I've got the slide that you prepared in advance showing figure four on the screen now and let's walk through how the 2DEG would work when operating Beach189 in enhancement-mode.

So what are you showing on slide four of demonstrative RDX100?

A. So the annotations I've applied to this slide, which are new, are the 0 volts above the gate 22 and the negative signs, which are in the barrier and so I think the negative signs are moved a little bit but nevertheless, the message of this slide is 0 volts. If it's an enhancement-mode device then the 2DEG will be depleted underneath layer 25, which is the compensated GaN layer as taught by Beach.

Q. And because the compensated GaN layer 25 extends and I know you clarified this a bit, but in the figure it looks like it extends between the source 20 and the drain 18, you only have the 2DEG on the slides -- on the sides in your slide; is that right?

A. That is correct.

MS. SPECHT: So let's go to slide five.

Q. And continuing to walk through the process, let's say now I've applied a positive voltage to the device of Beach 194 operating in enhancement-mode, what happens when you apply a positive voltage?

A. Well, as we've indicated through the cross that you can establish a 2DEG with a positive voltage on an enhancement-mode and the question here is, is that 2DEG doesn't -- it's not continuous all the way from source to drain and so I believe that was what the questions from opposing counsel.

Q. So how would a person of skill in the art operating Beach189 in enhancement-mode have solved this problem and gotten a 2DEG that extends all the way across the region of the AlGaN layer under element 25?

A. So the question here is how could you make this device work or make the 2DEG continuous between source and drain given the characteristics of what I've known so far in the Beach piece of prior art.

So what we know is, is that layer 25 is ultra high resistance, and what we do know is that you can put a voltage on to 22 to form the 2DEG under the gate. To get the 2DEG to form under the other part of 25, you've got to be able to apply a field. That means you're going to have to increase the voltage.

Now, I haven't modeled or simulated, but you

could play with the level of resistance or the level of semi-insulating level of layer 25. You could play with the voltage, but you can actually get the 2DEG to go from source to drain if you put enough voltage on it.

Now, I will say that may not be an ideal device. You may have lots of leakage, but certainly you can make it work and you can make it an operating device. May not be the best device, but you can make it work.

CHIEF JUDGE CHENEY: I'm sorry. There is an objection?

MR. DAVIS: Objection.

I believe Dr. Lebby is testifying outside the scope of his deposition and expert report.

CHIEF JUDGE CHENEY: What part of the testimony?

MR. DAVIS: The part explaining how you could actually get the 2DEG going from source to drain by putting enough voltage on it, that's -- that's the main part right there.

CHIEF JUDGE CHENEY: Okay. Counsel, your response?

MS. SPECHT: Your Honor, they just asked him questions on this exact issue. Is he not allowed to respond?

CHIEF JUDGE CHENEY: I am just curious about

1 your position.
2 MS. SPECHT: Your Honor, because --
3 CHIEF JUDGE CHENEY: Generally I don't answer
4 the questions. I asked them.
5 MS. SPECHT: Understood, Your Honor.
6 Because Dr. Lebby was presented with this
7 problem in his deposition and he did not get a further
8 report after that, the response, although he noted as we've
9 seen that Beach189 does operate in an enhancement-mode, the
10 questioning did not get so far as to explain how that would
11 work. So he's elaborating on the position that he has had
12 since the outset of this case, that Beach189 discloses an
13 enhancement-mode device. This is explaining why that would
14 work in response to counsel's suggestion on cross that this
15 device would not work.
16 CHIEF JUDGE CHENEY: Thanks. Very well.
17 Mr. Winston?
18 MR. WINSTON: Your Honor, I believe that the
19 witness was giving an explanation. That was the first time
20 that we'd ever heard it about modeling the device and
21 trying different voltages and such. I don't recall seeing
22 that in the expert report or hearing that at his deposition
23 and counsel has not pointed to any testimony or expert
24 report that discloses that.
25 CHIEF JUDGE CHENEY: Mr. Winston, do you have a

memory as to whether he was asked to explain this at his deposition?

MR. WINSTON: I don't have a recollection if he was asked to explain it, but he did not give that explanation at his deposition.

CHIEF JUDGE CHENEY: Okay and the explanation is not in the expert report?

MR. WINSTON: That is my recollection, Your Honor.

CHIEF JUDGE CHENEY: Okay. Mr. Davis is on his feet.

Do you have something to add?

MR. DAVIS: I did just want to add that he was generally asked about a situation like this with GaN all the way across and whether or not the 2DEG would be depleted and with respect to Beach189 whether that would be an operational device and he provided none of these opinions.

CHIEF JUDGE CHENEY: Okay. Ms. Specht, do you agree that Mr. Or Dr. Lebby was asked to explain this figure at his deposition?

MS. SPECHT: This exact figure? Yes.

CHIEF JUDGE CHENEY: Yes.

MS. SPECHT: With respect to the 2DEG, which as I noted was raised for the first time on cross for him, I

will acknowledge he did not explain the 2DEG in his deposition because these questions were never presented, which is why I objected a moment ago. It seems he should be allowed to explain his position on the 2DEG now that he's been asked about it.

CHIEF JUDGE CHENEY: Okay. I'll hold the objection in abeyance. If you wish to preserve it on the complaint's side, please raise it in your post-hearing brief and I will consider it further. For now I'll allow the testimony to come in.

Mr. Davis, something else to add?

MR. DAVIS: Yes. I did just want to add, we do have deposition transcript cite now starting at 93, line two asking about paragraph 43 of Dr. Schubert's report which --

CHIEF JUDGE CHENEY: Does it specifically ask about 2DEG?

MR. DAVIS: Yes. The question is: How would you respond to Dr. Schubert's statement in that paragraph that a field plate were compensated, in parens, passivated p-type gallium nitride, it would deplete 2DEG electrons below it? And that since the field plate extends across the entire length between source and drain, the entire 2DEG from source to drain is depleted.

CHIEF JUDGE CHENEY: Your response, counsel?

MS. SPECHT: I would like to read the portion for what Dr. Lebby's response was which will inform the scope of what he testified there. That was only the question that was read, Your Honor. I can have my graphics team put it up if that would be helpful?

CHIEF JUDGE CHENEY: I think if this is a really important point and you want to press it in your post-hearing brief, please do so. I'm holding my ruling in abeyance.

Let's continue and hear the testimony.

MS. SPECHT: We only have one more slide to wrap it up.

BY MS. SPECHT:

Q. Dr. Lebby, you prepared one final slide, slide six. So let's go to that. And this slide I think is consistent with the testimony you just gave, but if you could give a very quick explanation of what it shows.

A. What I'm showing here is you increase the voltage, then you can drive the 2DEG from source to drain. Won't be a very good FET, but you can make it work.

Q. So in your opinion it's really as simple as adding -- applying additional voltage to the gate electrode 22 to create an operational enhancement-mode device in Beach189?

A. I think that certainly would help. There may

be some other things you could do with layer 25, but, in essence, that's going to be one of the biggest parameters you change.

MS. SPECHT: No further questions.

Thank you.

CHIEF JUDGE CHENEY: Is there any further recross?

MR. DAVIS: No further questions, Your Honor.

CHIEF JUDGE CHENEY: Staff?

MR. WINSTON: No questions from the Staff, Your Honor.

CHIEF JUDGE CHENEY: Okay. Thank you, Dr. Lebby, your testimony helped me understand the case.

You may step down.

THE WITNESS: Thank you.

(Witness excused.)

CHIEF JUDGE CHENEY: Let me just add one more thing about my previous ruling. If you don't address this in your post-hearing brief, it's waived.

Do you understand, Complainant?

MR. DAVIS: Yes, Your Honor.

CHIEF JUDGE CHENEY: Okay. We are now ready to take our afternoon break. We'll take 15 minutes. By my clock that means 3:22.

We're off the record.

(Whereupon, a recess is taken.)

(Whereupon, the hearing resumed in open session.)

1 O P E N S E S S I O N
2
3 CHIEF JUDGE CHENEY: Please take your seats.
4 We're back on the public record now after the
5 afternoon break on this, the fourth day of the evidentiary
6 hearing in the 1366 investigation.
7 Before the afternoon break, we were listening
8 or we finished up the examination of Respondent's expert on
9 technical matters, Dr. Lebby, particularly on validity
10 matters.
11 Do responses have any more witnesses to call?
12 MR. LAVENUE: Other than Dr. Doolittle
13 tomorrow, no, Your Honor.
14 CHIEF JUDGE CHENEY: Okay.
15 So Dr. Doolittle tomorrow. No more witnesses
16 for Respondents today.
17 And do Complainants wish to call any rebuttal
18 at this point?
19 MR. DAVIS: Yes, Your Honor. Complainants wish
20 to call Dr. Fred Schubert.
21 CHIEF JUDGE CHENEY: Dr. Schubert, as you make
22 your way to the stand, please remember you're under the
23 same oath that you took earlier this week and please take a
24 seat.
25 Mr. Davis, proceed when you're ready.

1 MR. DAVIS: Thank you, Your Honor.
2
3 S. F R E D S C H U B E R T,
4 Having been previously duly sworn or affirmed
5 on his oath, resumed and was thereafter examined and
6 testified as follows:
7 REBUTTAL
8 BY MR. DAVIS:
9 Q. Good afternoon, Dr. Schubert.
10 A. Good afternoon.
11 Q. Dr. Schubert, did you work on any slides in
12 preparation for your testimony this afternoon?
13 A. Yes.
14 Q. And you'll see on your screen there is a cover
15 page. Are these the slides?
16 A. Yes.
17 Q. Let's go to the next one, please.
18 This slide we see in the heading overview of
19 the '294 patent. Could you explain what you did here?
20 A. Yes, I will first talk about the '294 patent
21 and we see on the left-hand side claim number one. Claim
22 number one has a key limitation: A compensated gallium
23 nitride layer. There is a claim construction or there are
24 three proposed claim constructions for that particular
25 limitation.

1 There is also claim number two and claim number
2 three and on the right-hand side we see the inventive
3 device of the '294 patent and layer 38 is the compensated
4 semiconductor layer.
5 Q. Thank you.
6 MR. DAVIS: Going to the next slide, please.
7 Q. Invalidity allegations, could you explain this
8 slide to us, please.
9 A. Regarding the '294 patent, Dr. Lebby presented
10 three reasons for which he believes the '294 patent is
11 invalid. Beach189, an anticipation reference, Beach189 in
12 view of Kigami, an obviousness combination and Uemoto, an
13 obviousness reference.
14 Q. And what was your conclusion with respect to
15 Dr. Lebby's allegations on the '294 patent?
16 A. My conclusion is and my opinion is that the
17 '294 patent is not anticipated and not obvious based on
18 these references.
19 MR. DAVIS: Skip to the next slide, please.
20 Q. Dr. Schubert, this slide references a Beach189.
21 What can you tell us about this slide?
22 A. This is one of the alleged anticipation
23 references, Beach189 and Dr. Lebby alleges that layer 25 is
24 the claimed compensated gallium nitride layer. Just if we
25 have an overall look at this particular reference, we see

that it is a depletion-mode transistor that has a field plate and a field plate is a feature that reduces the electrical field in the channel and field plate 25 is the particular layer that Dr. Lebby identifies as the claimed compensated gallium nitride layer.

Q. Thank you.

MR. DAVIS: Next slide, please.

Q. Here there is reference to a different reference to Uemoto. What can you tell us about Uemoto?

A. So this is another prior art reference and this could be referred to as a classic prior art reference. We have conducting p-type gallium nitride layer 15A and the '294 patent teaches compensated, passivated, semi-insulating, such a layer under the gate whereas Uemoto, the reference shown here, teaches a conducting, activated gallium nitride layer under the gate. So we see quite a significant difference between what is being taught in the prior art and what is being taught by the '294 patent.

MR. DAVIS: Next slide, please.

Q. Kigami.

A. This is another reference that is employed by Dr. Lebby and it is quite a unique reference, I would say. If we look at the location of the 2DEG, the 2DEG is located directly under the gate insulating film 52 and we see that

the Kigami reference has a p-doped layer, the region below the 2DEG is p-doped and in addition to that the layer 34 also below the 2DEG contains hydrogen, is passivated with hydrogen. So the Kigami teaches a configuration in which the semiconductor below the 2DEG. This one corresponds to the buffer layer is doped with p-type impurities and so the structure is different from the '294 structure in a significant way.

In addition, I'd like to point out that we have the news from the EPC patents to have a buffer layer and a barrier layer. Such buffer layer and barrier layer is not present in the embodiment that is employed by Dr. Lebby.

MR. DAVIS: Next slide, please.

Q. Slide seven here, Dr. Schubert, can you explain this slide, please?

A. Yes, I'm coming back to Beach189 and Beach189 is disclosing a field plate 25 above an aluminum gallium nitride barrier layer and the claimed key feature of the '294 patent is a compensated gallium nitride layer, and the different claim constructions show that the compensated gallium nitride layer has its electrical effects canceled. That is, the electrical conductivity is absent.

On alternative claim construction finds that the compensated gallium nitride layer is passivated. Passivated, nonconductive, the electrical effects are

canceled and we have a semi-insulating layer, but the field plate that is disclosed in the 189 or Beach189 patent has a certain purpose. It's a field plate. It's a field relaxation feature and with that purpose in order to full that purpose I will show that the field plate must be conductive, electrically conductive and, therefore, cannot be the claimed compensated gallium nitride layer for which we have three proposed constructions.

Q. Perhaps we have some more slides on that. Let's take a look.

MR. DAVIS: Next slide, please.

A. Yes. To explain this further, I'd like to talk about the field relaxation feature or the field plate and its function.

Now, the gallium nitride transistors that we are talking about are high voltage transistors or high-powered transistors and when the transistors are off, we have a relatively high electric field between the drain and the gate and so this is shown on the right-hand side. What we see is the channel and an electric field existing in the channel, but also reaching outside the channel and if this field is too high it will cause dielectric breakdown and damage the transistor and for that reason it is not uncommon to have a field plate or a field relaxation feature that helps reduce the electric field that is shown

here.

How does that field plate work?

Q. Let's go to the next slide.

A. That is shown in the present slide, slide number nine. And we have the primary electric field in the electron channel that reaches outside the channel and reaches also the field plate. The field plate has free charges, is conductive, and these free charges will reorient themselves based on the primary field.

As a result, I have shown a plus and a minus in the field plate and this reoriented charge in turn will create a field by itself and that field created by the field plate is shown in the next slide.

Q. Okay.

A. Slide number 10.

Q. And what's on this slide, slide number 10 that you just referred to?

A. The redistributed charge in the field plate creates the electronic field whose direction is opposite to the primary field. As a result, the primary field is weakened and the weakening of the field reduces the chance for damage. That is, I have shown that the field plate needs to be electrically conductive to meet its function to create a secondary field that opposes the primary field. That is basically the idea behind a field plate.

Now, if the electrical field plate -- if the field plate is electrically conductive, it cannot meet the proposed claim construction which call for the field plate, which call for the compensated gallium nitride to have its electrical effect canceled that is made nonconductive. It can also not meet the requirement of the alternative plane construction which calls for passivation of the compensated gallium nitride layer.

MR. DAVIS: Next slide, please.

A. This is a point that may be mentioned about the field relaxation feature of Beach189 are mentioned in slide 11. The field plate is not part of the gate structure. It also causes a leakage path between source and drain and as I said earlier, the field plate is required to be conductive to meet its function as a field plate.

Q. Ready for the next slide? Let's go ahead and do that.

Here towards the top you mentioned some more about Beach189 and I see the words "depletion-mode." What are you trying to convey with this slide?

A. Here I show that the associated narrative that goes with figure four identifies this transistor as a depletion-mode device. On the left-hand side I show paragraph three and the second sentence of the blue highlighted part reads: To control the current in a high

power application, a large negative voltage is applied to the gate electrode.

And so the polarity of the voltage putting a negative gate voltage on the gate or putting a negative charge on the gate will deplete the pre-existing 2DEG, thereby reducing the current. So paragraph three shows that the Beach189 transistor is a depletion-mode transistor.

Q. All right.

MR. DAVIS: Next slide, please.

Q. Here at the bottom you write: P-type doped field plate passivated with hydrogen would result in nonfunctioning enhancement-mode device. What do you mean?

A. Yes, as I have expressed in my reports and during deposition, if we follow the suggestion of Dr. Lebby and make field plate 25 p-type and passivate it with hydrogen the 2DEG on its entire length from the source to the drain would be depleted and the current path between source and drain could not be re-established because the gate electrode somehow somewhat likes -- works like a capacitor where charges is induced on the opposite side of the electrode, but charge cannot be induced at a remote location that is not opposite the electrode or the gate structure 22.

So this was a concern of mine that I voiced,

that even if the field plate were P-type doped, the device would not have the capability of being switched to the on state.

MR. DAVIS: Next slide, please.

Q. What about n-type doped?

A. Alternatively if we assume that the field plate is N doped, I wish to point out that it could not be passivated. N-type dopants in gallium nitride are not passivated by hydrogen. It is only the p-type dopants that are passivated by hydrogen. So we could not achieve the features of the claims, compensated gallium nitride layer claimed in claim one of the '294 patents.

Q. Understood.

And what about claim two?

A. What about?

Q. Would that apply to claim two as well?

A. Correct. Claim two requires that passivation occurs and to the extent the field plate is even doped, such passivation could not be accomplished because passivation does not work for n-type dopants in gallium nitride.

Q. Next slide, please, what are you trying to convey on slide 15?

A. What I'm pointing out on this slide is that the very nature of the '294 patent is nonobvious to a person of

skill in the art is counterintuitive to the thinking of a person of ordinary skill in the art and works in a manner that even surprised the inventors.

What I mean by that is the following: The prior art of the '294 patent includes the Uemoto reference, for example, the Uemoto reference. And the admitted prior art includes conductive p-type gallium nitride as the gate semiconductor. That is disclosed in figure one of the '294 patent. That is also disclosed in the Uemoto reference. That is also disclosed in the Nikita reference. And the activated p-type doping has been chosen to deplete the 2DEG.

Now, a person of skill in the art would have said the p-type doping has a purpose. The activated p-type purpose has the purpose of depleting the 2DEG. If I passivate those p-type dopants, I will lose the ability to deplete the 2DEG. I will no longer have the ability to make an enhancement mode transistor. The very idea of depleting the 2DEG requires that I have active p-type dopants. That's what a person of skill in the art would have thought before the '294 invention.

However, the '294 invention teaches if the p-type gallium nitride is passivated it does not lose the ability to deplete the 2DEG and remove the electrons from the 2DEG. That is the key innovation that was brought

about by the '294 patent. That key innovation was unknown, was nonobvious and was counterintuitive. So it is my view that no one predicted that particular characteristic of the '294 patent and, therefore, the very idea that we just passivate based on the prior art the gate semiconductor, not knowing the '294 patent is an idea that is originating in hindsight. It is not being taught by any of the prior art references and a person of skill would not have known that.

MR. DAVIS: Let's go to our next slide. Next slide, please.

Q. So here on this slide, Dr. Schubert, you appear to get into the Kigami reference, which is RX79 and specifically on the left part of the slide, there is a reference to Kigami in paragraph 10. Would you explain this slide, please.

A. Yes. So here we're coming back to the Kigami reference that is one of the secondary references that Dr. Lebby employs and we have a gate insulator 52 here. On top of the gate insulator we have a gate conductor 58 and below the gate insulator 52 we have a semiconductor structure that is -- that does not include this particular embodiment, does not include a barrier layer or a channel layer, which are the two key features of the HEMT device that the '294 patent talks about. So I would like to point

out that the two-dimensional electron gas is below -- directly below layer 52 and then we have p-type dopants not in the gate structure, but basically in the channel structure further down in the semiconductor structure.

And Kigami has its own reasons why to passivate these dopants, but they are unrelated to the reasons of the '294 patent. The '294 patent teaches to passivate the gate semiconductor in order to reduce the gate leakage current, but here we have absolutely no issue with the gate leakage current. So for that reason, you know, the combination is not motivated prior to the prior art itself.

Q. Understood.

MR. DAVIS: Let's go to the next slide, please.

A. I think this slide repeats the points that I made earlier. Hydrogen present in the 2DEG, hydrogen is present in the 2DEG region and below the 2DEG region, not in the gate semiconductor and not in the channel.

Q. Got it.

A. And so from that -- based on these factors, it is quite a different reference.

Q. Okay.

MR. DAVIS: Let's go to the next slide in that case.

A. And this is again Kigami. Let me just say a few more sentences on that reference. We have a

two-dimensional electron gas under layer 52. The p-type doping that we have here opposes that two-dimensional electron gas channel and so one can increase the threshold voltage by doping the channel p-type, but doping the channel p-type is a concept that is unrelated to the '294 patent.

Q. Understood.

And for the record, we have Kigami at paragraph 23 on the screen, which helped you with those opinions; right?

A. Correct.

Q. Okay.

MR. DAVIS: Next slide, please.

A. So based on the points that I mentioned before, a person of skill would not combine Beach189 with Kigami. The technical features that are present in Kigami and the technical features that are absent in Kigami does not make this an obvious reference to use in combination with Beach189. The reference is simply too dissimilar, too disparate from the -- both the Beach189 patent and a HEMT transistor.

Q. Ready for the next slide?

A. Yes.

Q. Let's do that. Now, we're on to Uemoto.

A. Yes. We're coming to a second reference,

1 obviousness reference or anticipation reference. I guess
2 obviousness reference and Uemoto is the typical prior art
3 reference. It has an activated region?
4 15A. So 15A is gallium nitride,
5 magnesium-doped, activated, conductive, capable of
6 depleting the 2DEG, but at the same time having a high
7 leakage current because region 15A is conductive and we
8 have also region 15B and region 15B is not located under
9 the gate electrodes 20, but 15B is p-doped, passivated and
10 a resistive region according to Uemoto.
11 And based on Uemoto, a person of skill in the
12 art would have just followed the prior art. We have a
13 conductive region 15A. It has its legitimate purpose. It
14 will deplete the 2DEG. It has a gate turn voltage on the
15 order of 2.5 to 3.5 volts as pointed out in the '294 patent
16 as well as the prior art references. This is a reference
17 that has the known problems of low gate turn on voltage and
18 high gate leakage current as long as we have that layer 15A
19 in its place.
20 Now, 15 layer -- layer 15B is a passivated
21 layer and it has the purpose disclosed in Uemoto having a
22 resistive layer on top of the regions that are between the
23 source and the gate and between the gate and the drain.
24 MR. DAVIS: Next slide, please.
25 A. Now, let's have a further look at the Uemoto

ground and I'm looking here at layer 15A, which is the layer below the gate electrode. That layer is p-doped and it is conductive and on the right-hand side I show a figure, figure 2A of Uemoto.

And I'd like to point out that just for clarity, this particular figure includes a typo. It identifies layer 15B, but this layer should be identified as 15A, and so this is region 15A, and so this is a typo.

And we see that this particular structure has no 2DEG present. So this is the 2DEG region, but because that region is located above the Fermi level, there is no 2DEG and so the layer has met its purpose and has depleted the 2DEG and has created the conventional enhancement-mode transistor, the prior art enhancement-mode transistor.

Q. And for the record, on this slide you referred to Uemoto, which is RX73 at paragraphs 33, 38 and figure 2A and does -- do the paragraphs that are on that slide inform your -- the points you made about a typo?

A. Correct, there is a typo.

Q. All right.

MR. DAVIS: Next slide.

A. Now, let us look what Uemoto teaches about the region 15B and Dr. Lebby has proposed a person of skill in the art would use 15B, which is the passivated region to create the '294 enhancement-mode transistor. So let's have

a look at the Venn diagram that Uemoto proposes for region 15B and I can only conclude that Uemoto's reasoning was, well, if we passivate the magnesium, we take away the electrical function and we will no longer be able to deplete the 2DEG and that's exactly what Uemoto teaches for region 15B.

Here we have the Fermi level in the conduction bend, meaning that all levels below the Fermi level are filled and so we have a 2DEG present here. So if we choose region 15B -- 15B as Dr. Lebby proposes, and if we go by the teachings of the prior art, we do not create an enhancement-mode transistor. We do not remove the 2DEG. So here the teaching of human regarding layer 15B is the opposite of what the '294 patent teaches.

The '294 patent teaches if we passivate the p-type gallium nitride, we remove -- we deplete the 2DEG. If we follow the prior art teaching of Uemoto, then the 2DEG is not removed, is not depleted. It's present. And, therefore, if we go by the teachings of the prior art, we would not arrive at the '294 patent and, in fact, the '294 patent teaches insight that contradicts the Uemoto patent.

Q. And for the record, on this slide you referred to Uemoto at paragraphs 33, 51, and 2B.

MR. DAVIS: Let's go to the next slide.

Q. What can you tell us about this slide,

Dr. Schubert? Slide 23?

A. Yes. I'm talking further about the compensated gallium nitride layer and region 15B.

Q. Okay.

A. And I quote Dr. Lebby's report and Dr. Lebby says: Uemoto thus teaches the high resistive reaching 15B is a compensated gallium nitride layer under each of the parties' proposed construction.

And -- well, I can say a few things about this layer 15B. First, the function of the layer 15B is -- that Uemoto teaches in hindsight is incorrect. The teaching is wrong in light of the '294 patent. So what Uemoto teaches is that this layer is not capable of removing the 2DEG, of depleting the 2DEG and furthermore, we can also look at the location of that layer.

So in the '294 patent the compensated gallium nitride layer is located under the gate electrode and by being located under the gate electrode, we have that layer fulfill its function, but here we do not have layer 15B under the gate electrode. A person of skill in the art looking at the figure and also reading the associated narrative would not get the impression that layer 15B is under the gate electrode. In fact, there is no teaching -- no narrative teaching like layer 15B would be located under the gate electrodes.

Now, we can -- we can focus in on layer 15B and say, let us look at layer 15B in isolation. Let us disconsider the surroundings and let us just look what layer 15B is and layer 15B is gallium nitride. It is doped with magnesium and it is passivated by hydrogen. So if we look at layer 15B in isolation then one could say that's the compensated gallium nitride layer we're looking for. However, in my opinion we cannot look at layer 15B in isolation.

We have to look, how does it fit in? What does Uemoto teach what it does? Would a person of skill in the art draw certain conclusions, modify 15A into 15B and based on the teachings of Uemoto, I would say that the '294 patent is not obvious, counterintuitive and does not follow from the Uemoto reference unless our modifications or guided by hindsight.

Q. Thank you.

MR. DAVIS: Let's go to the next slide.

Q. And some of these points you may have just made, but if you could take a look and see if you missed anything and if you want to further explain.

A. On the left-hand side is Uemoto figure seven. On the right-hand side I'm discussing layer 15B and a POSA would not consider region 15B to be under the gate electrode. There is no teaching, no narrative teaching in

1 Uemoto in that regard. It is not obvious to change the
2 location of 15B or to modify layer 15A.
3 The 2DEG is present underneath 15B, which is
4 the opposite of what is being taught by the '294 patent and
5 the last bullet point concerns Dr. Lebby's magnified image
6 where he magnifies a particular region of Uemoto and he
7 says at this particular location, at this particular
8 location if we look at the physical structure, and if we
9 look at the structure, the gate electrode is above a small
10 region of layer 15B and so I would say there is a very
11 small region or a sliver of region 15B that Dr. Lebby
12 identifies being under the gate electrodes 20 and I have
13 two points about that.
14 The first one is I do not see narrative support
15 in Uemoto for that suggestion and also the claim requires
16 that there is a compensated gallium nitride layer below the
17 gate electrodes and a person of skill in the art would not
18 identify this tiny region, this sliver of being a layer as
19 claimed in the '294 patent.
20 Q. Thank you.
21 MR. DAVIS: Let's go to the next slide. Oh.
22 MS. SPECHT: Your Honor.
23 CHIEF JUDGE CHENEY: Yes?
24 MS. SPECHT: May we clarify for the record
25 where Dr. Schubert was directing the laser pointer on the

screen? He referred twice to "at this location" as he was pointing, and I'd like to have a statement on the record of which location he was pointing at.

MR. DAVIS: Let's go back to the last slide, please.

MS. SPECHT: May I state the location on the record for Dr. Schubert to confirm?

MR. DAVIS: I can ask.

BY MR. DAVIS:

Q. Dr. Schubert, when you were pointing the laser pointer at figure seven on your slide, where exactly were you pointing it if you could describe it?

A. I was pointing to the region that Dr. Lebby identified as being under the gate electrode.

Q. And that's the region of -- or region 15B; correct? That's in figure seven at least shown to be in contact with gate 20 as Dr. Lebby indicated. Is that what you mean?

A. Well, so the figure points to feature 15B.

Q. Uh-huh.

A. And most of 15B is to the right of gate electrode 20 and there is a small region, a tiny region, the sliver on the left-hand side end of what is labeled 15B in figure seven of Uemoto.

Q. Okay. Thank you.

CHIEF JUDGE CHENEY: Can I just add to this? Does anyone object if I take a stab at this?

MS. SPECHT: No, Your Honor. That description was perfect.

Q. Next slide, please.

CHIEF JUDGE CHENEY: You are fine with the description that he's given?

MS. SPECHT: That description was acceptable to Respondents, but you are certainly welcome to take a stab at it, Your Honor.

CHIEF JUDGE CHENEY: I just wanted to clarify, Dr. Schubert, that the region that you said was not a layer under the gate, was that the area that has the leader 15A? You were contrasting Dr. Lebby's position with your position.

THE WITNESS: Correct, Your Honor.

CHIEF JUDGE CHENEY: I withdraw. I now understand the point that you were all making. And the error is clear to me. Thanks very much.

Please proceed, Mr. Davis.

MR. DAVIS: Next slide, please, slide 25.

BY MR. DAVIS:

Q. There is a reference to region 15A on this slide. Do you have anything that you need to add about region 15A?

A. The narrative disclosure and the pictorial disclosure of Uemoto shows that region 15A is under the gate electrode. That region is p-doped. It is conductive. It is prior art to the '294 patent and it does not obviate or anticipate the '294 patent's compensated gallium nitride layer.

Q. Okay. Thank you.

MR. DAVIS: Next slide, please.

That takes us to the '508 patent. Let's go to the next.

Q. Overview of the '508 patent is what you have on -- written at the top of slide 27. What can you tell us about this slide, Dr. Schubert?

A. Correct. The '508 patent is a method patent. It is a method to fabricate an enhancement-mode gallium nitride transistor. It has a relatively large number of claims. Certain claim limitations relate to the epitaxial growth. Another --

Q. Perhaps we could go to the next slide or on it or you have more?

A. Yeah.

Q. Sorry.

A. Another group of claim limitations relates to the gate formation structure or gate formation method. Another group of claim limitations or claim steps relates

to depositing a dielectric layer and fabricating ohmic contexts by a two photo mask process and the final limitation relates to subjecting the context to rapid thermal annealing.

Q. Very good.

MR. DAVIS: Next slide, please.

A. The '508 patent has a total of eight embodiments. In the first three embodiments the compensated -- the magnesium-doped gallium nitride layer are confined to the region below the gate electrode. In embodiments four to eight the p-type gallium nitride region is substantially below the gate electrode, but the p-type gallium nitride region is not restricted or is not entirely under or beneath the gate electrode.

MR. DAVIS: Next slide, please.

Q. This slide is entitled or has a heading of invalidity allegations. What's your understanding of Dr. Lebby's opinions on the '508 patent?

A. My understanding of the invalidity allegation is that the '508 patent claim one would be obviated by Hikita in view of Sheppard with Sheppard obviating transition layers and Beach624 with Beach obviating the formation of gate source and drain contact formation.

Q. Okay. And what's your ultimate conclusion?

A. My conclusion is that Hikita in view of the

1 secondary references would not obviate the '508 patent.
2 MR. DAVIS: Next slide.
3 Q. There is a diagram up here with the heading:
4 Single Photo Mask Gate Forming Process. What is that?
5 A. Yes. One group of claim limitations relate to
6 the gate formation process and the gate formation process
7 occurs with the help of a single photo mask and for that
8 reason it is a self-aligned gate formation process. We
9 have the gate semiconductor and the gate metal and those
10 two features, those two elements based on the method that
11 is disclosed in the '508 patent are self-aligned.
12 And I show here an exemplary process, an
13 example process of how that self-aligned process may
14 proceed, and I show the creation of a photoresist pattern
15 that is accomplished with a photo mask in step two. We go
16 through photoresist coating, exposure and development in
17 two and as a result obtain a photoresist mask in step
18 three, then we use that mask to etch the gate metal as
19 shown in step four.
20 We can proceed in different manners and let me
21 just for the sake of argument choose figure 5A. In figure
22 5A we etch the gate material and then we remove the
23 photoresist and by doing so we arrive at sub figure six and
24 then we have the option of, for example, applying a gate
25 metal shrinkage etch and we would arrive at sub figure

seven. So this is an exemplary process that is covered by the '508 patent.

I'd like to point out that the top of the gate material in figure seven not covered by gate metal is usually referred to as ledges. So the horizontal part of the gate material not covered by the gate metal is usually referred to as ledges, and I'd like to point out that embodiments one to three of the '508 patent according to my recollection do not have these ledges, but embodiments four to eight of the '508 patent have such ledges. So I would say there is a variety of gate structures disclosed in the '508 patent.

In all embodiments, the p-type gallium nitride is substantially below the gate metal, however, in four of the eight embodiments, the location of the p-GaN is not restricted to the region mathematically exactly beneath the gate metal, but protrudes somewhat out- -- outside. So it's still substantially below the gate metal.

Q. Understood. Thank you.

MR. DAVIS: Next slide, slide 31, please.

Q. This refers to a one photo mask process source and drain contact formation process. What is that?

A. As I said, another group of limitations of the '508 patent relates to the ohmic contact formation process and there are two basic processes, a one mask, one photo

mask or liftoff ohmic contact formation process, which is disclosed in this series of process steps and the next slide shows a two photo mask source and drain contact formation process, which involves the etching of the contact metal and this is disclosed in this series of process steps.

I'd like to point out that a fair reading of the Hikita reference shows that it is discloses a lift up process, a one photo mask process rather than the two photo mask process that is disclosed in the '508 patent.

MR. DAVIS: Next slide, please.

Q. More technology background, gate first process, what is that?

A. So the '508 patent if we go by the pictorial disclosure and the narrative disclosure forms the gate structure before the source and drain contacts are formed. Based on the pictorial description of the process sequence and what is driven in the patent we can call the process a gate first process.

Q. Okay.

A. And so the narrative disclosure and the pictorial disclosure relates to a gate first process in the '508 patent.

MR. DAVIS: Next slide, please.

Q. You mentioned Hikita just a couple of moments

ago. What can you tell us about Hikita?

A. Yes, if we look at Hikita we can see based on the process sequence that we have on the right-hand side, 8A, B, C, D, E, and F, we can see that gate electrode is formed in step 8F. So gate last, gate electrode last process.

Furthermore, we can see that the ohmic contact formation process as illustrated here and as obtained from a narrow reading of these figures is not the two photo mask process used for the ohmic contacts disclosed in the '508 patent, but rather is the one photo mask ohmic contact process or lift up process that the '508 patent is not claiming.

Now, if we go to the next slide, we also have the Beach624 reference and the Beach624 reference is somewhat a unique reference because it discloses the formation of source, gate, and drain at the same time. And if we look at figure 1E, the description of figure 1E says metal and N plus gallium nitride remove to form ohmic contact end gate. So here in that step the ohmic contact and the gate are formed at the same time in the same step.

And they're used -- they're fabricated by using the same photo-resistant pattern. And I'd like to point out that this is inconsistent with the '508 patent, the '508 patent discloses and claims that the gate formation

process is based on a different photo-resistant pattern on a separate photo-resistant pattern than the source and drain contacts and Beach624's teaching in this regard is inconsistent or contradicts the teaching of the '508 patent.

Q. Thank you.

Let me just go back one slide just for the record, and clarity, you're referring to figures 8A through 8F in the Hikita. That's RX41. So now go up two slides.

You mentioned Dr. Lebby's analysis and of a couple of bullet points. Why don't you tell us about that, please.

A. Yes. A general observation of Dr. Lebby's analysis is that he has not provided a step-by-step description of the process sequence that he's envisioning. Similarly Dr. Lebby is not providing a pictorial step-by-step description of the process that he's envisioning.

I'd like to contrast this to the '508 patent that describes such pictorial description. I'd like to contrast this to the Nikita reference that describes a narrative and pictorial description of the process sequence and I'd like to contrast this with Beach624 which also provides a narrative and pictorial process sequence.

To the extent that Dr. Lebby believes that

there is a process sequence that follows from the prior art, Nikita and Beach624 that meets the claim limitation, the claim limitations of the '508 patent, I have not seen such description of process steps in his reports, in Dr. Lebby's reports or in his presentation today.

So a general difficulty that I have with the analysis provided by Dr. Lebby is that he takes out certain modules and considers these individual modules as obvious based on the prior art, but he does not provide how these individuals -- individual modules are combined and integrated to yield a process that satisfies the claim limitations of the '508 patent.

MR. DAVIS: Next slide, please.

CHIEF JUDGE CHENEY: Okay. Before we go onto the inequities slide it's probably time for us to break for the day.

Dr. Schubert, you can step away from the witness well, and I'm going to talk to the attorneys. Please don't discuss your testimony with anyone until you return to the stand tomorrow.

THE WITNESS: Understood, Your Honor.

CHIEF JUDGE CHENEY: Thank you.

(Witness excused.)

CHIEF JUDGE CHENEY: Okay. So where do we stand with the health of Dr. Doolittle? Should we go on

1 the confidential record?
2 MR. LAVENUE: I do not think so, Your Honor.
3 CHIEF JUDGE CHENEY: Okay.
4 MR. LAVENUE: Dr. Doolittle reports that he
5 believes he will able to conduct a video deposition
6 tomorrow with no problem.
7 CHIEF JUDGE CHENEY: A video examination trial
8 examination?
9 MR. LAVENUE: By video, yes, Your Honor.
10 CHIEF JUDGE CHENEY: Okay. So by my accounting
11 of what you all provided to me, we're about halfway through
12 the total amount of time allotted for Dr. Schubert's
13 rebuttal. You allotted two and a half hours between all
14 parties. We've done about an hour and 15 minutes of that.
15 Does that sound right, Mr. Davis?
16 MR. DAVIS: We ended on what? About slide 37?
17 He has 53 slides. So whatever that equates to. We went
18 about what an hour. So --
19 CHIEF JUDGE CHENEY: We were an hour and 15
20 minutes in the last session.
21 MR. DAVIS: Yeah, that probably sounds right.
22 I don't know what --
23 CHIEF JUDGE CHENEY: Okay. Speaking of which,
24 these slides are not in my Box that I can tell. So if
25 someone could get them into my Box, that would be great,

1 the demonstrative slides for Dr. Schubert.
2 So sounds like we're about halfway through the
3 total two and a half hours allotted unless someone is going
4 to dramatically shrink our cross.
5 Staff? Are you going to take 30 minutes?
6 MR. WINSTON: At this point, Your Honor, I'll
7 only have a few questions. I don't need the full 30
8 minutes.
9 CHIEF JUDGE CHENEY: Okay.
10 MR. WINSTON: But I don't know if -- something
11 else may come up with the remaining examination.
12 CHIEF JUDGE CHENEY: I'm not asking you to give
13 up the time. If you need it, you'll get it.
14 Are you still anticipating about 30 minutes of
15 cross?
16 MS. SPECHT: At this point in time, yes. It
17 may come in a little bit shorter, but probably no less than
18 25.
19 CHIEF JUDGE CHENEY: Okay.
20 So setting up for Dr. Doolittle to testify
21 remotely is a big deal and it requires some time. So we're
22 going to start that process tonight, but we're going to
23 need some time after we've finished Dr. Schubert before we
24 start the examination of Dr. Doolittle just to set that up.
25 We will take a break immediately after the

conclusion of Dr. Schubert's examination to set up the connections and there will be new equipment if here tomorrow so Dr. Schubert might actually testify from the translator table for visual purposes.

So we'll take a break and then we'll set up for Dr. Doolittle and we'll complete the trial with Dr. Doolittle.

You should all be prepared if we need to if something goes wrong with the equipment tomorrow for us all to go and don headsets and do a Webex session without seeing him through the audio of the room.

So if you plan to participate tomorrow, bring a headset with you just in case. I will clarify what I mean if things go south with our material or our connections.

What that just basically means is we'll do a Webex like it was during the pandemic where we're all be online.

And then that should take us through the end of the hearing. I still plan to wrap the hearing tomorrow at 4:30. So everyone should be aiming toward that.

Any questions from the parties?

MR. DAVIS: Not a question, Your Honor. I have been handed a note that says that the slides are now in your Box.

CHIEF JUDGE CHENEY: Thank you so much.

Any questions from Respondent?

MR. LAVENUE: No, Your Honor.

CHIEF JUDGE CHENEY: Staff?

MR. WINSTON: No questions, Your Honor. Thank you.

CHIEF JUDGE CHENEY: Okay. Raise your hand if you have any other housekeeping matters for tonight.

(No response.)

CHIEF JUDGE CHENEY: Seeing none, we will see you all tomorrow morning at 9 a.m.

We're off the record.

(Whereupon, the proceedings concluded at 4:40 p.m., to continue the following day, March 1, 2024, at 9 a.m.)

C O N T E N T S

INDEX OF WITNESSES

WITNESS	DIRECT	CROSS	RE-DIRECT	RE-CROSS	STAFF
Dr. Denis Marcon	786	813			825
Todd Schoettelkotte	828				841
Dr. Michael Lebby	844	914	935		

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1 E X H I B I T S

2 EXHIBIT LISTS SUBMITTED FOR ADMISSION:

3 CX-0975

4 CX-0015

5 CX-0038

6 CPX-0123C

7 CPX-0140C

8 CPX-0141C

9 CPX-0142C

10 CPX-0143C

11 CPX-0144C

12 CPX-0145C

13 CPX-0146C

14 CPX-0147C

15 CPX-0148C

16 CPX-0149C

17 CPX-0150C

18 CPX-0151C

19 CPX-0152C

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CPX-0124C
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CX-0656C
CX-0551
CX-0852C
CPX-0027C
CPX-0028C
CPX-0029C
CPX-0030C

CX-0367C
CX-0368C
CX-0947C
CX-0950C
CX-0951C
CPX-0072C
CPX-0076C
CPX-0086C
CX-0966C
CX-0967C
CX-0886C
RX-0193C
CX-0509
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CX-0497
CX-0505
CX-0239
CDX-0002C
CDX-1001C
RDX-0004C
RDX-1001C
RDX-0007
RX-0701

1 C E R T I F I C A T E

2 TITLE: IMO: CERTAIN SEMICONDUCTOR DEVICES

3 INVESTIGATION NO.: 337-TA-1366

4 HEARING DATE: February 29, 2024

5 LOCATION: Courtroom A

6 NATURE OF HEARING: Evidentiary Hearing

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