UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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| MICRON TECHNOLOGY, INC., Petitioner, | ) | |
| VS. | ) | Case PGR2025-00021 |
| | ) | Patent 12,010,838 |
| YANGTZE MEMORY TECHNOLOGIES COMPANY, LTD., Patent Owner. | ) | |

REMOTE DEPOSITION OF
JACK C. LEE, PH.D.
WEDNESDAY, MARCH 25, 2026

STENOGRAPHIC REPORTER: CHRISTA YAN, CSR NO. 14316, RPR

YMTC
Exhibit 2047
Micron v. YMTC
PGR2025-00021
Ex. 2047-001

REMOTE APPEARANCES:

FOR PETITIONER:
ORRICK, HERRINGTON & SUTCLIFFE LLP
BY: PATRICK HERMAN, ATTORNEY-AT-LAW
51 West 52nd Street
New York, New York 10019
pherman@orrick.com

FOR PATENT OWNER:
LATHAM & WATKINS LLP
BY: THOMAS WATSON, ATTORNEY-AT-LAW
12670 High Bluff Drive
San Diego, California 92130
thomas.watson@lw.com

ALSO PRESENT REMOTELY:
DORU HALIP, The Technician

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BE IT REMEMBERED that on WEDNESDAY, the 25TH DAY OF MARCH, 2026, at the hour of 6:59 A.M., of said day, before me remotely, CHRISTA YAN, a Certified Shorthand Reporter, State of California, remotely appeared JACK C. LEE, PH.D., who was examined as a witness in said cause; that said transcript format was prepared in accordance with California Code of Regulations Section 2473.

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THE TECHNICIAN: Thank you to everyone for attending this proceeding remotely, which we anticipate will run smoothly. Please remember to speak slowly and do your best not to talk over one another. Please be aware that we are recording this proceeding for backup purposes. Any off-the-record discussions should be had away from the computer. Please remember to mute your mic for those conversations.

Please have your video enabled to help the reporter identify who is speaking. If you are unable to connect with video and are connecting via phone, please identify yourself each time before speaking. We will provide a complimentary unedited recording of this deposition with the purchase of a transcript. I apologize in advance for any technical-related interruptions. Thank you.

THE STENOGRAPHIC REPORTER: Okay. Dr. Lee, please raise your right hand. Do you solemnly swear and/or affirm to tell the truth, the whole truth, and nothing but the truth?

THE WITNESS: I do.

THE STENOGRAPHIC REPORTER: Thank you. Please proceed.

JACK C. LEE, PH.D.,

the Witness, called on behalf of Patent Owner, being duly

sworn to state the truth, the whole truth, and nothing but the truth, testified on oath as follows:

EXAMINATION

BY MR. WATSON:

Q Can you please state your full name for the record?

A Jack C. Lee.

Q And can you please state your home address for the record?

A 5803 Westslope is one word, W-e-s-t-s-l-o-p-e, Cove, C-o-v-e, Austin, Texas 78731.

Q And where are you currently located?

A I'm located at the address that I just provided.

Q And do you understand that your testimony today is under oath and under penalty of perjury?

A Yes.

Q And is there any reason you cannot provide full and truthful testimony today?

A No.

Q Do you have any materials with you in front of you?

A No.

Q Is there anybody else in the room with you?

A No.

Q And can you agree that during this deposition,

you will not open any document or file on your computer aside from those provided to you by the court reporter?

A Yes.

Q Dr. Lee, what did you do to prepare for your deposition today?

A I reviewed the materials related to this case, to this IPR, and the reply, many -- the reply IPR.

Q Did you meet with anybody in preparation for this deposition?

A Yes.

Q When did you meet with these people?

A I met with counsel, Patrick Herman, through Zoom once about three weeks ago and once two days ago.

Q And about how long were these meetings?

A I don't recall exactly. About one hour each.

Q Was there anyone who wasn't a lawyer present at these meetings?

A No.

Q Besides Mr. Herman, have you discussed this case with anybody else?

A No.

Q Now, in December, I deposed you about your opinions regarding U.S. Patent Number 11,145,666, correct?

A I don't recall the exact date.

Q Do you remember me deposing you on your opinions

regarding U.S. Patent Number 11,145,666?

A I believe that you deposed me twice, isn't it?

Q Correct. Yeah. I deposed you twice on the -- what we'll call the '666 patent.

A Yeah, one is -- one was the opening declaration, and the other one is the reply declaration.

Q Is it okay if I refer to U.S. Patent Number 11,145,666 as the '666 patent?

A Sure.

Q Okay. Let's pull up what we'll mark as Lee Deposition Exhibit 1.

(Whereupon Deposition Exhibit 1 was marked for identification.)

THE TECHNICIAN: All right. One moment. (Indicating.)

BY MR. WATSON:

Q Dr. Lee, can you see what we've marked as Lee Exhibit 1 on the screen?

A Do you mind uploading this onto the chat?

THE TECHNICIAN: Okay. Counsel, would you like me to upload it on the chat?

MR. WATSON: Yes, please do.

THE TECHNICIAN: Okay. One second. I just need to save it first, and then we'll be right there. (Indicating.)

Okay. Exhibit is in the chat.

THE WITNESS: Okay. Hold on. Sorry. Yes.

MR. WATSON: Why don't we put it on the screen too if that's...

THE TECHNICIAN: Yes, sir. (Indicating.)

THE WITNESS: Hello? Is there a question, sir?

BY MR. WATSON:

Q Are you able to see this Lee Exhibit 1, Dr. Lee?

A I see the front page.

Q Okay. Dr. Lee, is Lee Exhibit 1 your deposition transcript regarding your opinions for the '666 patent?

A Is this the transcript for the reply declaration?

Q Correct.

A Okay.

Q So, Dr. Lee, I'll ask you again. Is Lee Exhibit 1 your deposition transcript regarding your opinions from your reply declaration for the '666 patent?

A Yes. I believe so.

Q Okay. And were you under oath for the deposition recorded in this exhibit?

A Yes.

Q Did you understand that your testimony in this deposition recorded in Lee Exhibit 1 had the same force and effect as if given in court?

A Yes.

Q And to the best of your knowledge, does this deposition transcript accurately depict your sworn testimony?

A I don't know if I have reviewed the transcript, so I cannot answer your question. But I believe so.

Q Do you have any reason to believe that this deposition transcript does not accurately depict your sworn testimony?

A No, I don't.

MR. WATSON: All right. We can take that off the screen.

THE TECHNICIAN: Okay.

MR. WATSON: Can we pull up Exhibit 1003?

THE TECHNICIAN: Yes, one moment.

THE STENOGRAPHIC REPORTER: This was previously marked, correct, Counsel?

MR. WATSON: Correct.

THE STENOGRAPHIC REPORTER: Thank you.

THE TECHNICIAN: (Indicating.)

BY MR. WATSON:

Q Dr. Lee, do you have Exhibit 1003 in front of you?

A Is this uploaded already?

THE TECHNICIAN: No, it's not. Moving forward, do you want me to...

MR. WATSON: Yes, please upload all of them to the chat --

THE TECHNICIAN: Okay. I'll do that.

MR. WATSON: -- when we do, when we put them up.

THE TECHNICIAN: When we call it? Okay. (Indicating.)

All right. Exhibit is in the chat.

BY MR. WATSON:

Q Dr. Lee, do you have Exhibit 1003 in front of you?

A Yes.

Q And Exhibit 1003 was the declaration you submitted for this PGR back in, I believe, January of 2025, correct?

A I scrolled down to the last page. I believe that the signature was dated January 3rd, 2025. Am I correct?

Q That's what I have as well.

A So this is my opening declaration, right?

Q So it would be okay if we called Exhibit 1003 your opening declaration moving forward?

A Sure.

Q Okay. All right. Let's put that to the side, and let's pull up Exhibit 1075.

THE TECHNICIAN: (Indicating.)

One moment. Exhibit is in the chat and on the

screen.
BY MR. WATSON:
Q Do you have Exhibit 1075 in front of you, Dr. Lee?
A Yes, I have downloaded.
Q Exhibit 1075 is the declaration you submitted in this case on November 25th of this -- of 2025, correct?
A I'm sorry. Can you repeat the date again?
Q Sure. Exhibit 1075 is the declaration you submitted in this case on November -- excuse me. Let me take that back. I got the wrong date here.
Exhibit 1075 is the declaration you submitted in this case on February 14th, 2026, correct?
A That is correct.
Q And would it be okay if we refer to this declaration as your reply declaration or the -- or your declaration?
A It would be good if you refer to this as reply declaration.
Q Okay. I'll refer to this as the reply declaration. Is that okay?
A Yes.
Q Okay. Is there anything that's come to your attention that you would like to correct in your reply declaration?

A No.

Q When preparing your reply declaration, were there any materials you would have liked to have reviewed but did not have access to?

A No, I don't think so.

Q Now, in your reply declaration, you responded to opinions by Dr. Giapis, correct?

A As I stated in paragraph 2, I have been asked to reply to certain of the positions set forth in the patent owner's response, which is paper 28, and the opinions in a November 26, 2025, declarations of Konstantinos Giapis, Exhibit 2019, submitted by patent owners in the inter partes review proceedings related to the patent 20 -- '838.

So to answer your questions, I'm responding to both the patent owner's response and Dr. Giapis' opinions set in his declaration in November 26th, 2025.

Q Did you render any opinion on whether Dr. Giapis qualifies as an expert in the subject matter of the '838 patent?

A No, I did not.

Q Do your opening and reply declarations contain an accurate statement of your opinions regarding the validity of the claims of the '838 patent that you're offering in this PGR proceeding?

MR. HERMAN: Objection; form.
THE WITNESS: Can you repeat the question, please?
BY MR. WATSON:
Q Do your opening and reply declarations contain an accurate statement of your opinions regarding the validity of the claims of the '838 patent that you're offering in this PGR proceeding?
MR. HERMAN: Same objection.
THE WITNESS: Are you asking me whether Exhibit 1003 and 1075 contained all my opinion regarding this PGR?
BY MR. WATSON:
Q We'll start with that, sure.
A As I mentioned in my reply declarations in paragraph 7 that the paragraphs in this reply declaration are to respond -- might respond to certain of the argument and assertion made by the patent owner and Dr. Giapis in this proceeding, and I also noted that in these paragraphs, I addressed only a fraction of the opinion and assertion Dr. Giapis set forth in his declaration.
The fact that I do not respond to any particular opinion expressed by Dr. Giapis should not be considered and should not be interpreted as agreement, acceptance, or concessions of any kind, and that's what I've written on -- in paragraph 7. I'm paraphrasing.
Q Are there any opinions you wanted to include

regarding the validity of the claims of the '838 patent that are not contained in your opening and reply declarations?

A At this point, I cannot think of any.

THE STENOGRAPHIC REPORTER: I'm sorry. Dr. Lee, could you repeat your answer?

THE WITNESS: Sure. At this point, I cannot think of any opinion that I wish to include and not included in my reply declarations and my opening declaration, but I -- as I mentioned, in my reply declarations, I only addressed a fraction of the opinions and assertions Dr. Giapis set forth in his declaration.

THE STENOGRAPHIC REPORTER: Thank you.

MR. WATSON: Can I get control of the declaration on the screen, Exhibit 1075?

THE TECHNICIAN: Yes. One moment. (Indicating.)

And you've got control.

MR. WATSON: Okay.

BY MR. WATSON:

Q Dr. Lee, can you please turn to paragraph 9 of your reply declaration?

A Yes.

Q Now, in paragraph 9, you highlight two of the constructions Dr. Giapis proposes, correct?

A Yes.

Q Are these the constructions regarding the terms using the word portion or portions that you considered when responding to Dr. Giapis' opinions?

MR. HERMAN: Objection; form.

THE WITNESS: Can you repeat the question again?

BY MR. WATSON:

Q Sure.

You're aware that Dr. Giapis proposes constructions of terms that use the word portions, correct?

A Well, to be more precise...

Q Sure.

A I'm responding to Dr. Giapis' --

Q In paragraph 9 --

A -- proposal -- proposals of the claim terms listed in the table in paragraph 9.

Q So in your reply declaration, you considered the proposed constructions proposed by Dr. Giapis found in paragraph 9, correct?

MR. HERMAN: Objection; form.

THE WITNESS: Can you repeat the question again?

BY MR. WATSON:

Q In your reply declaration, you considered the proposed constructions listed in paragraph 9, correct?

A That's one of the topics that I respond in my

declaration, in my reply declaration.

Q And then if we could go to paragraph -- or strike that.

Also in your declaration, you respond to a proposed construction of the term curved side surface proposed by Dr. Giapis, correct?

A Can you point to where I...

Q Sure. Paragraph --

A Is it set in my declaration -- (simultaneous cross-talk) --

Q -- 57, for example.

THE STENOGRAPHIC REPORTER: I'm sorry. You're speaking over one another. I couldn't understand that.

And, Counsel, did you say curved, curved side surface?

MR. WATSON: Curved. Correct. Curved.

THE STENOGRAPHIC REPORTER: Thank you. I didn't hear your question. You were talking over one another. If you can please repeat.

BY MR. WATSON:

Q In your declaration, you respond to a proposed construction of the term curved side surface that was proposed by Dr. Giapis, correct?

A Again, can you point to where -- Dr. Giapis' constructions and where I responded in my declaration, in

my reply declaration?

Q Sure. Go to paragraph 57 of your reply declaration -- or, actually, paragraph 59.

A Is there a question, sir?

Q Yes. Other than the constructions discussed in paragraphs 9 and 59 of your reply declaration, did you respond to any other constructions proposed by Dr. Giapis?

A I don't think so. But if you think -- if you think that I have responded to other construction that Dr. Giapis has proposed, would you please point where I said that?

Q I'm not aware of any. I just wanted to make sure you didn't have some place that I wasn't aware of.

A No, I'm not aware of any either.

Q Let's turn to paragraph 15 of your reply declaration. Are you at paragraph 15, Dr. Lee?

A Yes.

Q Is it your opinion that the term portion refers to a part of a larger whole?

A As I describe in paragraph 15, the term portion has a straightforward plain and ordinary meaning to a person of ordinary skill in the art. It refers to a part of a larger whole.

Q And if you'll turn to paragraph 16, would you further agree that the '838 patent refers to a portion as

part of a larger whole?

A Yes. As I stated in paragraph 16, consistent with this well-understood plain and ordinary meaning of the word portion, the '838 patent itself repeatedly used the term portion to refer to a part of a larger whole, and I point to various places.

And, in fact, I believe that '838's specification uses the word portion in accordance with the plain and ordinary meaning, like, 50 times, and each time the patent -- the patent mentioned the word portion, it talks about a part of a whole and not as the claim construction that Dr. Giapis and the patent owner put forth.

Q Now, if something is part of a larger whole, that necessarily means that there's some remainder of the whole that's not included in the portion, correct?

A In general, when we talk about portion, when a person of ordinary skill in the art, understanding the term portion in the context of '838 patent and as I mentioned in paragraph 15 and 16 of my reply declaration, that has a straightforward plain and ordinary meaning to a POSITA. It referred to as a part of a whole, a larger whole, w-h-o-l-e.

And I believe that in the particular terms for the -- for example, the first and second portions of the second material layer is that the word -- the term second

portion referred to a part of the second material, and the remainder is referred to as the first portion of the second material.

To answer your question, that -- I believe that in the analysis of the invalidity of the '838 patent claimed that a portion is referred to as a part of the larger whole and the part is not 100 percent of the entire larger whole.

Did I answer your question?

Q I think so. So let me ask one question, make sure I understand. So a portion cannot be the entire -- strike that.

A portion of the second material layer can't be the entire second material layer. It must be less than the whole material, second material layer, correct?

A I believe that at least in the context of the prior art and the '838 patent, that portion is -- the term portion refers to a part of the larger whole and at least in those cases are not referred to the entire or 100 percent of the larger whole.

Q Let's turn now to -- let's look again at paragraph 15 if you have that in front of you.

A Yes.

Q In the last sentence of paragraph 15, you say, Nothing about the claims requires these parts to have any

specific structure or dimension other than that they are distinguishable parts of the same conductive layer.

Do you see that?

A As understood by a POSITA.

Q Okay. So it's your opinion that the second material layer is a conductive layer; is that fair?

A In both -- in the prior art that I referred to as well as the '838 patent, the second material is the conductive layer in the 3D NAND memory stack.

Q And it's your opinion that the first and second parts of the second material layer must be distinguishable parts, correct?

A Can you explain, in this question, what do you mean by distinguishable?

Q What do you mean by distinguishable here in paragraph 15, the last sentence?

A I believe that what I mean by that is that to a person of ordinary skill in the art, distinguishable parts of the same conductive layer are identifiable as different regions or portion of that layer based on the description provided by the prior art, and which is related to the function, the location, and the role in the device.

Q Would it be fair to say that the first and second portions of the second material layer must be identifiable as different regions or portions of that layer?

MR. HERMAN: Objection; form.

THE WITNESS: Can you repeat the question again?

BY MR. WATSON:

Q Would it be fair to say that the first and second portions of a second material layer must be identifiable as different regions or portions of that layer?

MR. HERMAN: Same objection.

THE WITNESS: I believe that -- at least in the context of the prior art, that the first and second portions of the second material layer are distinguishable part of that layer. That is, they are identifiable as different portions or different regions of that layer and in accordance to the description provided by the prior art.

BY MR. WATSON:

Q Let's turn to paragraph 27 of your reply declaration. Can you let me know when you're there?

A Hold on one second.

The previous answer I have provided is particularly regarding to the first and second portions of the second material related to the prior art such as Kim and Lee. You're asking me something in the more general terms, and I don't think I address that in my reply declaration. If I missed something, can you point to where I said that in my reply declaration?

Q I think I was just asking you to turn to paragraph 27. But is there something else you want to say about your previous answer regarding what makes the first and second portions of the second material layer distinguishable?

A No, I provided answers specifically regarding to the first and second portions of the second material, particularly related to the prior art that I discussed in my reply declaration.

THE STENOGRAPHIC REPORTER: And I'm sorry, Dr. Lee. You said Kim and Lee, K-i-m. Is that what you said?

THE WITNESS: That's correct.

THE STENOGRAPHIC REPORTER: Thank you.

THE WITNESS: Thank you.

BY MR. WATSON:

Q So one follow-up, then, I guess, to that response is if you go to paragraph 15 of your declaration, do you see that?

A Which declaration?

Q Your reply declaration.

A Okay.

Q Would you agree that the claims of the '838 patent require that the first and second portions are distinguishable parts of the same second material layer?

MR. HERMAN: Objection; form.

THE WITNESS: The claim has nothing to -- does not -- does not mention distinguishable.
BY MR. WATSON:
Q So if the claims do not mention distinguishable parts, why do you say here that nothing about the claims requires these parts to have any specific structure or dimension, other than that they are distinguishable parts of the same conductive layer as understood by a POSITA?
A I'm saying that the claim does not have the word distinguishable in it, but as understanding by a person of ordinary skill in the art, particularly in the context of the prior art that I referred to, that they are distinguishable parts of the same conductive material as understood by a POSITA.
Q So is it your opinion that a person of ordinary skill in the art would have understood that the first and second portions of the second material layer are distinguishable parts of the second material layer?
MR. HERMAN: Objection; form.
THE WITNESS: I believe that, particularly in the context of the prior art that I analyzed, that they are distinguishable parts of the same conductive material, and that is understood by a POSITA.
BY MR. WATSON:
Q In the context of the '838 patent, would a person

of ordinary skill in the art have understood that the first and second portions of the second material layer are distinguishable parts of the second material layer?

MR. HERMAN: Objection; form.

THE WITNESS: As I explained in my reply declarations related to the '838 patent, for example, in paragraph 47 through 49, and in my opening report, at Exhibit 1003, for example, in paragraph 175 and 196, I believe -- yes -- 196, for example, that they are distinguishable parts of the same conductive layer; that is, the second material layer.

Incidentally, may I point out that -- and I believe that during the -- my last deposition, I had mentioned that already, that in paragraph 175 of my opening report -- would you mind turning to that? Let me emphasize that.

Again, I believe that I discussed that during my last deposition, that in this paragraph, the annotated figure in paragraph 175 shows that the bracket of the second portion of the second material layer that I drew begins at the landing part -- landing pad, so I did not draw that with extreme precision.

However, in paragraph 190 -- let me see -- 196 -- if you can scroll down to 196 -- that the annotated drawing -- the annotated figure in paragraph 196, the

bracket illustrating the second portion of the second material layer is more precise.

Nevertheless, that the wording associated with both figures are accurate, that I clearly state that the second portion is the PAD_B at the end of the gate electrode. This is in accordance with the description provided by the team reference.

THE STENOGRAPHIC REPORTER: And, I'm sorry, Dr. Lee. You said, second portion is the PAD_P or PAB_B at the end of the -- I'm sorry. I didn't understand what you said there.

THE WITNESS: It's capital letters, PAD_B.

THE STENOGRAPHIC REPORTER: B as in --

THE WITNESS: PAD_B --

THE STENOGRAPHIC REPORTER: B as in --

THE WITNESS: B as in boy.

THE STENOGRAPHIC REPORTER: Thank you.

THE WITNESS: Thank you. Sorry about that.

THE STENOGRAPHIC REPORTER: That's okay. But I didn't understand what you said, at the end of the... I didn't understand what you said that -- what you said. I'm sorry.

THE WITNESS: At the end of the gate electrode.

THE STENOGRAPHIC REPORTER: Gate electrode. Thank you.

THE WITNESS: Yes.
BY MR. WATSON:
Q I don't think that was -- had anything to do with my question, so let me -- let me ask my question again.
So we're talking about your reply declaration, paragraph 15.
Do you see that in front of you?
A Yes.
Q In the context of the '838 patent -- well, strike that.
In paragraph 15, you're talking about the '838 patent and the meaning of the term portion, correct?
A Can you upload what is Exhibit 1030?
Q Are you unable to answer my question of whether paragraph 15's talking about the '838 patent in your reply declaration?
A Since I refer to the Exhibit 1030, I would like to look at it.
Q Where do you refer to Exhibit 1030 in paragraph 15 of your reply declaration?
A Oh, sorry. Wait a minute. Hold on one second. I'm looking at... I thought I looked at 1003.
This is Exhibit 1075; is that right?
Q Correct. That explains -- that explains a lot.
A Okay. Yeah. Okay. 1077.

What is that, Exhibit 1077?

So in that paragraph, I cited 1077. I couldn't find it in my opening -- oh, wait.

Q So let me ask you about --

A That's --

Q -- paragraph -- paragraph 15 of your reply declaration.

Is that okay?

A Yes. Sure.

Q Now that we're all on the same page.

A One-oh -- you're talking about the Exhibit 1075 now?

Q Correct. The reply declaration.

A Yes.

Q Okay. In paragraph 15 of -- of your reply declaration, you refer to the claims, in that last sentence.

Do you see that?

A Yes.

Q Those are the claims of the '838 patent, correct?

A Right.

Q So in the context of the claims of the '838 patent, a person of ordinary skill in the art would have understood that the first and second portions of the second material layer are distinguishable parts of the

same second material layer, correct?

MR. HERMAN: Objection; form.

THE WITNESS: Can you repeat the question, please?

MR. WATSON: Can the court reporter read the question?

(Record read.)

MR. HERMAN: Same objection.

THE WITNESS: In the context of the '838 patent, and particularly in the context of the prior art that I used to invalidate the claims of the '838 patent, that the portions are distinguishable parts of the same conductive material that is understood by a POSITA.

BY MR. WATSON:

Q Okay. Can we turn to paragraph 27 of your reply declaration?

A 27. Yes.

Q And I want to go to the second sentence of paragraph 27 in your reply declaration.

Do you have that in front of you?

A Yes.

Q You state, Because the first portion and second portion of the --

A Wait.

Q -- second material layer are different parts of a larger whole, they're always separate and distinct.

Do you see that?

A Yes.

Q So would you agree that the first portion of the second material layer must be separate and distinct from the second portion of the second material layer?

MR. HERMAN: Objection; form.

THE WITNESS: Can you repeat the question again?

BY MR. WATSON:

Q Would you agree that the first portion of the second material layer must be separate and distinct from the second portion of the second material layer?

MR. HERMAN: Same objection.

THE WITNESS: Hold on one second. Let me...

The first portion and the second portion must be separate and distinct in the sense that a POSITA can distinguish them as different parts of the same layer, and the distinctions are based on the disclosures and the specification of the prior art and the particular patent.

And separate and distinct does not mean they're physically separated and structurally different or disconnected. So that's what I mean by separate and distinct.

BY MR. WATSON:

Q So could a portion of the second material layer be considered part of both the first material layer and -- or, strike that.

Could a portion of the second material layer be considered part of both the first portion and the second portion?

MR. HERMAN: Objection; form.

THE WITNESS: So you are asking, can a portion be part of both first portion and second portion of the second material? Is that what you're asking?

BY MR. WATSON:

Q Yes.

A You're asking something that I did not address in my declaration. If I missed something, can you point to where I said that in my declaration?

Q So you don't have any opinions in your declaration about whether a portion can be part of both a first portion and a second portion of the second material layer?

A I -- at least for the prior art that I have and the '838 patent, that on the first and second portion can be part of the same continuous layer, namely the second material layer, a person of ordinary skill in the art would have understood them to be different --

Q So I guess my question is -- (simultaneous cross-talk) --

A -- and nonoverlapping regions.

A single region, at least in my analysis of the

prior art and the '838 patent, is not both the first and -- both the first portion and second portion.

Q So is it your opinion that in the '838 patent, a person of ordinary skill in the art would have understood the first and second portion to be different and nonoverlapping regions?

A I think that's what I answered, that the first and second portion -- portions are part of the second material layer, and that a person of ordinary skill in the art would understand them to be different, nonoverlapping regions, at least in the context of the '838 patent and the prior art that I use in invalidating the claims of the '838 patent.

Q Okay.

MR. WATSON: We've been going about an hour and 15 minutes. I think now is probably a good time to take a break.

We can go off the record for a sec.

(Recess taken.)

BY MR. WATSON:

Q Could we please pull up Exhibit 1001?

THE TECHNICIAN: Yes. One moment. (Indicating.)

Dropped it in the chat.

MR. WATSON: If we put it on the screen here too so I can...

THE TECHNICIAN: 1001.
BY MR. WATSON:
Q And, Dr. Lee, if you could go to Figure 8 of Lee -- of the Exhibit 1001, and let me know when you're there.
A In the same -- organize the orientation on my screen.
Yes.
Q Exhibit 1001 is the '838 patent, correct?
A That's correct.
Q And in Figure 8, what's labeled as layer 825 is called the dielectric layer, correct?
A 825?
Q Yes.
A Let's see.
As described in Column 9, line 40, the first sentence, indicating that the figure labeled element 825 as a dielectric disposed over the staircase structure, 800.
Q So Figure 8 --
THE STENOGRAPHIC REPORTER: I'm sorry, Dr. Lee. I didn't under -- I didn't hear you. You said, as a dielectric disposed over the what structure?
THE WITNESS: Staircase.
THE STENOGRAPHIC REPORTER: Staircase.

THE WITNESS: S-t-a-i-r-c-a-s-e. Staircase structure.
THE STENOGRAPHIC REPORTER: Thank you.
THE WITNESS: Element number 800.
BY MR. WATSON:
Q So Figure 8 shows the dielectric layer, 825, disposed on the staircase structure, 800, correct?
A I think that's pretty much what I said. Figure 8 labels element 825, a dielectric layer disposed over the staircase structure, 800.
Q And in Figure 8, layer 825 is not part of the staircase structure, but rather, disposed over it, correct?
MR. HERMAN: Objection; form.
THE WITNESS: Can you repeat that question again? I'm sorry.
BY MR. WATSON:
Q In Figure 8, layer 825 is not part of the staircase structure, but rather, it's disposed over the staircase structure, correct?
MR. HERMAN: Objection; form.
THE WITNESS: So in Figure 8, element 825 is an overlying dielectric form after the staircase is constructed. So it's drawn as a continuous overlying layer covering the entire staircase structure, number 800. So it is not one of the stepped element, if that's what

you meant.

THE STENOGRAPHIC REPORTER: Dr. Lee, you said, step element?

THE WITNESS: S-t-e-p-p-e-d.

THE STENOGRAPHIC REPORTER: Thank you.

BY MR. WATSON:

Q So layer 825 is formed after the staircase structure is constructed, correct?

A So -- so Figure, I believe, 1 through 8 -- hold on -- shows the process sequence of the -- well, a process sequence showing the structure evolving from step by step, from the initial stack to the complete staircase with overlying dielectric.

So it's really an example. The -- the figure is illustrating the example sequence of a fabrication step.

So, yes, Figure 8 is the figure that shows the element 825 disposed over the staircase structure.

Q So in the examples shown in Figures 1 through 8, layer 25 is shown to be formed after the staircase structure is constructed, correct?

MR. HERMAN: Objection; form.

THE WITNESS: Did you say layer 25 or...

BY MR. WATSON:

Q Strike that. Correct.

In examples shown in Figures 1 through 8,

layer 825 is shown to be formed after the staircase structure is constructed, correct?

MR. HERMAN: Objection; form.

THE WITNESS: In -- Figure 1 through 7 shows the process sequence, an example of formation of the staircase structure, and 825 shows -- Figure 8 shows layer 825 appearing at -- for the first time, as the top overlaying structure.

So I don't know what you mean by when the staircase structure is completed. But then there's still further steps. You know, Figure 1 through 7 is not showing the complete staircase structure.

So you have to be careful how you say what you mean by the complete staircase structure.

BY MR. WATSON:

Q But layer 825 is not a part of the staircase structure, correct?

A That is correct. Dielectric layer 825 is not part of the staircase structure.

Q Let's pull up your declaration, Exhibit 1075.

A Okay.

THE TECHNICIAN: (Indicating.)

THE WITNESS: But is this the same as your other --

BY MR. WATSON:

Q This is your reply declaration again.

A That's the same exhibit as previously uploaded, right?

Q Correct. Yeah. You should have your reply declaration. We're just going back to it.

Do you have your reply declaration with you?

A Yes.

Q Okay. Let's turn to paragraph 113.

Do you have in front of you?

A Paragraph 113?

Q Mm-hmm.

A Yes.

Q Okay. Now, you claim that Dr. Giapis' contention that Kim's and Yang's processes are incompatible misses the point.

Do you see that?

A Yes.

Q Now, in your reply declaration, you don't offer an opinion on whether or not Kim and Yang's processes are incompatible, correct?

A You said whether I have offered an opinion that Kim and Yang's prior art process are compatible or incompatible?

Q Correct.

A So, first of all, a POSITA -- when I say that Dr. Giapis' contention that the two prior art process are

compatible, missing the point is that by incompatibility means that a person of ordinary skill in the art do not blindly copy one process step by step; they understand that there's some differences, and differences is not equal to incompatibility.

So, in other words, there might be some process differences. A POSITA would, in general, when -- when doing combination, would routinely modify the process flow to implement known lessons, known teachings.

So that's why I say that Dr. Giapis' contention that Kim's and Yang's process -- processes are incompatible misses the point.

Q But you don't opine on whether these processes are compatible or not in your reply declaration, correct?

A Well, no, I did not offer an opinion, but -- about whether the process is incompatible or not, but I'm responding to Dr. Giapis' statement, or argument, about process incompatibility, and that his argument is missing the point.

And I just think that the relevant question is not process compatibility, and that a POSITA would adopt and implement teaching from different references, and it's whether -- whether the process is compatible or incompatible, that's not -- it's not directly related to combination.

However, it's -- speaking of that, that I'm relying on the teachings of Kim and Yang, and explain why -- what a POSITA would understand or be able to do, not necessarily proposing a rigid step-by-step combination of the entire process.

Q Okay. Let's go to paragraph 114 of your reply declaration.

A 114?

Q Yeah.

Now, you don't claim that Yang's structure could be formed using Kim's manufacturing process, correct?

MR. HERMAN: Objection; form.

THE WITNESS: I'm not proposing modifying Kim with Yang's fabrication process, and I'm not proposing importing process Yang's -- of Yang's into Kim. My analysis is that simply using Kim -- using Yang to illustrate typical staircase dimensions and geometry that a POSITA would understand, as I describe in my reply declaration.

BY MR. WATSON:

Q Let's go to paragraph 153 of your reply declaration.

A 153?

Q Yeah.

Let me know when you're there.

A I'm there.

Are you -- is there a question, sir?

Q Are you at paragraph 153? Are you there?

A Yes. I said, I'm there.

Q Okay. Sorry. I didn't hear that.

Now, you don't claim that Lee's structure could be formed using Haller's manufacturing process, correct?

A As I describe in paragraph 153 and neighboring paragraph, I did not propose Lee be modified to follow Hall's manufacturing process. I cite Haller -- sorry. Earlier, I said, to follow Haller's manufacturing process, not Hall's. I cite -- I cited Haller only as an example of the landing pad offset used to maintain the spacing between the adjacent conductive structure.

Lee and Haller address the same problems, spacing problems, and any differences in fabrication process are irrelevant through to that dimensional teaching. So in paragraph 148 to 153, basically detail what I said just now.

Q But you don't offer an opinion about whether Haller and Lee's manufacturing processes are compatible, correct?

A Well, I'm not proposing Lee to be modified to follow Haller's manufacturing process. So my analysis does not depend on process compatibility. As I mentioned

just now and in my reply declaration, I rely on Haller only for its teaching in the landing pad offsets and spacing, which is independent of a -- of the particular fabrication processes.

So process compatibility is not part of my analysis for the reason that I've given just now and in my reply declaration.

Q Let's turn to paragraph 151 of your reply declaration, and in particular, I want to direct your attention to the third sentence, where it starts, If it did. Let me know when you're at that sentence.

A Which? The third sentence is...

Q Starts with, If it did.

A If it did. Okay.

Q Now, in paragraph 115, you use the word material thickness.

What do you mean by the words material thickness?

A Meaning -- material thickness means a meaningful engineered thickness used in a semiconductor processing. In other words, it is a nontrivial, manageable thickness of an oxide beyond the native -- the initial native oxide thickness.

So, again, material thickness means a meaningful, manageable engineering -- engineered thickness used in semiconductor processing.

Q What's the smallest thickness that you would consider to be material?

A Well, depending on the generations that you're referring to, so, essentially, that, depending on the technology and the applications of the oxide in the semiconductor chip -- so by material thickness, I mean a practical oxide thickness beyond the ultra-thin initial layer, on the orders of tens to hundreds of nanometer, or even greater.

So, again, depending on the applications and depends on the technology node, moderate oxide thickness, maybe 28 to hundred nanometer, and you can even have thicker oxide for certain applications, maybe even 100 nanometer or more, or even -- even thicker, depending on the particular applications, so...

Q Could 2 to 3 nanometers --

A Say again.

Q Could 2 to 3 nanometers be materially thick enough?

MR. HERMAN: Objection; form.

THE WITNESS: In what application are you referring to?

BY MR. WATSON:

Q For 3D NAND application.

MR. HERMAN: Objection; form.

THE STENOGRAPHIC REPORTER: I'm sorry, Tom. I didn't actually -- did you say -- could you repeat your question, please?

MR. WATSON: The 3D NAND part, or which -- which part --

THE STENOGRAPHIC REPORTER: Did you say three -- you said 3D NAND, N-A-N-D, 3D NAND application?

MR. WATSON: Yes. Yeah.

THE STENOGRAPHIC REPORTER: Thank you.

THE WITNESS: Which part of the 3D NAND are you referring to; the peripherals part or -- or the memory array?

BY MR. WATSON:

Q Well, in paragraph 151, you're referring to the silicon oxide layers, so that's what I'm referring to.

MR. HERMAN: Objection; form.

THE WITNESS: In 3D NAND context that I refer to, that 2 to 3 nanometer would typically not consider a material thickness in the sense that I was using.

BY MR. WATSON:

Q Now, let's go to paragraph 151, a little bit lower in the paragraph.

You mention that oxygen will diffuse through a silicon oxide layer.

Do you see that?

A Yes.

Q Okay. Why will the oxygen -- oxygen diffuse from the silicon -- through the silicon oxide layer -- strike that.

Why will the oxygen diffuse through the silicon oxide layer rather than oxidize the silicon oxide layer?

A So you're asking, why would -- why would it diffuse through the silicon dioxide layer instead of oxidizing it?

Q Correct.

A You have to understand the mechanism of oxide growth.

THE STENOGRAPHIC REPORTER: I'm sorry, Dr. Lee. You said, of oxide goal? What did you say?

THE WITNESS: Growth. Growth. Sorry.

THE STENOGRAPHIC REPORTER: Growth.

THE WITNESS: Yeah.

THE STENOGRAPHIC REPORTER: Thank you.

THE WITNESS: Sorry about that.

So you have to understand the mechanism of oxide growth. It doesn't grow on top, the outer layer. It actually occurs at the interface, and it will diffuse through the oxidized diffusion -- diffuse through the existing oxide, and so that's why I say that it will diffuse through the oxidized -- through the existing

silicon oxide layer.

BY MR. WATSON:

Q Okay. Let's now go to paragraph 82 of your expert declaration.

A Say it again. Expert declaration?

Q It's paragraph 82 of your reply declaration. Excuse me. Reply.

A 87?

Q 82.

A 82. I'm sorry. Yes.

Q Okay. In paragraph 82, you state that a person of ordinary skill in the art would have understood that Kim is readily modifiable to produce rounded landing pads (with curved side surfaces) following the same approach, because Park's oxidation-induced rounding process is additive, occurs preferentially at the corners, and can be incorporated into Kim's sequence without altering Kim's overall architecture or fabrication objectives.

Do you see that?

A Yes.

Q So are you offering an opinion that a person of ordinary skill in the art would combine Kim with Park's oxidation rounding process to form the curved side surface?

MR. HERMAN: Objection; form.

THE WITNESS: So you're asking am I offering an opinion of combining Kim and Park?
BY MR. WATSON:
Q Sure.
A In a limited sense, not the wholesale process combination that -- I'm explaining that a POSITA would have applied Park's known oxidation-based rounding technique to Kim's structure to achieve the rounded landing pads.
Q So it's your -- is it your opinion that a person of ordinary skill in the art would combine Kim with Park's oxidation-based rounding techniques to form the curved side surface?
MR. HERMAN: Objection; form.
THE WITNESS: I'm saying that a person of ordinary skill in the art would understand that Park's oxidation-based rounding technique could be applied to Kim's structure to form rounded landing pads.
MR. WATSON: Can we take a short break here? I just need, like, two or three minutes just to look through some things.
(Recess taken.)
BY MR. WATSON:
Q Dr. Lee, did you talk to anybody during the break?

A No.

MR. WATSON: Okay. I don't have any further questions. Pass the witness.

MR. HERMAN: I don't have any questions either.

MR. WATSON: Okay.

THE STENOGRAPHIC REPORTER: All right. Then did you want to add anything else, Counsel, to the record?

MR. WATSON: I don't think so.

THE STENOGRAPHIC REPORTER: Okay. All right. And just to reiterate, we just marked Exhibit 1 today in terms of marking?

MR. WATSON: That's correct.

THE STENOGRAPHIC REPORTER: Okay. Perfect. Thank you so much. Have a great day, everyone.

(WHEREUPON THE DEPOSITION WAS CONCLUDED AT 9:19 A.M.)

Please be advised I have read the foregoing deposition, pages 1 through 51, inclusive.

I hereby state there are:

(Check one)_____ no corrections

_____ corrections per attached

_____

JACK C. LEE

--oOo--

WITNESS'S CHANGES OR CORRECTIONS

NOTE: If you are adding to your testimony, print the exact words you want to add. If you are deleting from your testimony, print the exact words you want to delete. Specify with "Add" or "Delete" and sign this form.

Deposition of: JACK C. LEE, PH.D.
Case Title: MICRON V. YANGTZE
Date of Deposition: MARCH 25, 2026

I,_____have the following corrections to make to my deposition:

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CERTIFICATE OF SHORTHAND REPORTER/STENOGRAPHER

I, Christa Yan, Certified Shorthand/Stenographic Reporter within and for the State of California do hereby certify:

That JACK C. LEE, PH.D., the Witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken before me and is a true record of the testimony given by such witness.

I further certify that both parties were represented by counsel at the deposition.

I further certify that the deposition of JACK C. LEE, PH.D., occurred remotely on March 25th, 2026 commencing at 6:59 a.m., to 9:19 a.m., Pacific Standard Time.

I further certify that I am not related to any of the parties to this action by blood or marriage, I am not employed by or an attorney to any of the parties to this action, and that I am in no way interested, financially or otherwise, in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 26th day of March 2026.



_____
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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|---|---|---|
| MICRON TECHNOLOGY, INC., Petitioner, | : | Case IPR2025-00189 |
| v. | : | U.S. Patent No. |
| YANGTZE MEMORY TECHNOLOGIES COMPANY, LTD. Patent Owner. | : | 11,145,666 |

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Remote Deposition of JACK C. LEE, Ph.D.

Tuesday, December 23, 2025

9:01 A.M. Central Time

Job No.: 613388

Pages: 1 - 194

Stenographically Reported By: Anita M. Trombetta, RMR, CRR, California CSR No. 14647

03/25/2026 - DH

Lee - Exhibit 01

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YMTC
Exhibit 2024
Micron v. YMTC
IPR2025-00189
Ex. 2024-001

Ex. 2047-069

Remote Deposition of JACK LEE, Ph.D., held pursuant to notice, before Anita M. Trombetta, a Certified Shorthand Reporter in the State of California, RMR, CRR, and Notary Public in and for the State of New York.



Ex. 2024-002

Ex. 2047-070

A P P E A R A N C E S

ON BEHALF OF PETITIONER AND THE WITNESS:

K. PATRICK HERMAN, ESQUIRE
ORRICK, HERRINGTON & SUTCLIFFE
51 West 52nd Street
New York, NY 10019-6142
212.506.3596

ON BEHALF OF PATENT OWNER:

B. THOMAS WATSON, ESQUIRE
LATHAM & WATKINS LLP
12670 High Bluff Drive
San Diego, CA 92130
858.523.3944

ALSO PRESENT:

ENRIQUE CASAS, Remote Technician

----------I N D E X----------

WITNESS - JACK LEE, Ph.D.


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----------E X H I B I T S----------


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P R O C E E D I N G S

THE COURT REPORTER: Before we begin, do all counsel stipulate to the identity of the witness?

ATTORNEY HERMAN: Yes.

ATTORNEY WATSON: Yes.

J A C K C. L E E, P h.D., called as a witness, having been first duly sworn by a Notary Public, was examined and testified as follows:

EXAMINATION BY
ATTORNEY WATSON:

Q Good morning, Dr. Lee.

A Good morning.

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

A Jack C. Lee.

Q And can you please state your home address for the record?

A 5803 Westslope, it's one word -- W-E-S-T-S-L-O-P-E; Cove, C-O-V-E; Austin, Texas 78731.

Q And where are you currently located,

Dr. Lee?

A Austin, Texas.

Q Are you currently at your home address?

A Yes.

Q Do you understand that your testimony today is under oath and under penalty of perjury?

A Yes.

Q Is there any reason you cannot provide full and truthful testimony today?

A No.

Q Do you have any materials with you at this moment?

A No.

Q Do you have any documents or notes in front of you?

A No.

Q Is there anyone else in the room with you?

A No.

Q During this deposition, I would ask that you do not put any documents in front of you besides those that we are marking or putting up as exhibits. Is that fair?

A Yes.

ATTORNEY WATSON: Can we take a quick break. My realtime is not working.

(An off-the-record discussion was held at this time.)

Q Dr. Lee, what did you do to prepare for your deposition today?

A I reviewed my reply declarations that you uploaded onto the link. I have also reviewed the exhibit listed in my declaration, including the prosecution history and the prior arts that I listed in my declaration. And I also reviewed and considered the material listed in my prior declaration, the board's institution decision, the patent owner response, the transcript of my deposition in this proceeding, Dr. Giapis's declaration, again, as well as the material listed in the table in paragraph 6 of my reply declaration.

Q You mentioned reply declarations. Did you review multiple reply declarations or just declaration in this proceeding?

A I'm sorry. Just one, the Exhibit 1027 that you uploaded on to the link.

Q Did you meet with anybody in preparation for today's deposition?

A Yes.

Q Who did you meet with?

A I met with counsel, Mr. Patrick Herman a couple times.

Q When did you meet with Mr. Herman?

A One last week, I believe it's on Thursday, and once yesterday.

Q About how long were each of those meetings?

A I don't recall exactly. Maybe one hour each or less.

Q And were these meetings in person or by videoconference?

A It's via, I believe it's Zoom videoconference.

Q Did you meet with anyone besides Mr. Herman in these meetings?

A No.

Q In preparing for your deposition today, have you discussed the content of your declarations with anyone other than Mr. Herman?

A No.

Q Now, Dr. Lee, you have been deposed multiple times, correct?

A Yes.

Q When was the last time you were deposed?

A I don't recall. I don't recall. Probably a month ago. I don't recall exactly when.

Q And was that in a matter where you represented Micron?

A I don't recall which case it was.

Q How many cases are you currently acting as an expert witness in?

A I haven't recently looked at how many number of cases that I'm currently involved in.

Q Would it be more than five cases?

A Possibly. I don't -- like I said, I don't recall exactly because some cases are in a holding pattern, and some cases are a little more active.

Q Siting here today, you don't know how many

cases you're acting as an expert in -- witness in?

A No, I don't have an exact count.

Q Do you have an estimate?

A I probably signed up for more than five at this point. But like I said, some of them are in a dormant state.

Q And Dr. Lee, do you remember being deposed by myself back in October of this year?

A I think you have deposed me multiple times. I don't remember exactly what date.

Q But you and -- I have deposed you a few times already, correct?

A I believe so.

Q And in one of those instances, I deposed you about your opinions regarding a U.S. Patent Number 12,010,838, correct?

A I don't remember exact number. I think you're right.

Q Okay.

ATTORNEY WATSON: I'm going to drop in the chat what we will mark as Lee Exhibit 10.

(Lee Exhibit 10, marked for

identification.)

Q Dr. Lee, can you please pull up what we've marked as Lee Exhibit 10.

A Okay. Yes.

Q Do you recognize what is provided in Lee Exhibit 10?

A On page 2 of the document indicates that this is a transcript for the deposition of me via videoconference on October 30th, 2025, regarding the IPR proceedings of U.S. patent 12,010,838.

Q Dr. Lee, if I use the term "the '838 patent," will you understand that to mean U.S. Patent Number 12,010,838?

A Yes.

Q So Lee Exhibit 10 is your deposition transcript regarding your opinions for the '838 patent; is that fair?

A I'm sorry. You keep referring to Lee Exhibit 10. All I see is the identification of Lee, Jack C. 103025, full size.PDF. I just want to make sure that we are calling -- we are talking about the same thing.

Q Yes. Yes. So I've marked this Lee Jack 103025 as Lee Exhibit 10.

In fact, let's -- let me ask if we can get the tech team to put a marked version into the -- into the chat and we can all be looking at the same --

THE EXHIBIT TECHNICIAN: Stand by. I'm putting the marked version in the chat.

ATTORNEY WATSON: Okay. Exhibit 10 is in the chat.

THE WITNESS: This is the same thing, right?

ATTORNEY WATSON: Correct.

THE WITNESS: Thank you.

Q All right. So Dr. Lee, what we've marked as Lee Exhibit 10 is your deposition transcript regarding your opinions of the '838 patent?

A Yes.

Q Have you had a chance to review this deposition transcript before today?

A Vaguely. I don't recall when I reviewed this, but, yeah, I think I have reviewed this

transcript after the deposition of October 30th, 2025.

Q And were you under oath for this deposition in -- strike that.

Were you under oath when you provided the testimony listed in Lee Exhibit 10?

A Yes.

Q Did you understand that your testimony given in Lee Exhibit 10 had the same force and effect as if given in court?

A Yes.

Q And to the best of your knowledge, does this deposition transcript in Lee Exhibit 10 accurately depict your sworn testimony?

A I haven't reviewed this in detail, and I don't recall if I found any error in this -- in this transcript. So I don't know if there is any inaccuracy in this transcript.

Q But sitting here today, you're not aware of any inaccuracies in your testimony in Lee Exhibit 10?

A You can say that. Like I said, I don't

recall if there is any error. I'm sure there will be some typo and some grammatical mistake. So -- but at this point, I don't recall any substance [sic] error.

Q And during this deposition that was transcribed in Lee Exhibit 10, did you have an opportunity to hear and respond to each question posed by counsel during that deposition?

A I'm sorry. Can you repeat that question, please?

Q During the deposition that was transcribed in Lee Exhibit 10, did you have an opportunity to hear and respond to each question posed by counsel during the deposition?

A Yes, I believe so.

Q Are you aware of any inaccuracies in your testimony in Exhibit 10?

A I'm not aware of any inaccuracy of my testimony.

Q Dr. Lee, could you turn to page 132, line 12 of Lee Exhibit 10?

A What page is this?

Q 131.
A 131. So PDF page number 132?
Q Correct.
A Yes.
Q And you can turn to line 12.
A Yes.
Q In your deposition in Lee Exhibit 10, I asked you if you were aware of any differences between the specification of the '666 patent and the '838 patent, correct?
A That's what it says there.
Q And you answered that you had never compared the '838 and the '666 patent?
A I didn't say I never compared. I said I have not compared it directly.
Q So you have compared the '838 patent and the '666 patent?
A I'm not sure what you mean by "compare." Are you saying that the specifications or the claims? Obviously, they're two different patents.
Q Fair enough.
Are you aware of any differences in the

specification between the '838 and the '666 patent?

A Would you mind upload the '838 patent and the '666 patent?

ATTORNEY HERMAN: I'll also note that the '838 patent is not of record in this particular proceeding, and I don't believe the board's rules allow you to submit additional exhibits beyond the deposition transcript of the witness.

ATTORNEY WATSON: That's fair.

Q So Dr. Lee, are you aware, sitting here today, of any differences in the specification between the '838 and the '666 patent?

A If you can upload the '838 patent and '666 patent, I can look at it.

ATTORNEY WATSON: Let me put in the chat the '666 patent real quick. That is Exhibit 1001.

Q Let me know when you have that.

ATTORNEY WATSON: I will also put into the chat what we will mark as Lee Exhibit 11.

A Got it.

ATTORNEY WATSON: And then if you could --

the tech could put a marked version of Lee Exhibit 11 into the chat.

THE EXHIBIT TECHNICIAN: Stand by.

ATTORNEY HERMAN: And, again, I object to that exhibit as inappropriate given the board's rules.

ATTORNEY WATSON: That's fair, but he did ask for it, so I want to make sure he has the material he wants to answer my question.

(Lee Exhibit 11, marked for identification.)

THE EXHIBIT TECHNICIAN: Exhibit 11 is in the chat.

Q Okay. Dr. Lee, what is what we've marked as Lee Exhibit 11?

A It's the '838 patent.

Q Okay. So you now have the '838 patent and the '666 patent, correct?

A Hold on one second.

Okay. Yes, I have both.

Q Dr. Lee, sitting here today, are you aware of any differences between the '838 patent

specification and the '666 patent specifications?

A So obviously the filing dates are different, and all the related dates are different, prior publication data and related U.S. application data. The figures appears to be the same -- the figures appear to be the same between the two patents.

The formats are slightly different. In other words, if you look at certain column at certain lines, they're not the same paragraphs.

Q Maybe I can short-cut this a little bit if that would be okay, Dr. Lee.

A Sure.

Q Okay. Are you aware of any differences in the figures between the '838 patent and the '666 patent?

A Skimming through this, there might be some differences, but skimming through Figure 1 through 9 of both of them, they appear -- they appear to be the same.

Q And similarly, are you aware of any differences in the description provided in the

specification between the '838 patent and the '666 patent?

A What do you mean by "description"?

Q Are you aware of any differences in the written description provided in the '838 patent and the '666 patent?

A Do you mean the specifications?

Q Yes. Other than, you know, formatting or column number.

A The specification starting from "Background" to "Brief Summary" to "Brief Description of the Drawing," "Detailed Description," they all appear to be the same.

Q So sitting here today, you're not aware of any differences between the specification in the '666 patent and the '838 patent, correct?

A Like I said, I have not compared in detail of the two patents, the '666 patent and '838 patents. There might be some difference, but skimming through these two patents at this point just right now, I'm not aware of any difference in the specification between the '838 patent and the

'666 patent?

Q Sitting here right now, you're not aware of any difference between the specification between '838 patent and the '666 patent, correct?

A Like I said, based on what you upload on the chat and based on what I just skimmed through the two patents, they look the same. The specification look the same.

Q You can put all those -- you can put those exhibits away or close them if you want.

A Okay.

Q Dr. Lee, how many declarations did you prepare for this proceeding?

A Can you explain what do you mean by "proceeding"?

Q Sure. So do you understand that today's deposition is regarding U.S. Patent Number 11,145,666?

A Yes.

Q And we've been using it as a shorthand, but you'll understand that when I refer to the '666 patent, I'm referring to U.S. Patent Number

11,145,666?

A Yes.

Q And when I refer to the term "proceeding," I'm referring to IPR 2025-00189, which is Micron's IPR regarding the '666 patent. Does that make sense?

A Sorry, where did you read that number?

Q Sure. Let's pull up -- well, let me -- let me do this.

ATTORNEY WATSON: I'm going to put up on the screen what we'll -- what has been already marked as Exhibit 1003 and Exhibit 1027.

Q And I'll put it on my screen so you can see what I'm referring to if you would like.

Dr. Lee, can you let me know when you have Exhibit 1003 and 1027 open.

A I just downloaded 1003.

Q Okay.

A Yeah. I'm sorry. Did you have a question?

Q Do you have Exhibit 1003 and Exhibit 1027 open?

A Yes.

Q Let's start with Exhibit 1003. What is Exhibit 1003?

A Well, as you've shown in -- on the screen here, this is a -- this is my declaration in support of the petition for IPR of the '666 patent.

Q And do you see where it says "Case No. IPR202500189"?

A Yes.

Q If I refer to "this proceeding," can we agree that we're referring to this particular IPR?

A I don't understand your question.

Q Yeah, so if I say "in this proceeding," I am referring to IPR 2025-00189 regarding the '666 patent; is that fair?

A Okay. The proceeding is the case number?

Q Yes.

A Okay. Sure.

Q Okay. I just wanted to make sure we have that clear to clarify. Okay.

So Dr. Lee, if we could go to the last

page of Exhibit 1003.

A Yes.

Q You signed this declaration in Exhibit 1003 on November 22nd, 2024, correct?

A Yes.

Q And moving forward, would it be okay if we call this your original declaration?

A Sure.

Q Okay. And the reason I say that is you submitted a second declaration in this case in Exhibit 1027, correct?

A Yes.

Q And that second declaration is Exhibit 1027?

A What you're showing on the screen right now.

Q Okay. And so if you could pull up Exhibit 1027 for a second.

A Yes, I have.

Q Exhibit 1027 is the declaration you submitted in this proceeding on November 25th, 2025, correct?

A Yes.

Q Now, was your declaration in Exhibit 1027 intended to replace your declaration in Exhibit 1003 or to add to it?

ATTORNEY HERMAN: Objection to form.

A I'm not sure what you mean by "replace" or "add to it."

Q What was the purpose of the declaration you submitted in Exhibit 1027?

A The purpose is -- of this, let's call this reply declaration. Is that okay?

Q Yeah, let's use the term "reply declaration" to refer to Exhibit 1027. Is that okay?

A Sure. And then the 1003, let's call that opening -- my opening declaration.

Q Okay. That's fair.

A Or you call that original declaration. So let's say opening and reply declaration.

In my reply declaration, in paragraph 2, essentially describes the purpose of my reply declaration.

Q Is there anything that has come to your attention that you would like to correct in your declaration, Exhibit 1027?

A I don't recall any things that I want to correct in my reply declaration. Let me --

Q When preparing your declaration --

A Hold on one second, sorry.

Okay. So in paragraph 87, I believe there is a spelling error. The U.S. Patent Number 9,728,547 to Osaki, I believe it's missing a letter H behind the letter O. Should have been O-H-S-A-K-I.

If you look at paragraph 6, Exhibit 1029, it's referring to the same U.S. patent '547, and there, the inventor's name is spelled correctly.

Q Other than spelling errors, is there anything that has come to your attention that you would like to correct in your declaration, Exhibit 1027?

A Not that I can think of at this point. There might be some omitting error or grammatical error, but as far as I can tell that -- other than

spelling and some formatting or grammatical error, there -- I don't see any error in substance.

Q When preparing your declaration, were there any materials you would like to have reviewed but did not have access to?

A Not that I recall.

Q And have you submitted any errata sheets for either your original or applied declarations?

A I don't recall exactly, and I have submitted previously errata sheet on other patent, but I don't recall exactly whether I have submitted an errata sheet for this proceeding, whether for the opening report -- or the transcript for my opening declaration.

So I can't give you a definitive answer.

Q I'm not aware of any errata sheet, but sitting here today, you're not aware of any errata sheets for your original or reply declarations, correct?

A Yes. My understanding -- you're the lawyer -- is that for IPR, we don't submit errata sheets anymore. Is that true?

Q I don't know. But you're not aware of having done so yourself, correct?

A I know I have done for other IPR in the -- in this -- in the case of YMTC versus Micron case which has many IPR, but I'm not aware for this particular '666 IPR proceeding.

Q Let's go to exhibit -- let's go to your reply declaration paragraph 2. Let me know when you're there. I have it on the screen too.

A One second, please. Okay.

Q In your reply declaration, you respond to proceedings offered by a Dr. Giapis, correct?

A Yes.

Q Apart from your work in this proceeding, do you know Dr. Giapis?

A No.

Q And did you render any opinions on whether Dr. Giapis qualifies as an expert in the subject matter of the '666 patent?

A Regarding Dr. Giapis's qualifications?

Q Correct.

A No, I don't think so.

Q Do your opening and reply declarations contain a complete and accurate statement of your opinions regarding the validity of claim 19 of the '666 patent?

ATTORNEY HERMAN: Objection. Form.

A Can you repeat the question and clarify the question, please?

Q Are you offering any opinions regarding the validity of claim 19 of the '666 patent that are not found in your opening and reply declarations?

ATTORNEY HERMAN: Objection. Form.

A My understanding is that this IPR proceedings relate to claim 19, which depends on claim 17. As I described earlier regarding what the purpose is for my reply declarations, it is summarized in paragraph 2 of my reply declarations. And the purpose of my opening declaration is described in paragraph 14.

So both, for example, in my opening declaration in paragraph 14, said that I have been asked to provide analysis and explain the subject

matter of the '666 patent. And at the end provide my opinion, at the end of the paragraph, that -- the second sentence, that I've been also asked to consider, analyze, and explain certain prior art to the '666 patent, including how the art relates to the challenged claims of the '666 patent and to provide my opinions regarding whether that art invalidates the claimed subject matter.

And since my -- since the only remaining claims is claim 19, which depends on claim 17. So both my reply declaration and my opening declaration is how the prior art are used to invalidate the claimed subject matters, namely claim 19, which depends on claim 17.

Q And your opinions regarding the validity of the claims in the '666 patent are found in your original and reply declarations, correct?

ATTORNEY HERMAN: Objection. Form.

A Well, as I explain in paragraph 2 of my reply declaration and paragraph 14 of my opening declaration, that I'm asked to provide my opinions regarding whether that the prior art to the '666

patent invalidates the claim subject matter. And the opening report, opening declarations.

And the reply declaration contains my opinion -- my opinions.

Q So your opinions in this proceeding are found in your opening and reply declarations, fair?

A I will also say that the transcript of my deposition that you uploaded, I'll call that Exhibit 10, I believe. The deposition of Jack Lee, Ph.D., via videoconference, Thursday October 10th -- October 30th, 2025, at 10:00 A.M.

So the testimony in my deposition also contained and in support of my opening declaration.

Q So your opinions in this proceeding are found in your opening and reply declarations and in your deposition transcripts; is that fair?

A I believe so.

Q And when was the last time you reviewed your declaration, your reply declaration?

A This morning.

Q Have any of your opinions regarding the validity of the '666 patent changed since you submitted your reply declaration?

A I don't think so.

Q I want to refer you to paragraph 4 of your reply declaration. Let me know when you're there.

A Okay.

Q Your reply declaration does not include a legal standards section, correct?

A That's right. I refer to my opening declaration.

Q So you applied the legal standards you listed in your opening declaration, fair?

A That is correct.

Q Let's pull up your original declaration, Exhibit 1003. Let me know when you have that up.

A Yes.

Q And we'll go to your legal standards section.

Your legal standards section starts in paragraph 18 of your original declaration, correct?

A That is correct.

Q What were the legal standards you applied when determining the meaning of the term "curved side surface"?

A As described in paragraph 94 through 97, that "I understand that during an IPR review, the same construction standard used in the Federal District Court is applied when addressing the meaning of the claim terms."

In paragraph 95, "I have been informed that the words of a claim are generally given their plain and ordinary meaning," but I think I need to read the entire section.

Do you want me to?

Q No, I don't think that's necessary.

What is your understanding of the role of a patent specification in construing a patent term?

A Can you clarify your question, please?

Q Yeah. What -- what don't you understand about my question?

A Well, what do you mean by the role of the

specification? Because normally that -- I look at to form my opinion regarding certain terms, normally, I look -- not only that I look at the specification but also the file history and more importantly the claims itself and formulate my opinion.

And once again, that is based on my understanding of what it means by plain and ordinary meaning.

Is there a question? Hello?

Q Yeah, no my -- I'm just looking for my next question here.

In providing your opinions in your reply declaration, what terms did you construe?

ATTORNEY HERMAN: Objection. Form.

A I don't know what you mean by what term did I construe?

Q Maybe I can clarify, how about that? Let's clarify.

Can you turn to paragraph 9 of your reply declaration.

A Okay.

Q It's your opinion that the claim terms of the '666 patent do not require further construction, correct?

A "As I explained in my opening declaration" -- and I repeated here in my reply declaration -- "the '666 patent claim terms do not require further construction and can instead be afforded their plain and ordinary meaning."

And that's what it says in paragraph 9 of my reply declaration.

Q What is your understanding of what a plain and ordinary meaning is of a patent term?

ATTORNEY HERMAN: Objection. Form.

A Well, as I describe in my opening report that the words of a claim are generally given their plain and ordinary meaning, that the term or phrase would have to POSITA at the time of invention, in view of surrounding claim language, the specification and file history. Collectively, they're called intrinsic evidence or intrinsic record.

And in the following two paragraph, I also

describe how it's extrinsic evidence, such as expert and inventors' testimony, dictionary and others, how that contributes to the understanding of the claim terms. Although the so-called extrinsic evidence are given or should be given less weight than the intrinsic evidence.

And finally, in paragraph 97, that, again, "the terms of the '666 patent claims do not require further construction and can be afforded their plain and ordinary meaning for the purpose of the analysis of the prior art that I am conducting in this declaration," meaning in this opening declaration, and I applied the same to my reply declaration.

ATTORNEY WATSON: I think we've been going about an hour and 15 minutes. How about we take a five-, ten-minute break.

THE WITNESS: Sounds good.

ATTORNEY WATSON: Let's go off the record.

(Recess.)

BY ATTORNEY WATSON:

Q Dr. Lee, can you turn to paragraph 10 of

your reply declaration, and I'll put it on the screen too so we can be in the same place.

Dr. Lee, do you see -- Dr. Lee, do you have paragraph 10 in front of you?

A Yes.

Q Is it your opinion that the term "side surface," in the '666 patent, would be understood to be any of the bounding surfaces of a three-dimensional structure?

A That's what it says in paragraph 10.

Q Is that your opinion?

A Well, paragraph 10 is in my reply opinion, and my reply opinion contains my opinions. So the answer is yes. And obviously, that is not -- you know, I also explain more in the subsequent paragraphs and also in my opening report regarding how a person of ordinary skill in the art, in understanding the term.

Q So what is your understanding of the plain and ordinary meaning of "side surface" in view of the '666 patent's intrinsic record?

A Well, my understanding of the term "side

surface" has been explained in my reply declaration, particularly in paragraph 10 to paragraph 36. And I'm sure you don't want me to read the entire sections in those paragraphs, but that basically described how I understand the term "side surface" and how the patent owner and Dr. Giapis is wrong in their narrow interpretations of the term "side surface."

Q So in paragraph 10, you opine that the term "side surface" refers to any of the bounding surfaces of a three-dimensional structure, fair?

A Again, that's just, you know, the overview of my -- not just my understanding, but a person of ordinary skill in the art reading the '666 patent and the claims would understand that, again, that there are more details in the subsequent paragraphs.

Q Okay. But I'm just trying to understand, what -- how are you construing the term "side surface" in view of the '666 patent?

ATTORNEY HERMAN: Objection. Form.

A I'm not construing the term "side

surface," but I'm saying that how a person of ordinary skill in the art would have understood the term "side surface" and how that is readily understandable. And that's what I said in paragraph 10, and again, I provide more evidence to support that understanding in the subsequent paragraph, paragraphs that I mentioned.

In fact, the -- The entire reply declarations -- reply declaration and the opening declarations, I spend a lot of time in how a person of ordinary skill in the art would understand the term "side surface."

Q Let's turn to paragraph 12 of your reply declaration.

What are you showing in the figure of paragraph 12 of your reply declaration?

A I'm showing the -- an example of three-dimensional shape as shown in paragraph -- at the bottom of page 5. It shows that it has a total of ten side surfaces; the top, the bottom, four lateral surfaces, four surfaces, bounding the hole through the inner -- through the shape's

middle.

Q So this figure in paragraph 12 -- strike that.

In this figure in paragraph 12, you labeled each surface of an example three-dimensional shape, correct?

A I labeled the ten side surfaces.

Q And one of those surfaces is what you call a top, correct?

A Yes.

Q In your figure in paragraph 12, which surface is a top surface?

A I believe it's labeled number 5.

Q The top surface in this figure in paragraph 12 is a horizontal surface. Is that fair?

A Well, I didn't label any axis for this particular three-dimensional shape, and the orientations of that three-dimensional shape. So I suppose you can't really say which one is horizontal and which one is vertical unless that shape has been labeled, which of the planes are

horizontal, which of the planes are vertical. But if you orient it, let's say we label X, Y, Z-axis and the top surface, 5, is parallel to the X-Y surface -- do you understand what I'm saying?

And if that is what is labeled a horizontal, then -- so we get -- then the top surface would be -- might be understood as the top -- may be understood as the top surface oriented in a horizontal direction.

But, you know, it's not -- just looking at the figures in paragraph 12 without more details of labeling the axis and defining the horizontal and level and vertical, I suppose you can't really say directly.

Q One surface in this figure in paragraph 12 is what you call a bottom surface, correct?

A Yes.

Q In your figure in paragraph 12, which surface is a bottom surface?

A I believe it's labeled number 6.

Q And the bottom surface is parallel to the top surface, fair?

A The way it is drawn, yes.

Q You also identified four surfaces as lateral surfaces, correct?

A Yes.

Q What's a lateral surface?

A Well, in the -- in the drawing, it's labeled 1, 2, 3, 4. So lateral surface in plain and ordinary meaning would mean that it's a side-facing surfaces as opposed to top-facing or bottom-facing surfaces.

And so my understanding is lateral means sideway, perhaps. And lateral surface would mean that a surface facing sideways, not up or down. So that's my understanding.

Now, of course, in general, in plain and ordinary meaning, in an English dictionary, I think that's what it means. Obviously in a certain context, it might mean differently, but I think in general the lateral surfaces basically is a surface that faces -- that face sideways, not up or down.

Q So the lateral surface faces the side

rather than facing the top or the bottom, right?

ATTORNEY HERMAN: Objection to form.

A That's what I explained just now.

Q You also identify four surfaces bounding the hole through the shape's middle, correct?

A Yes.

Q What are those four surfaces?

A Those are 7, 8, 9, and 10 in the figure at the bottom of page 5 in paragraph 12.

Q And those four surfaces are shown in your figure to be parallel to the four lateral surfaces; is that fair?

A You can say that, yes.

Q And the four lateral surfaces and the four surfaces bounding the hole through the shape's middle are perpendicular to the top and bottom surfaces, fair?

A Yes, that the -- the way it is drawn is that the four lateral surfaces and the four interior wall of the four holes or what I wrote, the four surfaces bounding the hole through the shape's middle are perpendicular to the top and

bottom surfaces.

Q And so there's ten surfaces shown in paragraph 12 of your report; is that right?

A That's what I said in paragraph 12.

Q Now let's pull up Figure 7 of the '666 patent. I'll put it on the screen, but you can have your local copy if you need it.

A Yes.

Q Let me know when you're there.

A Are you talking about Figure 6 or Figure 7?

Q Figure 7.

A I'm sorry. Again, I thought earlier you said Figure 6.

Q Are you at Figure 6? I'm sorry, now you got me confused. Are you at Figure 7?

A Yes.

Q In Figure 7 of '666 patent, what is labeled as 720 is the landing pad, correct?

A In -- in column 9, line 7 -- line 8 through 10, it says, "Figure 7 illustrates the cross-section view of a staircase structure 700

with landing pads 720, according to some embodiments."

Q Okay. So you understand that, in Figure 7, what's labeled as 720 is the landing pad, correct?

A That's what I just read.

Q Now, under your construction of side surface, how many side surfaces does landing pad 720 have in Figure 7?

A Again, you keep saying "construction." I did not construe any terms.

Q Okay. Under the meaning of "side surface" that you applied in reaching your opinions, how many side surfaces does landing pad 720 have in Figure 7?

ATTORNEY HERMAN: Objection. Form.

A So your question is how many side surfaces in the landing pad of 720 of Figure 7. Am I understanding correctly?

Q How many side surfaces does the landing pad in Figure 720 have? Correct.

A Well, first of all -- first of all, a

person of ordinary skill would understand that a staircase structure is a three-dimensional structure, and what is shown in Figure 7 is only a cross-section of its three-dimensional structure.

So one of ordinary skill in the art by just looking at 720, the landing pad's number 720 shown in the cross-section of the Figure 7 would not definitively be able to identify all the side surfaces, because this is only showing a cross-section of a three -- three-dimensional device.

Q Would a person of ordinary skill in the art know there's more than four side surfaces in the landing pad in Figure 7, 720?

A I'm saying that from the figure itself, one cannot identify all the side surfaces.

Q And my question was, would a person of ordinary skill in the art know if there were more than four side surfaces in the landing pad 720 in Figure 7.

A Well, first of all, the figure that you've shown in this Figure 7 are in such poor

resolution. And each one of those 720s, landing pads, are drawn differently, total of six landing pads. You can see that the top landing pads are very different from the other five. And each of the five patents are also drawn differently.

So -- and again, this is a cross-section of a three-dimensional device. So one would not definitively identify all the side surfaces, unless it's assuming a certain parameters of the surfaces into the -- into the board, in other words, in the x/y-axis.

(Reporter clarification.)

A Into the board, into the paper. In other words, along the x/y-axis, along the x-y plane.

ATTORNEY WATSON: Okay. I'm going to move to strike that as nonresponsive. Let me try this question again.

ATTORNEY HERMAN: Objection to form. Also, that's not a relief that's available to you.

ATTORNEY WATSON: I'm pretty sure you guys have done it multiple times in multiple depositions.

ATTORNEY HERMAN: I have not done anything of any sort in --

ATTORNEY WATSON: I'm not saying you, Patrick, but you certainly have -- your team has certainly done it in multiple depositions I've been in, so...

Q Let me try this -- let me try a different question.

So Dr. Lee, in Figure 7 of the '666 patent, the landing pad would be understood to be a three-dimensional object, correct?

A That's what I have said. A 3D NAND is a three-dimensional structure, and a landing pad is a three-dimensional structure. What is shown in Figure 7 is only a cross-section.

Q So a person of ordinary skill in the art would understand there is, at minimum, a top surface of the landing pad 720, correct?

A You can say that, yes.

Q And a person of ordinary skill in the art would understand there's, at minimum, a bottom surface of the landing pad 720, correct?

A Yes.

Q And a person of ordinary skill in the art would understand there's, at minimum, four lateral surfaces of the landing pad 720, correct?

A That's right.

Q So a person of ordinary skill in the art would understand there is at least six surfaces of landing pad 720 in Figure 7, correct?

A A person of ordinary skill in the art -- for example, if you look at the -- the very top landing pad is 720. Okay? Which show the cross-section as a rectangle. And if one extrapolates what they look like in the x/y-axis, one would understand that there is a top surface parallel to the x/y-axis, a bottom surface -- I'm sorry, let me rephrase that.

A top side surface parallel to the x/y-axis, a bottom side surface parallel to the x/y-axis, four lateral side surfaces perpendicular to the x/y-axis. So that will be total of six side surfaces in the top landing pad 720. If the understanding of -- of what it appears to be --

can be extrapolated into the x-y plane.

Q And in Figure 7, there's a substrate, I believe it's 204, correct?

A I beg your pardon?

Q In Figure 7, what's marked as 204 is a substrate, correct?

A Can you --

Q I'm sorry, let me -- let me strike that and repeat the -- give you a slightly different question.

The '666 patent describes a substrate, correct?

A Yes.

Q And that substrate has a top surface, correct?

A Yes.

Q And that -- the top surface of the substrate is shown to be in the X-Y direction, fair?

ATTORNEY HERMAN: Objection. Form.

A Can you repeat that question again? I'm sorry.

Q The top surface of the substrate is in the X-Y direction, in the x-y plane, correct?

A So the only place it identifies the substrate is in Figure 1. It identifies it as the layer 101. Okay? And so -- and as you can see that in layer 101, again, Figure 1 again only shows the cross-section and the substrate is showing as a rectangle, so a person of ordinary skill in the art would -- would have understood that the substrate, based on this drawing, and assuming that it extend into the X-Y direction, would have six side surfaces, two top side surfaces -- one top side surface, one bottom side surface, and four lateral side surfaces.

Q Now, I want to go to --

A And the top -- the top side surface would be parallel to the x/y-axis.

Q So the top and bottom surfaces are parallel to the X/y-axis, fair?

A In Figure 1, the substrate 101 has both a top side surface and a bottom side surface, and both of which are parallel to the x/y-axis,

assuming that the three-dimensional perspective is extended into the board with -- with some expectations. But since it didn't show a true three-dimensional structure, the top side surface might be tilted. We don't know. Okay. But assuming that it doesn't happen that way, then a person of ordinary skill in the art might have understood that the top side surface and the bottom side surface are parallel to the x/y-axis.

Q Let's go to paragraph -- let's go to column 5, lines 3 through 5 of the '666 patent.

A Column 5?

Q Mm-hmm.

A Right?

Q Correct.

In the '666 patent, "the terms 'horizontal/horizontally/lateral/laterally' mean nominally parallel to a lateral surface of a substrate," correct?

A That's what it says there.

Q So in the '666 patent, horizontal and lateral both mean the same thing, correct?

ATTORNEY HERMAN: Objection. Form.

A What do you mean by "both mean the same thing"?

Q Well, the '666 patent defines horizontal and lateral as "nominally parallel to a lateral surface of a substrate," correct?

A So it seems to me a person of ordinary skill in the art reading this sentence would mean that -- would understood as, if the surface direction or movement runs along the plane of the wafer, it might be considered as horizontal or narrow.

When they say "nominally," it means that, in my mind, I believe a person of ordinary skill in the art would understand that it means approximately, generally, or for practical purpose. I don't know. You might be able to tell me in terms of legal sense what "nominally" means.

So it seems to me that it doesn't mean that those surfaces are perfectly parallel, just approximately parallel, with some angle, small angle or irregularities. I don't know.

You might be able to explain in the legal sense what it means by "nominally" better than I can obviously.

Q So the reason I bring this up is in paragraph 12 of your report, you refer to four lateral surfaces, right?

A Sorry, in my reply declaration?

Q Correct. In your reply declaration, paragraph 12, you talk about four lateral surfaces.

A Yes.

Q Okay. But the meaning of "lateral" that you used in paragraph 12 is different than the meaning that the '666 patent applies to the meaning of the word "lateral," correct?

ATTORNEY HERMAN: Objection. Form.

A I think that what I said in figure -- in paragraph 12, I'm talking about the lateral surface. Meaning that it's a sidewall. And as shown in the figure, in paragraph 12, that like many sidewall happen to be vertical.

And on the other hand, I believe that the

column 5, line 3 to 5 in the '666 patent that you mentioned, in the -- in the context of semiconductor engineering, the lateral direction are parallel to the substrate.

So I think the confusion that you have, I believe is referring to the lateral -- the word "lateral" can be used to refer to a direction or the surfaces. So I believe that there is nothing wrong with my statement in my reply declaration in paragraph 12. I don't think it's contradictory to what is read in column 5, line 3 to 5 of the '666 patent.

Q And the reason you believe it doesn't contradict is, in paragraph 12, you're using the word "lateral" to refer to a particular surface wall in the '666 patent, the word "lateral" is being used to refer to a direction; is that fair?

A Yeah, in -- in paragraph 12, I use the word "lateral" referring to a side surface -- a lateral side surface when it means a sidewall. And everybody knows what a sidewall is. And many sidewall happens to be vertical. And -- and

there -- in paragraph -- the second paragraph in column 5, they're referring to a direction. I believe that's the key differences.

Q Okay. So your use of "lateral" in paragraph 12 is not the same usage of "lateral" that they're talking about in that -- in column 5, lines 3 through 5, fair?

A The --

ATTORNEY HERMAN: Objection to form.

(Reporter clarification.)

THE WITNESS: I'm sorry, Patrick.

A Do you want me to repeat my explanation?

Q Let me re-ask the question. That got a little muddled, and I'm sure Patrick will offer the same objection.

Your use of "lateral" in paragraph 12 is not the same use of "lateral" that they're talking about in column 5, lines 3 through 5 of the '666 patent?

ATTORNEY HERMAN: Same objection.

A As I mentioned and explained earlier, in column -- in Figure 12 -- sorry, in figure -- in

paragraph 12, when I say "lateral surface" or "lateral surfaces," I'm referring to lateral side surface of a structure, perhaps commonly known as sidewalls. And many sidewall happen to be vertical.

In column 5, line 3 to 5, I believe when they say horizontal, horizontally, lateral, laterally, they're referring to a direction which says it's nominally parallel to a lateral surface of a substrate, meaning that -- yeah.

So I think -- I believe the difference is one is talking about sidewall, one is talking about direction. That's my understanding.

Q Okay. In the '666 patent, column 5, lines 11 through 12, the '666 patent defines the term "vertical/vertically" to mean "nominally perpendicular to lateral surface of a substrate," correct?

A Where are you?

Q Column 5, lines 11 through 12.

A That's what it says, "The term 'vertical/vertically' means nominally

perpendicular to the lateral surfaces" -- or "lateral surface of the substrate."

Q So something that's vertical would be nominally perpendicular to the lateral -- or horizontal surface of the substrate. Is that fair?

A Yeah, I mean, it's simple geometry, right? Vertical is perpendicular to horizontal.

Q So let's go back to Figure 7 of the '666 patent.

Do you have that in front of you?

A Yes.

Q In Figure 7, the top and bottom surfaces of the landing pad would be horizontal surfaces, fair?

A Yeah. One of ordinary skill in the art, looking at the cross-section of Figure 7 -- again, this is only a two-dimensional illustration of a three-dimensional structure. So one, if you make some assumption whether it extends, how it extends into the x/y-axis, into the x-y plane. But assuming that it's extended into the x-y plane in

a parallel fashion, then yeah, you would -- each one of the 720 landing pad would have a top side surface and a bottom side surface.

Q And in addition to these top and bottom surfaces, there would be at least four vertical surfaces of the landing pad 720, correct?

A Yes. In the -- for example, with the top landing pad in Figure 7, it just say rectangle in a cross-section. It would have a top side surface and a bottom side surface and four, what I call lateral surfaces or the sidewalls. So I would say four horizontal side surfaces.

Q There would be four horizontal side surfaces and two vertical side surfaces; is that --

A I'm saying the two horizontal side surfaces and four vertical side surfaces.

Q So in Figure 7 of the '666 patent, landing pad 720 has at least two horizontal side surfaces and four vertical surfaces?

A You would have at least one horizontal top side surface, one horizontal bottom side surface,

and four vertical side surfaces.

Q Okay. Let's go back to your reply declaration. Let's go to paragraph 13.

A Just one second, please.

Okay.

Q In paragraph 13, you provide a dictionary definition of "side," which is, "any outer surface of the object," correct?

A Yes. It says that "A POSITA would have understood a 'side' (and relatedly a 'side surface') when referring to a three-dimensional object to refer to any 'outer surface of [the] object.'" And I cite Exhibit 1024 at 483.

Q How is this dictionary definition of "side" related to what a side surface is?

A So your question is, how does this opinion relate to what?

Q I think my question is a little simpler than that. So you say, "relatedly a 'side surface.'"

Do you see that?

A Yes.

Q How does the definition of "side" that you cite here relate to the definition of "a side surface"?

A I'm not sure I understand your question.

Q Okay. Let me try a different question.

Would you agree with me that a side surface would be any outer surface of an object?

A That is what the dictionary says, that the side surface -- that "A person of ordinary skill in the art would have understood the term 'side' (relatedly a 'side surface') when referring to a three-dimensional object to refer to any 'outer surface of [the] object.'"

So -- so my understanding is that the term "side" is a portion of a three-dimensional object; whereas "side surface," perhaps it's the actual surface area that formed the side. Does that make sense? In other words, the side surface is a physical surface that makes up a side.

Q Okay.

A So when he says that -- when the dictionary defined "side" as "any outer surface of

an object," I believe a person of ordinary skill in the art would understand that the surface corresponding to that side is a side surface.

Q Okay. So a side surface would refer to the outer surface of a three-dimensional object?

A I believe that a side surface is simply the surface corresponding to a side of a three-dimensional object. Okay? A POSITA would have understood that side surface to encompass any such bounding surface.

Q What do you mean by "bounding surface"?

A Well, let me perhaps -- "bounding" means by forming a boundary perhaps. Maybe I should rephrase that.

Forming the outer surface of the object. Okay, I don't want to introduce another term. I'm sorry.

Q Okay. So a person of ordinary skill in the art would have understood that a side surface encompasses any outer surface of an object?

ATTORNEY HERMAN: Objection. Form.

A Well, I believe that what I've written in

paragraph 13 that would have -- you know, from the dictionary, a person of ordinary skill in the art would understand that "side surface" is referring to a three-dimensional subject -- object, to refer to any outer surface of the object.

Q Let's go to paragraph 15 of your reply declaration. Let me know when you're there.

A Okay.

Q In paragraph 15, you discuss the term "a curved side surface."

Do you see that?

A Yes.

Q What is the plain and ordinary meaning of "a curved side surface" that you applied in reaching your opinions?

A So in my reply declaration and my opening declaration, "curved side surface" is given a plain and ordinary meaning and not a process oriental -- orientation-based meanings.

So what I was trying to find is that, in my opening declaration in paragraph 202, said that "In my opinion, a person of ordinary skill in the

art would have understood that this teaches a variety of different protrusions of pad" -- you know, they're referring to the landing pad, many of which have the type of so-called curved side surface that claim 17 requires.

So "This includes, for instance, pads with curved sides when viewed in cross-section or pads with curved sides when viewed above."

So in other words, in plain and ordinary meaning, a curved side surface is a side surface that is not planar. Instead have a curvature, have a radius. In paragraph 202 of my opening declaration, have a curve size.

It doesn't have to be vertical, it doesn't have to be curved along the Z-axis. It doesn't have to be -- result from poor step coverage. And this is apparatus claim. It does not depend on how it was fabricated.

So a person of ordinary skill in the art, in summary, would understand that the meaning of "curved side surface" to be any non-flat side surface of the conductive pad layer, in

understanding of claim 17.

Does that make sense to you?

Q Sure. So let's go to paragraph 8 -- 18 of your declaration.

A 18?

Q Mm-hmm.

A Okay.

Q In paragraph 18, you state, "The applicant plainly could have claimed a 'side surface' that is oriented in a particular way relative to the 'top surface' (i.e., the claim could have specified that the 'side surface' is 'perpendicular' to the 'top surface' of the substrate)."

Do you see that?

A Yes.

Q And let's look at claim 1 of the '666 patent.

Do you have that in front of you?

A Yes.

Q In claim 1, the landing pad includes a top surface and a side surface, correct?

A Yes.

Q By separately claiming both a top surface and a side surface, does the side surface still encompass a top surface?

ATTORNEY HERMAN: Objection. Form.

A Can you repeat the question, please?

Q By separately claiming both a top surface and a side surface, does the side surface still encompass a top surface?

ATTORNEY HERMAN: Objection. Form.

A A person of ordinary skill in the art would understand that side surface does not have any particular orientation, a particular surface. A side surface could be a bottom side surface, a top side surface, and so on and so forth.

So the answer is -- is that yes, bottom side surface, top side surface, first side surface, second side surface, claim 1 and 2 specify the landing pad of these claims. However, claim 17, the inventor chose not to -- not to claim any particular surface.

Q Let's turn to paragraph 19 of your reply

declaration.

A That's where I was.

Q Oh, okay. All right.

Does the fact that claims 1 and 2 refer to a landing pad with a top, bottom, and side surface have any impact on how you understand the term "side surface"?

ATTORNEY HERMAN: Objection. Form.

A It's described in paragraph 19, claim 1 and 2 use specific terms such as bottom surface and the top side surface -- side -- bottom surface and top side surface, and the applicants could have claimed a particular surface in claim 19 but deliberately not -- chose not to.

So what it means is that the term "side surface" must include not only lateral surfaces but also the top and bottom surfaces of a layer.

Q You say in paragraph 19 that claim 1's reference to a landing pad with a top, bottom, and side surfaces "merely shows that the applicant knew how to craft a claim that excludes the top and bottom surfaces of a layer from the scope of

the term 'side surface,'" correct?

A No, I didn't say that. I said it -- "it once again merely shows that the applicant know how to" -- "knew how to craft a claim that excludes the top and bottom surfaces of a layer from the scope of the term 'side surface,'" right?

And this is accomplished by specifying that the layer has the top, bottom, and side in the same claim. Again, the applicant chose not to do so in claim 17 --

Q So is your opinion --

Go ahead and finish if you hadn't.

A -- when -- when referencing only a side surface.

Q So is it your opinion that claims 1 and 2's usage of the terms "bottom surface" show that the applicant knew how to craft a claim that excludes the top and bottom surfaces of a layer from the scope of the term "side surface"?

A Can you repeat that?

ATTORNEY HERMAN: Objection to form.

Q Sure.

A I think there's something wrong with your question because you said -- go ahead. Repeat your question, please.

Q Is it your opinion that claim 1 and 2's usage of the terms "top and bottom surface" show the applicant knew how to craft a claim that excludes the top and bottom surfaces of a layer from the scope of the term "side surface"?

ATTORNEY HERMAN: Objection to form.

A Yes, that's what I said right there, "that the applicant knew how to craft a claim that excludes the top and bottom surface" -- "surfaces of a layer from the scope of the term 'side surface.'"

And -- and, again, this is accomplished by specifying the layer has a top, bottom, and side in the same claim, but claim 17, the applicant chose not to do so.

Q So it's your opinion that the meaning of "side surface" in claim 1 and 2 excludes the top and bottom surface, correct?

ATTORNEY HERMAN: Objection. Form.

A Again, that the applicants knew how to craft a claim that excludes the top and bottom surfaces of a layer from the scope of the term "side surface." So it didn't do that in claim 17, so therefore, the term "side surface" in claim 17 must include not only the lateral surfaces but also the top and bottom surfaces of a layer.

Q I don't think that was quite my question.

I'm referring to claims 1 and 2, correct? Are we on the same page here?

A Yes, I --

Q Claim 17? Okay.

A I just answered you, that claim 1 and 2 basically indicating that it excluded the top and bottom surfaces of a layer from the scope of the term "side surface."

Q Okay. So claims 1 and 2 exclude top and bottom surfaces from the scope of the term "side surface," correct?

A In the limitations of claim 1 and 2 -- claim 17, an inventor did not do so. So therefore, a person of ordinary skill in the art

reading claim 17 would understand the term "side surface" must include not only the lateral surfaces but also include the top and bottom surfaces of a layer.

Q So the side surface term in claims 1 and 2 has a different meaning than the side surface in claim 17, correct?

ATTORNEY HERMAN: Objection. Form. It mischaracterizes the witness's testimony.

A I'm saying that in claim -- claim 1 and 2, it used specific terms, the bottom surface and a top surface, that -- specifying the landing pad of those claims and those claims only, that exclude the top and bottom surfaces of a layer from the scope of the term "side surface" in -- only in claim 1 and 2.

In claim 17, which is independent, it doesn't say that. So therefore, it follows that the term "side surface" must include not only the lateral surfaces but also the top and bottom surfaces of a layer in claim 17.

Q So by claims 1 and 2 claiming a top and

bottom surface, the term "side surface" in claim 1 and 2 excludes top and bottom surfaces, fair?

ATTORNEY HERMAN: Objection. Form. Also, once again, mischaracterizes the witness's testimony.

A I said that the applicants knew how to craft a claim that exclude the top and bottom surfaces of a layer from the scope of the term "side surface," in claim 1 and 2, but not in claim 17. Okay? That exclusion only applied to claim 1 and 2. But the applicant deliberately chose not to do so in claim 17.

Q So in claim 1 and 2, the term "side surface" does not encompass top and bottom surfaces, correct?

ATTORNEY HERMAN: Objection. Form.

A In claim 1 and 2, the applicants wrote it in such a way that the claim exclude the top and bottom surfaces of a layer from the scope of the term "side surface." But in claim 17, it does not do so and deliberately not -- not do -- deliberately chose not to do so.

It is not any new opinion. I say that same thing in my original opening declaration.

So I do not understand why we keep hashing out this point that we -- we talk about it many times in my deposition that lasted seven hours back in the -- related to the opening declaration.

Q I just am asking a simple question.

A I answered you --

Q -- let me finish it --

A I'm sorry.

Q I mean, I'm entitled to ask my questions. And let me ask my questions and I'll give you a chance to answer, if that's okay, Dr. Lee. So let me try a different question for you.

The scope of -- strike that.

The term "side surface" in claims 1 and 2 encompasses a different scope than the term "side surface" in claim 17?

ATTORNEY HERMAN: Objection. Form.

A I don't know what you mean by that, but I answered it many times now. In 1 and 2, the claim is drafted in such a way that it excludes the top

and bottom surfaces of a layer from the scope of the term "side surface." And the inventor, the applicant chose not to do so in claim 17, and therefore, a person of ordinary skill in the art reading claim 17 would understand that the term "side surface" must include not only the lateral surfaces but also the top and bottom surfaces of a layer.

ATTORNEY WATSON: All right. Let's take a break. We've been going about an hour and a half.

(Luncheon recess.)

BY ATTORNEY WATSON:

Q Dr. Lee, can I refer you to column 4, lines 10 through 20 of the '666 patent. Put it on the screen as well.

A Hold on one second.

Column 4?

Q Yes.

A What lines?

Q Lines 10 through 20.

A Hold on one second.

Q Are you there?

A I'm sorry. So this is starting --

Q With "Further, spatially relative terms."

Do you see that paragraph?

A Yes.

Q The '666 patent uses "spatially relative terms to describe one element or feature's relationship to another element or feature as illustrated in the figures," correct?

A That's what it says there.

Q So the '666 patent -- strike that.

Does that mean the '666 patent teaches that spatially relative terms describe the features' orientations relative to each other as illustrated in the figures?

ATTORNEY HERMAN: Form.

A I think this is basically a clarification, right? They use the word such as "above," "below," "upper," and "lower" simply to make the description easier to follow, right, based on how the device is drawn in the figure, but those words do not lock the invention to any one orientation, physical orientation.

What was your question? I'm sorry.

Q Would you agree with me that the spatially relative terms used in the '666 patent describe how different features are oriented relative -- relative to each other?

A Well, is your question specifically related to what we just quote in column 4?

Q For the entire '666 --

A For the entire '666 patent.

So this paragraph that you just read describe how the '666 patent distinguish above -- terms like "above" and "below," but it is used only for descriptive convenience and do not limit the invention to any particular physical orientation or the orientation shown in the figures.

And if you read the paragraph above that or -- I mean, what it's saying is that the invention is not orientation-dependent. The device can be rotated, right, 90 degrees upside down, and in any other -- in other orientation. The relationships still apply between parts.

So in other words, the word -- the wordings or the words should be interpreted flexibly, that the device -- if the device is rotated above my -- then become beside or below in a physical space, and the terminology would adapt to the orientation. That's my understanding.

But what it doesn't require -- what it doesn't do is it does not require vertical or horizontal orientation, and doesn't limit the claims to be Z-axis, and doesn't tie the claim, scope to how a figure is drawn or how a figure is drawn and does not redefine what side surface occurred.

So I think we addressed this in the last deposition also. This is not a new opinion. This is the same old thing.

Q I simply was asking whether the '666 patent uses these relative terms to describe how features are positioned relative to each other as opposed to any singular orientation.

A Right, and I answered that.

Q Let's go to paragraph 20 of your reply

declaration. Let me know when you're there.

A Is that, "The specification of the '666 also patent does not require any" --

Q It starts with that, correct.

A Okay.

Q I want to direct your attention down to the last sentence. You state, "A POSITA would also recognize that even though the figures depict vertically oriented surfaces, those drawings are merely illustrative examples."

Do you see that sentence?

A Yes.

Q So you'd agree with me that the figures in the '666 patent depict side surfaces that are vertical, correct?

ATTORNEY HERMAN: Objection. Form.

A You were saying that whether the figures are drawn vertical sidewalls?

Q Correct.

A Or vertical side surfaces, right?

Q Correct.

A So first of all, as I mentioned before and

many times last time and this time, the side surface means any surface, right? And even though the patent -- some patent drawing can be interpreted that, as shown a vertical sidewall, those drawings are just example and how the invention might look like, a person of ordinary skill in the art would understand that the drawings are simply illustrative, not instruction that limits the claims.

And, in fact, that, as I mentioned before this time and last time, the drawings are in such poor quality, the resolution is so bad that -- and so inconsistent that a person of ordinary skill in the art would not be able to draw any definitive conclusion from those figures.

Q So is it your opinion that a person of ordinary skill in the art would not be able to determine whether there are vertical sidewalls of the landing pad in the figures in the '666 patent?

A No. I'm saying that even -- even if a POSITA could recognize under these poor illustrations and poor resolution, even if they

recognize that those figures depict vertical, oriental -- oriented surfaces, those drawing are merely illustrative example and should not be imported into the claim term "side surface."

Q Do you dispute that the figures illustrated in the '666 patent depict vertical side surfaces between the landing pad and the insulating layer?

A Again, this is a three-dimensional structure and what all these figures shown are two-dimensional cross-sections. So without a three-dimensional drawing and the perspective in the other orientations such as X-Y orientations or Y-Z orientations, one would not definitively conclude that the side surface is only oriented vertically. There are side surface in oriental [sic] -- horizontal, I'm sorry, horizontal orientations and how that related to the insulating layer in the other prospective, a person of ordinary skill in the art would not be able to determine that without explicit illustration.

Q So where the patent gives an orientation and it refers to horizontal surfaces as top and bottom, and vertical surfaces as side surfaces, a person of ordinary skill in the art would ignore that in your opinion, correct?

ATTORNEY HERMAN: Objection. Form.

A No, I didn't say that. I'm saying that the drawing just simply shows a cross-section. It doesn't show explicitly what the -- the top and bottom side surfaces look like. And so -- and as I explained in paragraph 21, the purpose of the description are not -- is simply a description, not of limitations.

Q Turn to paragraph 22 of your reply declaration.

A Okay.

Q Okay. You note in paragraph 22 that both the terms "horizontal" and "vertical" are not included in claim 19, correct?

A Right claim 19 does not have those terms.

Q Now, the specification does expressly define "horizontal" and "vertical," correct, as

you noted in the paragraph 22?

A Right. In my first sentence of paragraph 22 of the '666 patent "defines both the term 'horizontal' ('nominally parallel to the lateral surface of a substrate') and 'vertical' ('nominally perpendicular to the lateral surface of the substrate).'"

Q Does the patent ever use the term "vertical" to refer to a top or bottom surface?

A The word "vertical" or the phrase "nominally perpendicular" is in reference to the substrate top surface, and it does not use "vertical," the term "vertical" to refer to the substrate top surface. Is that what you're asking?

Q Does the patent ever use the term "vertical" to refer to a top or bottom surface?

A As I mention many times, including this time and opening declaration, reply declaration, that whether the specification use the word to define "top surface" or not, it doesn't change the understanding of claim 17 that the inventor could

have used these particular surfaces in claim 17 but deliberately chose not to.

So we talk about this many times, and I don't know why we're dwelling on this again.

Q So you mentioned --

A Many --

Q -- you mentioned -- you talked about this many times, so let me just ask you this question. Are you aware of any instance in the '666 patent where the term "vertical" refers to a top or bottom surface?

A Again, that the -- and I answered the question, that the '666 patent does not use the term "vertical" to refer to top surface, but that doesn't not [sic] mean that the claims -- that these language should be imported into the claim language of claim 19.

Q Does the patent ever use the term "horizontal" to describe a side surface?

ATTORNEY HERMAN: Objection. Form.

A The '666 patent expressly define what vertical and horizontal means, but at the same

time you also remember that the -- earlier we talk about that this is orientation-dependent. You could rotate the device 90-degree and has different orientation completely. But the more important thing is that the -- these terms are absent in claim 17 and 19. A POSITA would understand that the claim intentionally omit any orientation requirement and cannot limit -- cannot be limited to a vertical size as Dr. Giapis suggested.

And more importantly, in paragraph 64, the last sentence of paragraph 64, that even under the patent owner's construction -- which I disagree with -- the prior art would still yield a pad of a curved side surface in contact with insulation -- insulating layers, as required by claim 17 and 19.

So all these questions and debate about what, you know -- what orientation is claim 19 means when they talk about curved side surface, in terms of invalidity, it's irrelevant.

I, you know -- so even if Dr. Giapis and patent owner's narrow construction is adopted,

which I don't think it will; that is, that the curved side surface is in a z-direction, I don't know why you want to waste time on this, because the prior art would still invalidate claim 19 as discussed in paragraph 64 in my reply declaration.

Q I'm not interested in wasting time. I just want to know --

A But you are.

Q Let me just ask this question -- let me ask you this question: Are you aware of any instance in the '666 patent that uses the term "horizontal" when describing a side surface?

A I already answered that.

ATTORNEY HERMAN: Objection. Form. Asked and answered.

Q Is the answer no?

A I already answered that. You can look back and see my answer.

Q So you're not aware of any instance in the '666 patent that uses the term "horizontal" when describing a side surface?

ATTORNEY HERMAN: Objection to form. Also

asked and answered and argumentative.

A I already have answered that.

Q What is that answer? I'm still not sure what it is, so I want to --

ATTORNEY HERMAN: Same objection. He says he answered it.

ATTORNEY WATSON: I'll ask the question again. Let me ask the question again, and let me just see what the answer is.

Q Are you aware of any instance in the '666 patent that uses the term "horizontal" when describing a side surface?

ATTORNEY HERMAN: Objection. Form. Asked and answered. Argumentative and badgering the witness.

A The '666 patent expressly defined vertical and horizontal, yet it does not use these terms in claim 19 or 17. Furthermore, as we discussed earlier, that orientations is relative, especially when you are allowed to rotate the subject or the apparatus by 90-degree or any angle you want.

So the answer to your question is that,

even though one might conclude that -- which is not exactly accurate, if a person of ordinary skill in the art using that paragraph and say that, oh, horizontal -- the patent never use the word "horizontal" to describe side surfaces, I think it needs to be qualified by what I just said.

And even though -- even if one can conclude that -- and it seems like Dr. Giapis and patent owner likes to conclude that and likes to use the narrow claim construction, that the prior art would still invalidate claim 19, as I describe in paragraph 64 in my declaration, reply declaration.

Q Does the patent ever use the terms "top" or "bottom" to refer to a vertical surface?

A Can you repeat that question?

Q Does the '666 patent ever use the terms "top" or "bottom" to refer to a vertical surface?

A To describe what?

Q Does the '666 patent ever use the terms "top" or "bottom" to refer to a vertical surface?

ATTORNEY HERMAN: Objection. Form.

A Does the '666 patent ever use the terms "top" and "bottom" to describe side surfaces? Is that what you mean?

Q Vertical surfaces.

ATTORNEY HERMAN: Same objection. Objection to form.

A So in the '666 patent, the top and bottom are used -- generally not used to describe vertical surfaces. The top and bottom refer to orientations relative to the substrate, right? The top surface facing away from the substrate, meaning upward; the bottom surface facing away from the substrate, meaning downward.

And -- but, again, remember that all these are relative because the apparatus can be oriented and rotate 90-degree or any other rotation, so it -- it doesn't matter whether it distinguishes top and bottom surface from vertical in -- in the patents, in the specification, because those are just example; they're not to be -- to be imported into the claim, especially claim 17 and 19.

Q So you are not aware of any instance in the '666 patent where the term "top" or "bottom" is used to describe a side surface, fair?

ATTORNEY HERMAN: Objection. Form.

A I believe I answered that. The '666 patent use -- uses the terms "top" and "bottom" to describe surface nominally parallel to the substrate and not the vertical surfaces. However, once again, these are just illustrations, an example, and nonlimiting.

Q Where does the patent use the terms "top" or "bottom" to refer to a side?

A Did I say that?

Q Well, let me ask -- let me change the question.

Does the '666 patent use the words "top" or "bottom" to refer to a side?

A Again, I think I just answered that. The '666 patent use the terms "top" and "bottom" to describe surfaces nominally parallel to the substrate, not the vertical surfaces. Okay? And -- but a person of ordinary skill in the art

reading -- understanding the term "side surfaces," in the plain and ordinary meaning, means that it can be any surface, any side. It's not limited to vertical only.

Whether the specification of '666 patent use the term "top" and "bottom" to relate to the side surface is irrelevant because "side surface," in plain and ordinary meaning, it means any surface, any sides. It can mean the top side surface, it can mean the bottom side surface, and it could mean the top side, bottom side and so on and so forth.

So it doesn't matter whether the claims -- whether the specification directly refer to the top and bottom as side surface. A person of ordinary skill in the art would understand in plain and ordinary meaning in the claim 17 and 19 that means any size, any surface.

Q So you're not aware of any place in the '666 patent where the patent uses the words "top" or "bottom" to refer to a side. Is that fair?

ATTORNEY HERMAN: Objection. Form. Also

mischaracterizes the witness's testimony.

A Again, the '666 patent uses the terms "top" and "bottom" to describe surfaces nominally parallel to the substrate, not vertical or -- not vertical surfaces. And if you want to say, you know, not side surface, but the -- but that doesn't mean that the plain and ordinary meaning of "side surface" cannot be top surface or bottom surface because plain and ordinary meaning of "side surface" is any surfaces as I describe in paragraph 12 or paragraph -- what is it that I showed in a -- that I showed the drawing of 12, as I describe in paragraph -- yeah, paragraph 12 on page 5.

Q Okay. Can you point to me -- strike that. Does --

A Excuse me. Can you hold on one second?

ATTORNEY WATSON: Sure. Let's go off the record if you need to go off the record.

THE WITNESS: Thank you.

(An off-the-record discussion was held at this time.)

Q Dr. Lee, sitting here today, are you able to identify any part of the '666 patent that uses the words "top" or "bottom" to refer to a side?

ATTORNEY HERMAN: Objection. Form.

A Well, if you look at column 4, as I mentioned, that the plain and ordinary meaning of "side surface" is any side, any surfaces. And the claim says only side surface. It doesn't say lateral, it doesn't say vertical, horizontal side surface. So it could be any surface along the x-y plane, X-C plane, Y-C plane, or any other surfaces.

And your question is whether the patent ever used top surface or bottom surface relate to side surface. And in column 4, you can see that it says that the bottom surface is opposite to the top surface, and therefore, bottom side of the substrate is opposite to the top side of the substrate.

And -- so even though it does not explicitly say side surface, but it implicitly, a person of ordinary skill in the art reading that

would also understand that when they talk about bottom, it also means a bottom side, meaning that it is a bottom side surface. And so it is -- it is -- and when they talk about top, it's -- top surface is also related to the top side surface.

So in all of those, top surface and bottom surfaces, a person of ordinary skill in the art would have understood that as one of the side surfaces.

Q Okay. Let's go to paragraph 25 of your declaration.

You state here that "the patent includes no views of its memory device" --

A Hold on. One second, one second. Sorry. I'm sorry. Paragraph 25?

Q Mm-hmm.

A Yes.

Q You state that "the patent includes no views of its memory device in the X-Y direction," correct?

A That's right.

Q Are there any processes described in the

'666 patent that would form a curved side surface that is curved along the X-Y direction?

ATTORNEY HERMAN: Objection. Form.

A I believe that I have answered that in my reply declaration and as well in my opening declaration, because these are not new opinion -- opinions.

In my reply declaration in paragraph 23 to 30, that number 1, claim 19, claim 17 are apparatus claim, and it's not directed to any particular manufacture -- manufacturing recipe.

And so the -- and that's in paragraph 26 in my reply declarations, and not limit itself to techniques such as PECVD or PVD, that the patent owner relied on, and that's in paragraph 28.

And '666 patent does not discuss curved flux component or directional that -- or isotropic fluxes. That's in paragraph 27.

So to answer your question, is that, you know, Dr. Giapis is wrong in importing the method of manufacturing into claim 19 and claim 17, and that it is not true that the method of

manufacturing in -- described in '666 patent only produce or produce only a surface that is curved along the z-axis.

Q Okay. But I don't think that answered my question. I'm just asking, are there any processes described in the '666 patent that would form a curved side surface curved along the X-Y direction?

A Well, the deposition techniques such as LPCVD and ALD by themselves would not produce vertically curved landing pad side surface like those shown in the '666 patent. And these techniques can, however, produce landing pad that a curve in x-y plane, as I describe in paragraph 29.

And patent owner and Dr. Giapis is wrong in saying that poor step coverage will result in a certain particular direction of curvature. Poor step coverage is simply due to non-conformal deposition and does not impose any particular orientations or particular direction of curvature.

Q Okay. So let's go to paragraph 29 of your

declaration.

A Okay.

Q You state that "These techniques can produce" -- "can, however, produce landing pads that are curved in x-y plane (using appropriate shaped mask during deposition)."

Do you see that?

A Right.

Q Where does the '666 patent say anything about using a shaped mask?

A I'm saying that a -- first of all, the patent does not limit itself to deposition technique such as plasma-enhanced CVD or directional sputter deposition PVD. It also talks about low pressure CVD and atomic layer deposition ALD. Okay?

And so a person of ordinary skill in the art understanding low pressure CVD or ALD would understand that it can produce curvatures, landing pad that are curved in the x-y plane, even though '666 does not explicitly say that in the specification, that a person of ordinary skill in

the art would understand that.

And the patent also does not explicitly say that it will result in a curved side surface in a vertical direction, as Dr. Giapis and the patent owner tried to try to conclude, which is totally incorrect based on the understanding of a person of ordinary skill in the art.

So -- and the key -- the key point is that claim 19 and claim 17 are apparatus claims. And Dr. Giapis and the patent owner try to import any particular manufacturing process, a recipe, into the claim is, in my understanding of the legal patent -- legal aspect, is totally inappropriate.

Q Okay. So you agree that the '666 patent specification does not expressly say anything about using a shape mask, fair?

ATTORNEY HERMAN: Objection. Form. Also mischaracterizes the witness's testimony.

A The patent does not say anything about -- explicitly say anything about curve in the vertical direction. In fact, the specification of '666 patent does not use the word "curve" at all.

Okay? And so the fact that Dr. Giapis and the patent owner try to import the understanding of the manufacturing recipe and draw a conclusion that it is describing a -- a vertical, curved structure is, I believe that it's -- a person of ordinary skill in the art would see that as completely incorrect.

Q So I'm not asking you about curvature and Z plane, or Dr. Giapis's opinion. I just want to know and just want to confirm, does the '666 patent say anything about using a shaped mask?

ATTORNEY HERMAN: Objection. Form. Also asked and answered.

A You know, if a person of ordinary skill in the art would understand the -- the process, I'm saying that '666 patent does not say anything about landing pad being curved in the vertical direction or in the z-direction. And if, by the same token that Dr. Giapis and the patent owner, importing the understanding of manufacturing recipe into the claim language, one would be -- a person of ordinary skill in the art would

understand that the technique described in '666 patent can also produce landing pads in the -- that are curved in the x-y plane using the appropriate shaped mask during the deposition, even though it does not explicitly -- the '666 patent does not explicitly say anything about -- saying the shaped mask during deposition, nor does it say landing pad are curved in the vertical direction.

Q The '666 patent never says anything about using a shaped mask during deposition, fair?

ATTORNEY HERMAN: Objection. Form. Also asked and answered.

A That the '666 does not explicitly say using a shaped mask during the -- during the fabrication. However, I'm drawing the understanding of the patent -- of the manufacturing technique. And to -- to say that one can generate a landing pad that are curved in the x-y plane, and all it does to the incorrect and inappropriate conclusion that Dr. Giapis and Dr. -- and the patent owner draw an arbitrary --

arbitrarily conclusion that using non -- using poor step coverage to produce a curved surface or to produce a landing pad that are curved in the z-direction.

Q Let's go back to paragraph 26 of your report.

A Okay.

Q You refer to Dr. Giapis's opinion that "a person of ordinary skill in the art would have selected and optimized specific gas-phase deposition techniques capable of supplying both directional and isotropic fluxes of depositing molecules to the staircase structure."

Do you see that? Where you refer to that opinion?

A Yes.

Q Will using gas-phase deposition techniques capable of supplying both directional and isotropic fluxes of depositing molecules to the staircase structure form a curved side surface?

A The simple answer is no. The direction those sputter deposition PVD will produce a

non-conformal -- non-conformal deposition, a poor step coverage and would not -- one would not automatically conclude that it will produce a curved side surface in the vertical direction.

Q Could it produce a side surface in the vertical direction?

ATTORNEY HERMAN: Objection. Form.

A Once again, you could -- you know, if a person of ordinary skill in the art looking at the -- understanding the plasma-enhanced CVD or directional sputter deposition would simply conclude that this is a very poor process, would result in poor step coverage and non-conformal deposition, unless you do subsequent annealing or densification.

And just going from that and jump to a conclusion that would result in a curved side surface in vertical direction is laughable.

Q Let's go to paragraph 29 of your report, your reply report, reply declaration.

A Yes, sir.

Q You're there?

A Yes, sir.

Q You state, "A person of ordinary skill in the art" -- or a POSITA -- "would understand that non-conformal deposition can produce curvature in different directions depending on future geometry, shadowing, and mask shape, rather than only in the z-direction."

Do you see that?

A Yes, I see that.

Q So a person of ordinary skill in the art could use non-conformal deposition curvature techniques to form curvature in the z-direction. Is that fair?

A You could, but is -- again, it really depends on the features, geometry, shadowing, the mask shape. So one cannot infer a specific direction of curvature simply based on this method.

So the -- what I'm saying there is, in plain English, curvature direction depends on geometry, not just deposition. A POSITA would understand that when the deposition is

non-conformal, which is what Dr. Giapis and the patent owner relied on, that when the direction -- when the deposition was non-conformal, the direction of the curvature really depends on many things: the feature shape, the shadowing, aspect ratios, the mask geometry, and therefore, the curvature could appear in the X-Y direction, the X-Z directions and the X -- Y-Z direction, or any multiple directions.

So to conclude that it would only result in z-direction is -- is inappropriate and it's completely wrong.

Q Is there any description in the '666 patent of producing curvature using non-conformal deposition?

A So the -- that is what Dr. Giapis and the patent owner relied on using non-conformal deposition to conclude that it will result in curvature in the z-direction. And the '666 patent does not say that.

A non-conformal deposition is well-known to just simply result in poor step coverage,

meaning a -- a layer that is in very poor characteristics, and why would anybody use that to form any -- anythings to just simply try to satisfy a certain limitation.

Q Let's turn to Figure 6 of the '666 patent.

ATTORNEY WATSON: Put it up on the screen.

Q Are you there?

A Yes.

Q Figure 6 of the '666 patent shows poor step coverage, correct?

A Yes.

Q And do any of the figures in the '666 patent show good step coverage?

A Figure 6 shows a poor step coverage, also called -- or you can think of partially -- partial coverage, not uniform. And -- so that it result in uneven thickness.

So that doesn't mean that it will automatically result in a curved side surface in the z-direction, and -- and the patent does describe conformal deposition in Figure 3. Figure 3 illustrates a cross-sectional view of the

staircase structure 300 with material, 310, disposed thereof, according To some embodiments. Material layer is conformally disposed on the staircase structure.

So yes.

Q Would you agree with me that some embodiments of the '666 patent show poor step coverage and some include good step coverage?

ATTORNEY HERMAN. Objection. Form.

A You mean the figures?

Q The embodiments themselves.

A Yeah, they both discuss conformal and non-conformal deposition.

Q Okay. Are there any examples -- strike that.

Would following the steps -- strike that.

Would following the manufacturing process discussed in the '666 patent form a curved side surface?

ATTORNEY HERMAN: Objection. Form.

A The simple answer is no.

Q Okay.

A Because, as I discuss in paragraph 29, that Dr. Giapis and the patent owner try to use non-conformal deposition that result in poor step coverage and concluded that that could be used to result in curvature in a z-direction. As I describe in paragraph 29, that the -- the curvature can produce -- I mean, these non-conformal deposition really can produce curvature in various directions. It really depends a lot on the details of the -- of the processing, including the feature geometry, whether it's micron range or nanometer range, shadowing effect, the shape of the mask and the aspect ratio and so on and so forth.

Q So in your opinion, a person of ordinary skill in the art would not be able to follow the steps listed in the '666 patent to form a curved side surface?

A I don't know what you mean by "step." There is no steps. I mean, all I did say is a non-conformal deposition would result in Figure 6 without any details whatsoever.

Q Let's turn to paragraph 33 of your reply declaration.

A Okay.

Q In paragraph 33, you cite an image of a staircase structure that was discussed during the prosecution history of a related patent, correct?

A Yes.

Q Now, do you see the landing pad in that structure?

A Yes.

Q Under your understanding of a side surface, how many side surfaces are there of that landing pad?

A So as I describe in paragraph 34, right, that "In discussing the structure shown in this figure, the examiner explained that the memory staircase includes a 'landing pad' with '4 side surfaces: A, B, C, and D,' where A -- 'Sides B and D' (the top and bottom) corresponded to the claimed 'side surfaces.'"

And I think the examiner missed two other surfaces. You have surface -- the top surface D,

the bottom surface B, the lateral surface -- surfaces A and C, but you also have surface that's in the -- facing -- facing the audience. In other words, in the Z-X direction, one in the front and one in the back of the -- of the -- of the landing pad.

So there's actually six sides, just like when you have a dice that you have -- when you have a dice, you have six sides.

Q So the landing pad in this figure that you reproduce in paragraph 33 of your reply declaration has six side surfaces, correct?

A Right.

Q And two of those side surfaces are the top and bottom surface, fair?

A B and D.

Q B and D.

And then there's four side surfaces that would be -- assuming this is oriented in an X-Z plane -- would be vertical; is that fair?

A That's kind of simplistic, once again, that it depends on the orientation. In an A and C

and the front side surface and the back side surface, and those are substantially perpendicular to the substrate top surface. And if you want to call that vertical, that's fine, but it is -- I try not to do that because, once again, that a apparatus can be rotated, you know, 90 degrees or any other orientation.

Q Let's go to paragraph 35 of your declaration.

A Yes.

Q You that the applicant "amended the claims to require surfaces that are substantially perpendicular to a top surface of the substrate."

Do you see that?

A That's what it says there.

Q Okay. That amendment didn't limit the term "curved side surface," correct?

ATTORNEY HERMAN: Objection. Form.

A You know, it's been a while since I looked at that prosecution. And so I need to look at that more carefully before I can answer that question.

Q Okay. So you don't know one way or the other based on what you have here in your reply declaration?

A I'm saying that without looking at the details of the prosecution history of the '956 patent, one would not be able to answer your question.

Q Okay. Now, this -- you note that the applicant specified that the "side surfaces were substantially perpendicular to the top surface of the substrate." Is that right?

A That's what I had written in paragraph 35.

Q What's the difference between "substantially perpendicular" and "nominally perpendicular"?

A You -- perhaps you can answer that for me because you're the lawyer. The -- let me think about this.

Earlier, we talked about nominally, right? And I believe that we all conclude that "nominally" means approximate -- approximately. So I -- to be honest, I think -- legally, I don't

know exactly what is the -- the difference, but in plain English, I would think that "substantially" means mostly substantially perpendicular, mostly or largely perpendicular. And with some -- with some tolerance.

"Nominally," I think is related to -- "approximately" is described. It's in -- approximately or generally perpendicular.

So they're very, very similar based on my understanding, but, again, I'm not a lawyer, so you can tell me.

I think "substantially," if I understand correctly, is more related to the claim's limitation, and "nominally" is more described in the -- they're described in literature or in the specification.

And so -- but, again, I'm not -- I'm not a lawyer, so I wouldn't -- I'm sure that what I recall or try to understand, like what I just said, might be totally incorrect. But that's my understanding. They both -- they both seem, in my mind, "substantially" or "nominally," in plain

language, English seems to be very similar.

But if I recall correctly, based on my other cases, one is more applied to claims and one is more in general discussions.

What do you think, Tom?

Q Well, let me ask you this: In preparing your reply declaration, did you consider a difference between "substantially" and "nominally perpendicular"?

A Well, all I'm saying here, okay, what I want to conclude is that in the -- all I want to say over here is that in the prosecutions of the '956 patent, the claims specifically specify that the side surface is substantially perpendicular to the surface substrate. Okay? And the -- but the '666 patent does not say anything about that, and so therefore, a person of ordinary skill in the art would understand that -- an understanding of the '666 patent, not the '596 [sic] patent, that side surface is -- should be interpreted based on plain and ordinary meaning; in other words, it means any side, any surfaces.

And that's why I draw that discussion to -- to understand why a person of ordinary skill in the art, from reading the prosecution history of the '956 patent, one of the '666 patent's parents' applications, and whether it is used -- whether the word is "substantially" and "nominally," based on my understanding, is that '956 patent specify what the orientation is of the side surface and '666 does not.

Q I'm not sure that's responsive, but let's just take a break right now if that's --

THE WITNESS: How much more do you have, sir?

ATTORNEY WATSON: How long -- how long?

THE WITNESS: How much longer? Because --

ATTORNEY WATSON: Let's take a break. Let's go off the record and we can talk about that.

(Recess.)

ATTORNEY WATSON:

Q Dr. Lee, let's turn to Exhibit 1005, which I've put in the chat for you. Let me know when

you're there.

A I'm there.

Q Okay. Exhibit 1005 is the Kim reference you discuss in your declarations, correct?

A Yes.

Q All right. Let's go to column 12 of Kim. Column 12, lines 14 through 19.

A Column 12, line what?

Q Lines 13 through 19. Are you there?

A Yes.

Q Figures 10 through 18 of Kim illustrates operations of a method of manufacturing a semiconductor device, correct?

A That's what it says there.

Q Okay. And if you'll go down to column -- or row 30. I'll give you a second.

In this method taught by Kim, a plurality of insulating layers 110 in sacrificial layers 120 are formed using thermal CVD, plasma-enhanced CVD, physical CVD, or atomic layer deposition process, correct?

A Right.

Q The insulation layers 110 are silicon oxide, correct?
A Where are you reading?
Q Let's go up to column 12, lines 26 through 29.
A Right.
Q This insulation layers 110 are silicon oxide?
A Yes.
Q Correct?
The sacrificial layers 120 are silicon nitride, silicon oxynitride layers, or silicon layers, correct?
A Right.
Q Now let's go down to column 12, lines 43 through 47.
After the sacrificial and insulation layers are formed --
A Wait, wait, where are you?
Q Column 12, lines 43 through 47.
A 43, "For example"?
Q Yes. Are you there?

A Yes.

Q So in this Kim process, after the sacrificial and insulation layers are formed, a mask pattern is formed on the insulating layer 110 using the mask pattern as an etching.

Do you see that?

A Yes.

Q Now, have you ever heard of the term "lithography"?

A Yes.

Q What is lithography?

A Well, lithography is a process where you transfer the image of the mask onto the chip.

Q Okay.

A Of course a lot more detail, but essentially photolithography is a process. In fact, it's probably the most expensive steps compared to all the others, deposition, etching and all that. It's a process in the manufacturing process where we transfer the patent -- the pattern from a mask onto the surface of the semiconductor substrate.

Q So in the Kim process, once the mask pattern is formed on the insulating layer 110, is that when lithography is performed?

A "For example, a mask pattern may be formed on the uppermost insulating layer 110, and the uppermost insulating layer may be etched using the mask pattern as an etching mask to expose a second upper sacrificial layer 120 and the second upper insulating" -- "second upper insulating layer 110."

So yeah, when they talk about mask pattern is basically make use of the process called photolithography.

Q Okay. So once the mask pattern is formed on the insulating layer 110, the lithography is performed, in Kim?

A I'm not sure what you mean by that.

Q So we were just talking about how a masked pattern is formed on the insulating layer 110, in Kim.

Do you see that in column 12, line 43 through 47?

A Yeah.
Q Okay.
A I think you're missing the point.
Q Okay. So I guess my question to you is, when is the lithography performed in Kim?
A Well, from -- in many, many steps. Photolithography is basically transfer the pattern on the mask onto -- onto a photoresist, so-called photoresist, on the -- on the substrate.
And so it involved many sub-steps: photoresist coating, mask alignment, exposure, development, pattern transfer, and then resist removal. But that just forming the pattern on the photoresist, which is then followed by etching where you transfer to the -- transfer to the actual layer underneath the photoresist.
Q Okay. So let's go back to the steps that we've talked about in Kim. So first, the sacrificial and insulation layers are formed, correct?
A Yes, in Figure 10.
Q Yeah. And then a masked pattern is formed

on the insulating layer using the masked pattern as an etching?

A Yes.

Q Let's turn then to Kim, column 12, lines 57 through 60.

A Mm-hmm.

Q After etching the insulating layer, the auxiliary insulating layer 122 is formed on substrate 100, correct?

A Yes.

Q And if you'll turn to column 9, line 29, the auxiliary insulating layer 122 can be silicon oxide, correct?

A Yes.

Q So in Kim, the silicon oxide in auxiliary insulating layer 122 is not formed by oxidizing silicon, correct?

A Wait. This is column 9?

Q Well, we're on column 12, lines 57 through 60.

A Column 12, line 57 to 60. Okay.

Q So after etching the insulating layer 110,

the auxiliary -- the auxiliary layer 122 is formed -- then formed on substrate 100, correct?

A Right.

Q Okay. That auxiliary insulating layer 122 is silicon oxide?

A And where did you read that?

Q Line 59 and 60.

A Of column 12?

Q Correct.

A Yes.

Q Okay. So in Kim, the silicon oxide in auxiliary insulating layer 122 is not formed by oxidizing silicon from another layer, correct?

A Where did you conclude that?

Q Well, it says there, the auxiliary insulating layer is formed on substrate 100, correct?

A Where did you read that?

Q Column 12, lines 57 through 60.

A Yeah.

Q Are you there?

A Yeah.

Q Okay. So I just want to walk through the process here.

So after the etching insulating layer, the auxiliary insulating layer 122 is formed on the substrate 100, correct?

A Yes.

Q And that auxiliary insulating layer 122 can be made of silicon oxide, correct?

A Yes.

Q And that silicon oxide is directly deposited onto the step structure itself, correct?

A Yes.

Q It's not formed -- strike that.

The silicon oxide in Kim is not formed by oxidizing silicon in another step?

A No, because at that point the steps involve both the layer 110, which is silicon oxide, and layer 120, which is silicon nitride. So it can't really oxidize nitride that easily. So layer 122 is deposited.

Q I think the answer just got confusing there. Let me try to clarify that.

So in Kim, the silicon oxide is not formed by oxidizing the silicon of other --

A Which silicon oxide?

Q Fair. The silicon oxide in auxiliary insulating layer 122.

A That's right.

Q Now let's go to Kim, column 12, lines 61 through 64.

A Okay.

Q Are you there?

A Yeah.

Q In this process in Kim, after auxiliary insulating layer 122 is formed, a mask pattern is then formed on that auxiliary insulating layer 122?

A Right.

Q And so in Kim, the damaged region is the auxiliary insulating layer 122.

ATTORNEY HERMAN: Objection. Form.

A Can you repeat that again?

Q Sure. A mask pattern is formed on the auxiliary insulating layer 122, correct?

A Yes.
Q So in Kim, the region that is damaged is the auxiliary insulating layer 122?
A Where did you read that?
Q Well, you're using a masked pattern onto layer 122, correct?
A Yes.
Q So using a masked pattern involves injecting -- damaging some portion of the layer, correct?
A Well, it's an ion injection.
Q Okay. So -- fair. So when ion injection is performed on the mask pattern, those ions are being injected into auxiliary insulating layer 122, correct?
A That's right.
Q And so the region that is damaged from the ion injection is the auxiliary insulating layer 122.
A Okay.
Q Let's go to column 13, lines 12 through 15.

After removing the photosensitive resin pattern M, a buried insulating layer 125 is formed, correct?

A Mm-hmm.

Q Now let's go to column 13, lines 55 through 67.

In the Kim process, a gap in the auxiliary insulating layer 122, called opening 122_O, is formed by removing the sacrificial layer 120.

A Mm-hmm.

Q Correct? Correct? If you can answer "yes" or "no," that would be appreciated.

A Are you reading column 13?

Q Column 13, lines 55 through 67. I'm not reading, but I'm trying to summarize what's in there.

A "The opening 122_O may be a region in which the region 120_I doped with the predetermined ion is removed from the auxiliary insulating layer 122." Okay?

Q Okay. So my question is, in this process in Kim, a gap in the auxiliary insulating layer

122, called opening 122_O, is formed by removing the sacrificial layer 120, correct?

A Yes.

Q In Kim, only a small portion of the auxiliary insulating layer 122 is removed, fair?

ATTORNEY HERMAN: Objection. Form.

A Well, 122_O is removed.

Q But not all of auxiliary insulating layer 122 is removed in the process in Kim?

A That's right.

Q And after the sacrificial layers are removed, the gaps are filled with conductive material to form PAD_B and PAD_P?

A That's right.

Q Now, we've just walked through the steps that Kim discusses, fair, at a high level?

A Yes.

Q When does Kim use lithography during those steps?

A Well, it used photolithography in Figure 11, Figure 12, Figure 14, Figure 15, and Figure 16. So, yeah, it may use a

photolithography each time it tried to etch something.

Q Okay. So Kim uses lithography in this ion implantation to create an etchable volume in insulating layer 122. Is that fair?

A Well, it use photolithography each time it tried to etch a certain portion of the -- of the substrate -- of the -- of some layers in a substrate.

Q And so when that material that is etched is removed, it leaves a void behind which is filled with the conductive material that forms the pad, correct?

(Reporter clarification.)

THE WITNESS: P-A-D.

A So you're talking about particular steps of -- pulling from Figure 16 to Figure 17. Is that right?

Q Sure.

A Okay. So what's your question?

Q So my question is, when the material that is etched is removed, that leaves a void behind

which is then filled with the conductive material that forms the pad, correct?

A Yes.

Q So the shape of the pad in Kim is determined by how this auxiliary insulating layer is etched; fair to say?

A It depends on the -- more than that. It depends on other steps as well, not just the -- not just the damage processing step.

Q What other steps determine the shape of the pad in Kim?

A Well, it also depends on each step that you etch the staircase, whether you etch it, you know, in the -- whether the pattern is aligned well, whether it's shifted to the left, shifted to the right. And it also depends on the open -- the implant dosage, the implant profile, the implant energy.

And -- so there are many things. It's not a single as you think, or as the figures tend to illustrate.

Q So would you agree with me that the

manufacturing process taught in Kim uses lithography to form the contact pad?

ATTORNEY HERMAN: Objection. Form.

A Photolithography is used in every single processing in defining the features of the 3D NAND structure, including the contact pad or the landing pad.

Q All right. Let's put Kim to the side. Let's go back to the -- your reply declaration --

A Okay.

Q -- paragraph 45 -- 44 and 45.

A One second.

Q Let me know when you're there.

A 44 to 45. Okay.

Q So you note that "Park teaches a rounded pad can be achieved using an additional oxidation step during the pad formation."

Do you see that?

A Yes.

Q And it's your opinion that when a person of ordinary skill in the art applies Park's oxidation method to Kim, they would arrived at the

claimed invention in the '666 patent, correct?

(Reporter clarification.)

ATTORNEY HERMAN: Objection to form.

A Yeah, it's a combination between -- a combination of Kim techniques and Park's technique.

Q Now, you rely in both your opening and reply declaration on this Park reference, correct?

A Yes, I've used both Kim and Park and other references.

Q And you claim that Park teaches a curved side surface; is that fair?

A Well, it's not just my opinion. It's a person of ordinary skill in the art reading Park would understand that.

Q If Park teaches a curved side surface, why didn't you use Park as the primary reference in one of your obviousness combinations?

ATTORNEY HERMAN: Objection. Form. Also outside the scope of direct.

A What was the question again?

Q If Park teaches a curved side surface, why

did it use Park as one of the primary references in your obviousness combinations?

ATTORNEY HERMAN: Objection. Form. Outside the scope of direct. Counsel, this has nothing to do with his reply declaration.

ATTORNEY WATSON: It absolutely does.

ATTORNEY HERMAN: It has nothing at all to do with his reply declaration. Like, his choice of prior art references, are you kidding?

ATTORNEY WATSON: He chose the prior art. I'm asking him a question. He can answer the question --

ATTORNEY HERMAN: Limit your questioning to his reply declaration. Where in his opinion did he -- in his reply declarations did he offer an opinion about the choices he made about prior art? Point that paragraph to me.

ATTORNEY WATSON: I think it's right there, but I don't think this is proper.

ATTORNEY HERMAN: Point the paragraph to me. Counsel, you're wasting everyone's time.

ATTORNEY WATSON: You're wasting our time.

I just asked him a question. If you have an objection, you can object, but this is improper for you to continue to coach your witness through your objection.

ATTORNEY HERMAN: I'm not coaching. It's objecting to your wasting of time and consuming unnecessarily everyone's time.

ATTORNEY WATSON: I disagree. And if your witness would answer the question --

(Simultaneous crosstalk.)

ATTORNEY HERMAN: Limit your question -- so I ask that you limit your questions to the opinions in his reply declaration as the patent office's rules require you to do.

ATTORNEY WATSON: We've been in his reply declaration the entire time. We haven't -- we almost never left his reply declaration.

Are we on the record still?

THE COURT REPORTER: Yes.

ATTORNEY WATSON: Okay. All right.

Well, let me ask a different question, then.

BY ATTORNEY WATSON:

Q Dr. --

A Lee.

Q -- Lee, in paragraph 45 of your declaration --

A Yeah.

Q -- it says that "Park teaches a rounded pad can be achieved by performing an additional 'oxidation' step."

A Right.

Q Do you see that?

A Yes.

Q And then you opine that you would modify Kim using that step?

A Yes.

Q What -- let's turn to -- which embodiment in Park do you refer to when discussing how a person of ordinary skill in the art would use Park in conjunction with Kim?

A I don't understand what you mean by that because Park is using oxidation-induced rounding process, right?

Q Okay. Let's go to your opening declaration, paragraph 208, real quick.

A Hold on one second. Let me find.

Okay.

Q So in your opening declaration, you refer to the embodiment shown in Figure 7 from Park, correct?

A Yeah.

Q Do you cite in either of your declarations any other figure or embodiment from Park, other than Figure 7?

A Sir, is it possible to upload Park?

Q Sure. I'm happy to do that.

ATTORNEY WATSON: Let's put up Park.

Q In the meantime, Dr. Lee, since my question is related to your declarations, do you have -- do you cite in your declarations any other figure or embodiment other than Figure 7 from Park?

A In paragraph 228 of my opening report, I cited Figure 8.

Q Anything besides Figure 7 and Figure 8 of

Park?

A In paragraph 236, I cited column 7, line 17 to 29, which I believe is related to Figure 4 or Figure 5.

Q Okay.

A And then I also cited, in the same paragraph, column 8, line 33 to 49, which is related to Figure 6C.

Q Okay.

A And at the end of the paragraph, I also cited column 9, line 3 to 11, cite Figure 6D to F.

Q All right. Let's --

A I'm not sure what's the intent of the question because I'm using Park holistically, in combination with Kim, to invalidate the claims, claims 17 and claim 19 of the '666 patent. Whether I use one figures or two figures or multiple figures, multiple citation in the specification, to me it's irrelevant.

Q Okay. Well let's go to Park. Let's go to Park Figure 7 first. We'll go there. We'll put it on the screen. Let me know when you're there.

A Yes, I'm there.
Q Okay. So in Park Figure 7, 79b is the rounded end of pad portion 78, correct?
A One second. 79b?
Q Mm-hmm.
A In paragraph 404 of my opening declaration, I said, "Park also explained that the 'end 79b' of this 'raised pad portion 78' may be 'rounded' to 'prevent a short circuit' between the pad and the 'adjacent'...conductive layer pattern 72c."
Q So 79b is the rounded end of the pad portion, correct?
A It's one end of the rounded landing pad portion.
Q And layers 52a through 52f are the insulating layers, correct?
A Yes.
Q Okay.
A Mr. Watson, I think we covered all of this in my first deposition.
Q I actually don't think we did.

A I think we did.
Q We didn't talk much about Park.
A I think we did.
Q We'll continue. All right.
In Figure 7 of Park, the rounded surface of the landing pad is not in contact with the side surface of the insulating layer, correct?
ATTORNEY HERMAN: Objection to form. Also outside the scope of direct.
A I'm not saying it does.
Q It doesn't, correct?
A In this figure it does not, but the point is that's not -- that's not how I'm using Park in combination with Kim.
Q And if you'll go to Park column 11, lines 63 through 65. Let me know when you're there.
A Yes.
Q "The interlayer, insulating [sic] layers 52a through 52f are formed of silicon oxide," correct?
A Yes.
Q And there's no listed definition of what

silicon oxide is in Park, correct?

A There's no definition of what silicon oxide is in Park? Is that what you're saying?

Q Yes.

A A person of ordinary skill in the art reading this prior art would understand that it doesn't need it. Everybody knows what silicon oxide is or oxide is. And it's not silicon dioxide.

(Reporter clarification.)

Q Okay. Let's go to Figure 7 of -- back to Figure 7 of Park. Are you there?

A Yes.

Q Okay. Can you point to me where the oxidant is added in Park Figure 7 to form the rounded pads?

A Well, it's due to the oxidation step as shown in Figure 6C. Figure 6C is -- the additional insulating layer 40 is formed by oxidizing the surface and the side surface of the step sacrificial layer patterns 14a through 14f that are externally exposed.

Q So the oxidant is introduced into the corners that are externally exposed, correct?

A I don't know how you said the corner is -- the oxidizing -- by oxidizing the surface and the side surfaces of the step sacrificial layers, layer patterns 14a through 14f that are externally exposed.

Q I want to talk a little bit about how Park forms the rounded end of the pad. Okay?

A Sure if you want to talk about it.

Q All right. Let's go to column 12, line 16 through 18.

A What is it again?

Q Column 12 of Park, line 16 through 18.

So in Park, after the sacrificial layers and the insulating layers are formed, an additional insulating layer 66 is formed by oxidizing the surfaces of the sacrificial layer pattern 62b through 62f, correct?

A Now we're switching to another embodiment now.

Q Okay. We can go back to --

A No, go ahead and stay on this.
Q Okay.
A I -- I don't understand the reason for this line of questioning.
Q Well, you can --
A If you don't understand it and you want some explanation, I don't know what that -- what you're trying to do in terms of invalidity, but get to it, please.
Q Yes. I'm just asking you, after the sacrificial layers and interlayer, insulating layers are formed, an additional insulating layer is formed by oxidizing the surfaces of the sacrificial layer pattern 62b through 62f, correct?
A You're referring to Figure 9C now?
Q I believe it's 9B.
A Okay. All right. You're reading from column 12?
Q Correct.
A So what's the question?
Q My question is, do you see that?

A Yes.
Q So in Park, the silicon oxide in insulating layer 68 [sic] is formed by oxidizing the silicon nitride or polysilicon that's found in the sacrificial layers, correct?
A Where are you reading?
Q Well, I was just reading that same portion. I'm asking you as an expert what happens to --
A No. Where exactly -- where exactly are you reading?
Q I am looking at column 12, lines --
A 39.
Q 16 through 18.
A 16 through 18 didn't say anything about 68.
Q I think I said 66, but I'll --
A No. You said 68.
Q -- I'll repeat it. Sorry.
All right. So in column 12, lines 16 through 18, it says, "The additional insulating layer 66 is formed by thermally oxidizing the

surfaces of the sacrificial layer pattern 62b through 62f, correct?

A That's what you asked previously.

Q Okay. So my question to you is, the silicon oxide that's an insulating layer 66 is therefore formed by oxidizing the silicon nitride or polysilicon that's found in the sacrificial layers, correct?

A Yes.

Q Okay. And then if you'll go down to lines 24 through 29, "One end of the interlayer, insulating layer patterns 52c through 52f can be etched to form a recess 77," and that is shown in Figure 9C, correct?

A Okay.

Q So if we go to Figure 9C, is it fair to say that the silicon oxide in interlayer, insulating layers 52a through 52f is not oxidized when the oxidant is introduced?

ATTORNEY HERMAN: Objection. Form.

A Okay. So yeah, it's oxidized, the sacrificial layer 62b to 62f, which could be

polysilicon layer and not the -- not the oxide layer, which is 52a through 52f.

Q If the silicon oxide in Park were oxidized, then the recessed portion 77, shown in Figure 9C, would also be oxidized, correct?

A Yes, but obviously the process is designed in such a way that it oxidizes the polysilicon and not the oxidized oxide layer.

Q Why is the silicon oxide not further oxidized when oxidant is introduced?

A Well, you can design in such a way that polysilicon is oxidized and not the silicon dioxide, depending on the ambience that you use, depending on the temperature. There are all kinds of ways --

(Reporter clarification.)

A Depends on the temperature you use and the ambience that you use. So it is a very simple optimization process.

Q Does the manufacturing process taught in Park use lithography to form the contact paths?

A Yes. Every single step requires

depositions, etching, and photolithography.

Q All right. Let's go now to your reply declaration. And we're going to go to paragraph 46.

A Okay.

Q Are you there?

A Yes.

Q Is the structure of a landing pad determined by the manufacturing process used to create it?

A Say it again? Is the structure of the landing pad dependent on?

Q Is the structure of a landing pad determined by the manufacturing process used to create it?

A Of course.

Q So a person of ordinary skill in the art would know that they cannot just form a curved side surface without using a manufacturing process that would form a curved side surface, correct?

ATTORNEY HERMAN: Objection. Form.

A I don't understand what you're talking

about. Obviously, every -- every step and the structure and the resulting shape of the structure is determined by the processing stamp that you use.

Q Now, Kim does not discuss introducing oxidant between oxide layers, correct?

A You said Kim does not discuss oxidation?

Q I asked if Kim discusses introducing oxidant between the oxide layers.

A Not explicitly.

Q So you rely on Park's oxidation process to describe how a person of ordinary skill in the art would form the curved side surface, fair?

A Yeah, you can say that.

Q Now, let's turn to paragraph 48 of your declaration.

A Which one?

Q Of your reply declaration.

A Okay.

Q You propose introducing oxidant into the blue as shown in paragraph 48 of your reply declaration, correct?

A Yes.

Q And only the external surfaces will be oxidized, fair?

A I'm not sure what you mean by "external" -- go ahead.

Q Introducing an oxidant won't round internal surfaces of the interlayer, insulating layer 122 in Kim, correct?

A Well, when you --

ATTORNEY HERMAN: Object to form.

A And I described that during my deposition last time. During the -- when you introduce oxidant into the corners, you have the concave corners which you might -- someone might call it interior corners and convex corner; somebody might call that exterior corners.

So during that thermal oxidation, when you introduce oxidant into the area that's shown in figure -- in the figures, in paragraph 48, that the exterior convex corners would oxidize faster because they receive more oxidant flux from multiple sources, from multiple directions, while

the interior corners or so-called convex, concave corners, oxidize more slowly, because it is more restricted access to the oxidants.

So the difference in the oxidation rate at the corners versus the planar surface would cause both types of the corners, convex and concave, to round. So that would result in a rounded corners in both a convex and concave corners.

So that's the mechanism that result in rounded corners in the figures, Figure 16 in paragraph 48. And we discussed that during my last deposition. So it's not a new opinion. I simply explained again what I said earlier last time.

Q What is the material that makes up the oxide layers in Kim Figure 16 that you cite in paragraph 48 of your report?

A The material is silicon oxide. In other words, it is not a silicon dioxide.

Q Okay.

A It is well-known that the -- so-called non-stoichiometric silicon oxide is found in many

semiconductor structure including 3D NAND. Non-stoichiometric oxide means that it's not SiO2, but rather SiOx.

Now, in general, typically the numbers X is between 1.7 to 1.9 or so. So these are slightly non-stoichiometric.

Q Let's go to paragraph 89 of your reply declaration real quick.

A Okay.

Q In paragraph 89 of your reply declaration, you say that a person of ordinary skill in the art would oxidize the oxide layers in Lee, correct?

A Yes.

Q Okay. Is the material in the oxide layers in Figure 16 of Kim the same material used in Lee's Figure 5B that you cite?

A I would say that -- I would say that a person of ordinary skill in the art would understand that the material would be non-stoichiometric silicon oxide, and that the same process and the same mechanism is known, in other words, the oxidation of the convex and the

concave corners at a different rate compared to the planar surface and therefore result in rounder corners.

And whether they're identical to the other figures, Kim is relevant that -- whether the -- SiO, or SiOx, a person of ordinary skill in the art would understand that SiOx, non-stoichiometric oxide, silicon oxide extremely common and widely used in the -- in semiconductor industry, especially 3D NAND.

But whether it's the -- whether it's SiOx, the X value is the same, it's, you know, obviously is -- is irrelevant as long as it is non-stoichiometric, which is widely known.

Q Are there any meaningful differences in oxidizing the oxide layers in Kim and oxidizing the oxide layers in Lee?

A Well, the Lee figures in Figure 5B in paragraph 89 and Figure 16 in paragraph 48 essentially showing that you have a -- you have oxidant introduced into a non-stoichiometric oxide. And in terms of the underlying mechanism,

there is no difference, that there is, basically, oxidized the corners, convex and concave corner, at a different rate as the planar surface that result in a -- in rounded corners.

Q Let's turn to paragraph 47 --

A Let me check one thing. Even though Park earlier showing the -- showing the oxidizing process that to create a rounded -- rounded landing pad is oxidizing polysilicon and not the silicon oxide, it does not prevent a POSITA to combine this oxidation-induced rounding process to combine Park and Lee and Kim, and Park and Lee in achieving rounded corner.

Basically, the underlying mechanism is the same, using oxidation to induce rounding corners.

Q Let's turn to paragraph 47 of your reply declaration.

A Okay.

Q Are you there?

A Yes.

Q And you claim that Kim's process can be modified by adding an oxidant to the space between

oxide layers after Kim's sacrificial layers are removed, as taught in Park, correct?

A Yes.

Q So we went through Kim's process earlier --

A Yes.

Q -- so I just want to understand, how would you modify Kim using this process? How --

A It's a --

Q Strike that.

How would Kim's process change to form a curved side surface, using Park?

A It's a simple step. You simply introduce a short oxidation steps to provide a rounded corner before you fill the opening with metal conductive layers to form the gate electrode and the landing pad.

(Reporter clarification.)

A Forming the gate electrodes and the landing pads.

Q So we discussed earlier the various steps that happen in Kim's process? Do you remember

that we walked through each portion?

A Yes.

Q Okay. So you would perform the oxidation process after the sacrificial layers are removed, correct?

A Yes.

Q And at that stage, there is already a gap in the insulating layer 122 called opening 122_O, correct?

A So you remove the sacrificial layer and then you perform a slight oxidation before you fill in the sacrificial -- before you fill in the gap with conductive layer.

Q I just want to make sure I have the right stage here.

So let's go back to Kim. I have Kim, column 13.

A Okay.

Q Let me know when you're there.

A I'm there.

Q So Kim column 13, line 55 through 67 describes forming a gap in auxiliary insulating

layer 122 by removing the sacrificial layer 120.

Do you see that?

A Column 13, line what?

Q Lines 55 through 67.

A So the gaps 260 is formed by removing the insulating layer 122. Okay? So is there a question?

Q So which -- does using the oxidation process happen before or after this step?

A So you remove the -- you remove the sacrificial oxide layer -- remove the auxiliary insulated layer 122, which include 120_I and 120_O, and then -- after that, then you introduce a small -- a short period of oxidant to rounded the corner, followed by injecting -- followed by depositing conformal deposition of the -- the gate electrode. I believe it's 300.

(Reporter clarification.)

A Of the -- of the gate electrode.

Q So once the sacrificial layers are removed, there's gap, correct, in Kim?

A Yes, of 260.

Q 260. And you're saying that a person of ordinary skill in the art would modify Kim by, at that step, adding oxidant to the auxiliary insulating layer 122 to form a rounded side surface, correct?

A Yes, before you put in the gate electrode. Just as I describe in my reply declaration.

Q Let me go back to your reply declaration, then. This is paragraph 48.

A Hold on one sec.

Okay.

Q Now, layer 122 is made of silicon oxide. We've already established that, correct?

A Yes.

Q And layer 125 is also -- can also be made of silicon oxide, correct?

A Yes.

Q Is layer 125 oxidizable?

A It could be.

Q So if you added oxygen to layers 122 and 125, both layers will expand, correct?

A Well, you have to remember, number one,

the oxidation rate of 125, which is a planar structure, is slower than the corners of 122 and 122_O, just like 122 has a planar surface and a concave and convex corners.

So therefore, yeah, 125, you could oxidize, and which is an additive process, but the oxidation is very slight. And also, oxidation around the corner is going to be large -- faster than the oxidation in the planar surface.

So as a result, you would end up with the figure drawn in the circle that we highlight.

Q And when layers 122 and 125 are oxidized, some of layer 125 will ultimately expand into the space allocated for the pad, correct?

A Again, that amount is so little compared to the corners. It's miniscuous [sic], and most of the oxidant is basically contributing rounding corner instead of oxidizing the 125, because of the planar surface.

Q If oxygen were added to layers 122 and 125 in Kim, then the space for pad key would be smaller due to the expansion of the layers 122 and

125, correct?

A Again, almost all the oxidation is at the corners, not at the planar surface. So you would not have a reducing height of the landing pad. You simply have a rounded corner, which would actually improve the characteristics of the -- of the device because a rounded corner will prevent shorting between the pads and the adjacent conductive structure.

Q And the end result and figure -- in figure -- strike that.

If you added oxidant to layers 122 and 125 in Kim, the end result would be what's shown in the circle in your figure in paragraph 48 of your reply declaration, correct?

A That is an illustrative drawing, that since the oxidation rate on the planar surface is slower than the oxidation rate around the corners, almost all the oxidation occur at the corners and not at the planar surface.

Q All right.

A This is very simple optimization

processes. We do it every day.

Q Okay.

ATTORNEY WATSON: Let's take a break. I think we've been going about an hour and a half. Off the record.

(Recess.)

BY ATTORNEY WATSON:

Q Dr. Lee, let's turn to paragraph 50 of your declaration.

A Hold on. The reply declaration?

Q Yes. Correct.

A Okay.

Q In paragraph 50, you claim that it would be obvious to employ Nam's process to obtain landing pads with curved side surfaces in Kim, correct?

A Yes.

Q You claim that the only change to Kim's process needed to form a curved side surface is adding an additional heating step, correct?

A Yes. Nam basically is applications of heat after ion implantation which causes the

damage region to spread, resulting in a curved contact pad, as discussed in paragraph 51 in my reply declaration.

And let me emphasize, that, again, this is not new. I discussed that in my opening report, as well as my deposition.

So the -- the only thing is that I just want to include a figure in paragraph, I believe 50- -- 52 to answer or clarify the confusion that Dr. Giapis and the patent owners seem to have. Again, it is not a new opinion, but I simply just want to elaborate of what I said in my opening IPR.

Q I've provided you with Exhibit 1006, the Nam reference. Can you pull that up real quick.

A Sure. Okay.

Q Does the manufacturing process taught in Nam use lithography to form the contact pad?

A Obviously forming the contact pad would require photolithography.

Q And when does Nam use the lithography to form the contact pad? What stage of the process?

A In every stage of the process. When you think about it, how do you form a staircase region? You etch one layer at a time. How do you do that? By using photolithography.

Q Is the contact pad formed by using lithography with the damaged region?

A You use an implant of the -- to introduce a damaged region, and you don't want the implant to implant an entire wafer, so you're going to have to cover a certain part of the chip that you don't want the damaged region. So therefore, what do you do? Photolithography.

Q And where in Nam does it disclose that covering of the damage region?

A You don't cover the damage region. You cover the region that you don't want to damage.

Q And where in Nam does it disclose covering the region that you don't want to damage?

A Look, you don't need to specify every single step of the process. A person of ordinary skill in the art reading a -- reading a patent would understand that next step we're going to do

implantations, and wait a minute, doesn't it require photolithography, doesn't photolithography require spinning, a photoresist, heating -- develop -- expose to the mask, and then developing the photoresist.

Do we need to spell every single step? No. You basically put out the -- the significant -- the important steps, the in-between steps. A person of ordinary skill in the art would understand that.

So I don't recall whether they -- whether Nam explicitly indicating that there will be photoresist steps. And I'll go take a look again. But whether or not they actually talk about that, in my mind, is irrelevant because it is well-understood that you would use photolithography to determine where you implant and where you don't implant.

So if you want, I can --

Q Let's go --

A Do you understand what I'm saying, Mr. --

Q Yeah. Go ahead.

A So let me -- let me -- there are many places. For example, in Figure 14 -- 13 and 14, they talk about using masks, layer, and in other places talk about using masks. But whether Figure 17, whether Nam specifically talks about using masks or photolithography, a person of ordinary skill in the art would understand looking at these pictures and understanding the -- the processing of photoresist step and the mask layer would have to be used.

Q Let's turn to Nam paragraph 67.

Let me know when you're there.

A 67, yeah.

Q So in Nam, there is a doped region 271A, where the "impurity, having been injected into the interface, is diffused and remains during the manufacturing process of the memory device 200."

Do you see that?

A Yes.

Q So in Nam, the region is only etched out when the ion concentration is larger than a certain value. Is that fair to say?

A Hold on. This is about Figure 8A, I believe.

Are you talking about paragraph that says, "On the other hand"?

Q Yes, 67.

A So what was the question?

Q Sure. In Nam, the doped region is only etched when the ion concentration is larger than a certain volume.

A So in that paragraph, Nam is saying that part of the insulating layer, layer 271, contain a doped region, 271A, where the impurity had diffused and remained during fabrications, right? The doped region formed only on the top surface but also in the lateral side -- lateral surface, the side surface of the gate electrode.

So Nam teaches that the impurity diffusion form a doped region on both the top and the lateral surfaces of the gate electrode layers, I believe with higher -- with high impurity concentration on the side surfaces.

(Reporter clarification.)

A Yes, confirming that side surfaces are explicitly modified, right, and structurally significant in the -- in the process, in the disclosed process.

Q So in Nam, the regions that are damaged can be etched dependent on the ion concentration in each region. Is that fair to say?

A Where did you read that?

Q I'm not reading it. I'm trying to summarize what you're saying. I'm asking you about how the amount of ion concentration in each region affects the etching and what's etched.

So maybe I can try a different question. Is that all right?

How does the amount of ion concentration throughout the damaged region affect what is etched?

A Where do you see "etching"? What paragraph are you reading?

Q Well, in paragraph 67, it says some of the impurity remains throughout the manufacturing process, correct?

A Yes.

Q In section other sections of Nam, it says that parts that are doped and damaged are removed, correct, and etched out?

A Where do you see that?

Q I believe we talked about it last time.

I may look at it a little bit later, but let's -- let's move on. Let's go to Nam -- let's go to -- back to your reply declaration real quick. And we'll go to paragraph 52.

A Wait, are we going 52 of my --

Q Of your reply, correct.

A Hold on one second. Mm-hmm.

Yes, is there a question?

Q I was -- you were telling me to hold for a second, so I was just holding.

All right. So are you at paragraph 52?

A Yes.

Q All right. So when modifying Kim, you would apply the heat diffusion step to the impurities implanted in Kim's insulating layer 122, correct?

A Yes.

Q And so you would spread the damaged region in insulating -- auxiliary insulating layer 122, correct?

A Yes.

Q Okay. Again, we walked through Kim's process earlier. When would you incorporate Nam's heat diffusion process into Kim's process to obtain the curved side surface?

A Well, in Kim's, you apply the heat after the ion implantation, which causes the damage to spread and resulting in a curved contact pad, as I explain in paragraph 51 and 52.

Q So walking through the Kim process, a mask pattern is formed on auxiliary layer 122, correct?

A Yes.

Q And then you would modify Kim by then performing this heat diffusion step directly after using the mask pattern. Is that fair to say?

ATTORNEY HERMAN: Objection to form.

A You do implantation of the damage first.

Q So first you would use the mask pattern,

and then you would implant the damaged region, fair?

A Right.

Q And then after you implant the damaged region into layer 122, you would heat that area, is that fair?

A Yes.

Q And then after you did that, you would form the insulating layer 125, and then you would remove the sacrificial layer 120; is that fair?

A Yes. You could do that.

Q And then after the sacrificial layers are removed, you would fill those gaps to form the pad. Is that how you would modify Kim in view of Nam?

A Yes, it's basically the same process, except now you apply heat to allow it to spread so that it give you the rounded -- rounded corners. And we talk about that normally in my opening declaration, but also, I believe in my last deposition, which, again, this is nothing new, but to -- to help to -- for -- after Giapis, and the

patent owner seems to be confused how it works, and this inclusion of the figure and the description is to try to elaborate and clarify the process step for them.

Q So let's look at this figure you've reproduced in paragraph 52 of your reply declaration.

Are you there?

A Yeah.

Q Okay. So when a person of ordinary skill in the art modifies Kim to form a curved side surface in view of Nam, it would implant ions into the auxiliary layer 122, correct?

A Right.

Q Then a person of ordinary skill would heat the auxiliary layer 122, correct?

A Yes.

Q And by heating the auxiliary layer 122, the impurities of the auxiliary insulating layer 122 will spread, correct?

A Yes.

Q And when the auxiliary layer 122 spreads,

where does it spread to?

A As shown in my figure, it's spread into the 122, not from the 122_I.

Q Would the insulating layer only spread horizontally during this process?

ATTORNEY HERMAN: Objection.

A Well --

THE WITNESS: Sorry, Patrick.

A No, it would spread both horizontally and vertically. What's important is the horizontal spreading, not the vertical spreading.

Q So using a heat diffusion process in Kim would expand the insulating layer into the etched region where the landing pad is formed, correct?

A No. As I describe in paragraph 58, when you implant the damage, you can adjust the profile and -- in such a way that the bottom of the pad is wider and the top of the pad is narrower. So therefore, the wider bottom would prevent contact to punch through when you etch the contact. And the narrower top prevent the shorting between the pads and the adjacent conductive structure. This

is all explained in paragraph 58.

So you get the best of both worlds, by doing the process that I discuss in my opening report, as well as elaborations in my reply declaration.

Q And when you say "you can adjust the profile so that the bottom of the pad is wider and the top of the pad is narrower," where in Nam is that disclosed?

A Nam disclosed just implantations, but the person of ordinary skill in the art would understand that implantations could either be -- would have both the dosage and the profile. And I believe that -- so a person of ordinary skill in the art would understand that when you do the implant, there will be a damage -- in fact, in figure -- let's see. Yeah, Figure 34 --

Q So Doctor, you're referring to Figure 34 of Nam?

A No. So -- so if you look at, for example -- let me see which figure -- figure -- go to Figure 22.

Q Of Nam?

A Of Nam. Or even Figure 20. Okay. It talks about, you can have an implantation with a -- basically profiling the damage. And the difference between DA1 and DA2 is DA1 is formed by the first ion implantations, which will give you location near the local -- lower surface of the sacrificial layer in the pad region, representing the damage, with impurity degrade of film characteristics resulting in a higher etch grade. Okay.

And then you also can have another implant, DA2, by a second ion implantation, which is formed in the upper surface, and, again, which, causing a higher etch rate and -- so overall --

By the way, you don't -- Nam described it in two different separate implant, but you can all done in one single implant with -- with a alternating energy level. And -- so all in one.

So therefore, what happened is that now you create the damage at both the upper -- upper surface and a lower surface, and nothing in

between, okay? As a result, you would give rise to a shape that -- in figure -- for example, Figure 25, Figure 27, Figure 29.

So in other words, Nam would understand that you could profile the implant damage in such a way that it give rise to a etching profile according to what you decide to have.

And similarly, in my reply declaration in paragraph 52, that one can profile the implant damage in such a way that you would result a wider bottom compared to the top, as I describe in paragraph 58. And you get the best of both worlds. You have a wide bottom, which prevent a shorting, caused by contact punch-through, and you get a narrower top so that it remained a good distance between the pads and the adjacent contact structure. So therefore, you would avoid and prevent shorting between the pads and the adjacent conductive structure.

So that's what I'm discussing and elaborate based on -- again, based on how my discussion in my opening report.

Q Let's go to paragraph 59 of your reply declaration.

A Okay.

Q You say, "Kim is open to various different pad shapes and sizes."

Do you see that?

A Yes.

Q Okay. Kim's pad shapes are not created randomly, though, correct?

A Obviously every process is well-controlled. The point that I want to make in paragraph 59 is basically distilled what Dr. Giapis and the patent owner seems to indicate in that the -- in paragraph 57, I said that Dr. Giapis seems to be confused about Kim's reference and say that using Nam's rounding process would basically negate the -- Kim's advantage of precise -- precisely control the location of the landing pad.

And I disagree with both points, as I describe in paragraph 57. And that Kim does not say that the pad formation is intended to produce

precisely the pad shape.

And -- so Dr. Giapis seems to suggest that when you rounded the corner, you will lose all the precision. On the contrary, each process is done with precision and with control and that -- you know, I think he seems to confuse that you might -- it might cause the shape to be the -- somehow become uncontrollable and that the pads might be too close and cause shorting.

But Kim never used the word "precise," anywhere in this pad formation that it tends to produce precisely shaped pads. Even though by using the process, the -- as described in paragraph 52, will have -- will have -- will result in a well-controlled process, but it will not create a short between the pads and the adjacent conductive pad, as Dr. Giapis seems to suggest when Nam is used in the process.

Q Okay. Let's go to paragraph 62.

A Okay.

Q You claim that "A person of ordinary skill in the art would have recognized that a rounded

landing pad operates to increase the distance between the landing pad and the adjacent conductive structure," correct?

A Sure.

Q Does --

A I do, right. If it is a sharp corner, you know, versus a rounded corner, rounded corner will give you a bigger distance. And furthermore, rounded corner will have less electric field gate intensity.

Q Does a landing pad rounded in the x-y plane increase the distance between the landing pad and the adjacent conductive structures?

A Would rounded pad in the x-y plane increase the distance between -- yeah, if you round the pad, will -- think about it, if you have a square pad and then you rounded it off, then obviously it will increase the distance between the landing pad and the adjacent conductive layer.

Q Let's go down to paragraph 96 of your declaration.

A Okay.

Q In paragraph 96, you offer this figure from the Plummer reference as an example of the extra silicon atoms present in non-stoichiometric oxide, correct?

A Yes.

Q And there is an arrow in this figure pointing to an extra atom marked Qf.

Do you see that?

A Yeah.

Q What does the Qf denote?

A In general, when you have -- when you have additional silicon atom and you don't, you know, hear -- basically illustrating that you would have -- in general, you have a non-stoichiometric silicon, meaning that -- non-stoichiometric silicon oxide, meaning that you have SiOx, which x is less than 2 but greater than 1. Okay?

So in the -- when you have an extra silicon atom in the silicon oxide matrix -- so ideally, what you have -- ideally, what you like to have is silicon is bonded to oxygen to form a silicon oxide layers and -- but if you have extra

silicon or extra dangling bonds, such as showing --

(Reporter clarification.)

A Dangling bonds. Like if you look to the left of the arrow Qf, you see some bonds that are dangling, okay? And that dangling bond can eventually cause defect. And Qf stands for fixed charge, is one type of charge that basically degrades the performance of the transistors.

And -- so what you'd like to have is to have that silicon bond, that's extra silicon, to be bonded to an oxygen. So therefore, the -- what I discuss in -- in the -- in this section is basically that having an oxygen deficiency in the non-stoichiometric oxide, non-stoichiometric silicon oxide, is basically -- would cause a oxidation, not very much, a slight oxidation, not only create such a rounded corner that we discuss, but also repair some of the bonding in perfection in the matrix.

Q Is Qf an example of a charged defect in the non-stoichiometric silicon oxide?

A No. Qf is a fixed charge in a non-ideal situation, not only in non-stoichiometric oxide but also even when you have supposedly pure SiO2 or have DM oxide, high-k dielectric. They all would have some imperfection, and one of the imperfection is Qf.

Q And what do you mean by "imperfection"?

A "Imperfection" means that when -- when you -- when you operate the transistors and whether it is a logic microprocessor or 3D NAND, the electron tend to float around. And when you have imperfection in the oxide, the electron will be -- easily be tracked, basically tied to this Qf site.

And imagine that the SiO2 is supposed to be -- or SiO, silicon oxide or silicon dioxide, is not supposed to have any charge in the insulator. Now you have a electron charge, and that would alter the characteristics of the underlying transistor and causing slowdown of the semiconductor chip and degrade the reliability of semiconductor chip.

That's what I mean by imperfection.

Q So the non-stoichiometric oxide is electrically defective?

A No --

ATTORNEY HERMAN: Objection. Form.

A -- that's not what I said. A non-stoichiometric oxide is not inherently inferior or unstable or more reactive compared to SiO2. It's simply that it has slightly more silicon compared to pure SiO2. Si is silicon, O is oxygen and a subscript 2.

So whether you have stoichiometric silicon dioxide or non-stoichiometric silicon oxide, that both are -- both happens in ordinary conventional semiconductor processing. You don't need any special process to achieve non-stoichiometric silicon oxide. You don't need to do anything special in the processing. Just like what is described in one of the prior art reference Ohsaki, and both can be very robust insulators.

So let me clarify that. I'm not suggesting changing or replacing the insulating

material in Kim or Lee for the purpose of the rounding of the pad. A person of ordinary skill in the art would know that the dielectric material being used in semiconductor processing would have some amount of excess silicon, and these excess silicon would enable further oxidization when the -- when the device is exposed to oxygen. And that I discuss in detail in my -- in paragraph 83 to 92.

Q Let's go down to paragraph 98 of your reply declaration.

A 98. Okay.

Q You stated, "A person of ordinary skill in the art" -- or POSITA -- would have immediately recognized that it would have been desirable to further oxidize the non-stoichiometric film to reduce the amount of extra silicon."

Do you see that?

A Right.

Q Why would a person of ordinary skill in the art want to further oxidize non-stoichiometric oxide into silicon dioxide?

A Well, as I mention, when you have extra silicon as in the -- in the paragraph of 96, where I have included the image, Figure 6-39, that the extra silicon would result in a fixed charge which amounts to some kind of defect. So by oxidizing it, you basically minimize the amount of extra silicon and therefore reduce the -- the material degradation problem and at the same time produce a rounded landing pad.

Q So would you say that the non-stoichiometric oxide due to its extra silicon is electrically defective compared to the silicon dioxide?

ATTORNEY HERMAN: Objection to form.

A No.

THE WITNESS: Sorry, Patrick.

A No. As I discussed earlier, the non-stoichiometric silicon oxide is not inherently inferior, unstable, or more reactive compared to pure SiO2.

What I'm saying is that the non-stoichiometric silicon oxide obviously have

slightly more silicon atoms, okay, excess silicon, and this excess silicon would allow further oxidation when exposed to oxygen. And -- however, this small amount of silicon, excess silicon will potentially give rise to wear-out.

Having said that, the pure silicon dioxide also have dangling bands, which might be passivated with hydrogen atom, but those are not very strong bond, would also cause reliability issues. In other words, silicon dioxide and non-stoichiometric silicon oxide are both, in general, very robust, and depending on the processing, some might be less reliable compared to others.

It depends on the detail processing, it depends on whether you densify the oxide afterwards, whether you oxidize -- to further oxidation or annealing. So the detail is quite complicated.

But the bottom line is that one cannot say that non-stoichiometric silicon oxide is inherently unstable compared to pure SiO2.

Q To convert the non-stoichiometric oxide into silicon dioxide, that requires an additional processing step, correct?

A Well, as I describe, the purpose -- first of all, as I describe -- discussed earlier and also in my reply declarations, as well as during the deposition previously, when we say that, whenever there is an excess amount of silicon, whether it's coming from the silicon substrate or whether it's coming from the fact that you have non-stoichiometric silicon oxide, the amount of excess silicon would allow for further oxidation when exposed to oxygen. And that gave us an ability to rounded the corner of the -- of the contact pad. Okay?

So to answer your question, yes. If you want to convert non-stoichiometric silicon oxide to pure silicon oxide, all you have to do is simply do additional oxidation, which someone -- some people may call that densifications. But that's a very simple step, and it achieves the best of both worlds, rounded corner and wider pad

in the bottom.

Q How does silicon dioxide and non-stoichiometric silicon oxide compare in their band gaps?

A Well, in general -- as I discuss in my -- in paragraph 85 to 86, it is well-known that LPCVD and PECVD oxide would result in non-stoichiometric silicon oxide and [indiscernible] it is SiOx --

(Reporter clarification.)

A SiOx, silicon, S-I, O, oxygen, X. Okay? It's a molecular symbol, silicon Ox, SiOx.

But, in general, that x is closer to 1.7, 1.9. So the amount of excess silicon is quite negligible. And pure SiO2 has a band gap, silicon band gap or energy band gap of about nine electron volt. Okay? And non-stoichiometric silicon oxide has a very similar band gap because the amount of oxygen deficiency is quite small. And -- so the band gap is very similar.

Now, of course, you can always find some example that x is very low, like 1.2, 1.1, that would result in a much smaller band gap, but those

are outliers.

Q But the band gap will be smaller in the non-stoichiometric silicon oxide compared to the silicon dioxide, correct?

A That is not correct. Were you listening to me? The SiOx, where x is closer to 2, 1.7 to 1.9, the band gap is not smaller.

Q So the band gap increases where the amount of oxygen per silicon atom is 1.7 to 1.9 compared to silicon dioxide. That's your testimony?

A I don't think you're listening to me. There is not conventional non-stoichiometric silicon oxide that you see in typical processing in semiconductor chips, including microprocessor, 3D NAND. They all include -- naturally include non-stoichiometric silicon oxide. Those have the same amount of band gap.

Because if you think about it, the percentage is so small that it is not -- it is not affecting the band gap. If you understand the band gap theory, you would see that the effect is very small, especially when x is very close to

two, 1.7, 1.9, and so -- but the -- the advantage of having a smaller x, 1.7, 1.9 versus 2 is that you allowed some amount of excess silicon for further oxidation when exposed to oxygen and which causing a -- a rounded corner of the landing pad, what we try to achieve.

Q Dr. Lee, let's go to paragraph --

A You're already at the last paragraph, 98.

Q We're going to bounce up a little bit.

A Oh.

Q Let's go and talk about the Lee reference real quick. Let me go put that in the chat.

A What paragraph are you talking about?

Q We will refer to paragraph 81. Let's start with paragraph 81?

A Are you talking about Lee?

Q Yes.

A 81.

Q Now, you offer the opinion that a person of ordinary skill in the art would be motivated to combine Lee with Park's oxidation process, correct?

A Yes.

Q Okay. Let's turn to paragraph 48 of Lee, which is Exhibit 1007.

A Hold on, let me get --

Okay.

Q In paragraph 48, it states -- and this is the second part --

A Paragraph 48 of Lee or paragraph --

Q Lee, paragraph 48 of Lee.

A Hold on one second. Okay, I'm there.

Q Okay. Lee states that "before an impurity implantation process is performed, side walls of the first material layers 21 exposed at respective steps may be oxidized to thereby form a plurality of barrier layers 28."

Did I read that correctly?

A I think so.

Q So from Lee, layer 21 is oxidized to form barrier layer 28, correct?

A Hold on. This is Figure 8A.

Q 8B is this one.

A Sorry, let me go there.

So what's your question?

Q Sure. In Lee, layer 21 is oxidized to form barrier layers 28, correct?

A Barrier -- okay. Yeah.

Q So you're with me right now, right?

In Lee, layer 21 is oxidized to form barrier layer 28, correct?

A That's what he says there.

Q But layer 22 is never described as being oxidized in Lee, correct?

A So layer 21 is the sacrificial layer, right? Layer 22 is the insulating layer.

Q So Lee never describes oxidizing layer 22, correct?

A Sorry, it's getting late and -- I believe you're correct. Lee does not oxidize layer 22.

Q If oxidation in Lee occurred on the edge of the staircase, would layer 22 be oxidized?

ATTORNEY HERMAN: Objection. Form.

A Well, it depends on the state of layer 22, but layer 22 is deposited as an oxide. So -- a silicon dioxide. So at least the purpose of

the -- of the process is that that layer is not subject to any subsequent oxidations.

Q So layers 22 is not subject to any subsequent oxidation, correct?

ATTORNEY HERMAN: Objection. Form.

A You're right. It's not -- in general, even if it is exposed to even -- it might oxidize slightly but not very much. At least it's not designed to oxidize.

Q If layer 22 were able to be oxidized at the end of the staircase, these pads would be shortened. Is that fair to say?

ATTORNEY HERMAN: Objection. Form.

A Again, it's not designed to be oxidized.

Q And that's because layer 22 is made of silicon dioxide; is that fair?

ATTORNEY HERMAN: Objection. Form. It misstates the witness's testimony.

Q Dr. Lee, did you hear my question?

A No, I did not.

Q Is layer 22 made of silicon dioxide?

ATTORNEY HERMAN: Objection. Form.

A 22 or 21?

Q 22. Do you need me to restate the question, Dr. Lee?

A No. I'm -- you're asking whether layer 22 in Figure 8B is made of silicon dioxide?

Q Correct.

A Hold on. Sorry.

ATTORNEY HERMAN: While he's looking at that, how long have we been on the record?

ATTORNEY WATSON: Honestly, this is my last question, Patrick, assuming he confirms what he's already said. I've just been waiting for it for ten minutes.

A Oh, in paragraph 30, it says that second material layer may include insulating layer such as oxide layer. So it seems like it is an oxide layer but -- but not necessarily silicon dioxide.

ATTORNEY WATSON: I don't have any further questions, subject to, of course, what your counsel asks.

EXAMINATION BY
ATTORNEY HERMAN:

Q I just have two or three questions, Dr. Lee.

The first is, is it your understanding that the deposition today was meant to be a memory test?

ATTORNEY WATSON: Objection. Argumentative.

A I don't -- I hope it is -- I don't know, but it seems like it is asking questions -- asking for my memory test.

Q Did you memorize your declaration in preparation for today's deposition?

A No.

ATTORNEY WATSON: Same objection.

Q So, for instance, counsel asked you today if, in Lee, layer 22 is meant to be silicon dioxide. Do you remember when he asked that question?

A Yes.

ATTORNEY WATSON: Objection. Form.

Q When he asked that question, did he direct you to paragraph 81 of your reply declaration?

A No, he did not.
Q What does paragraph 81 of your reply declaration say?
ATTORNEY WATSON: Objection. Form.
A That Lee explained that insulating layer a form of oxide, not solid silicon dioxide.
Q Would that have answered counsel's question?
A Yes. So that's the answer to Mr. Watson's question.
Q And is that still your opinion today?
A Yes, it is.
Q And counsel also asked you if layer 22 in Lee is capable of being further oxidized. Do you remember that question?
ATTORNEY WATSON: Objection. Form.
A Yes.
Q In asking you that question, did counsel direct you to paragraph 89 of your reply declaration?
ATTORNEY WATSON: Objection. Form. Leading.

A I can't recall that, yes. I don't know if he did or not. I don't remember.

Q In paragraph 89 of your declaration, you include a figure that shows oxide layer 22 being further oxidized.

A Yes.

ATTORNEY WATSON: Objection. Form. Leading.

Q Did counsel direct you to that figure when asking you that question about the further oxidation of layer 22?

ATTORNEY WATSON: Objection. Form. Leading.

Counsel --

A In the earlier --

ATTORNEY WATSON: -- you can ask yes-or-no questions.

A In the earlier discussion but not in the later discussion.

ATTORNEY HERMAN: I have no further questions.

ATTORNEY WATSON: All right.

CONTINUED EXAMINATION BY
ATTORNEY WATSON:

Q Dr. Lee, during your deposition, did -- you were asked in this cross-examination about certain paragraphs of your reply declaration. Do you remember that?

A Yes.

Q Okay. And when you answered the questions throughout this deposition, did you answer it to the best of your ability?

A Yes.

Q Okay.

ATTORNEY WATSON: I don't have any further questions.

ATTORNEY HERMAN: Let's see here. Thank you, Dr. Lee, and thanks --

ATTORNEY WATSON: I do want to reserve the right to object based on the transcript for nonresponsive answers, but we can take a look at that and see afterwards.

ATTORNEY HERMAN: Again, I disagree that's an option that's available for you, but you can do

whatever you like.

ATTORNEY WATSON: Your counsel -- you guys have done it multiple times, so I think that's it for us.

(Time noted: 4:28 P.M.)

ACKNOWLEDGMENT OF DEPONENT

I, JACK LEE, Ph.D., do hereby acknowledge that I have read and examined the foregoing testimony and the same is a true, correct, and complete transcription of the testimony given by me and any corrections appear on the attached errata sheet signed by me.

_____ _____

(SIGNATURE) (DATE)

CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

I, Anita M. Trombetta, Certified Reporter and Notary Public within and for the State of New York Do hereby certify: That JACK LEE, Ph.D., the Witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken before me and is a true record of the testimony given by such Witness.

I further certify that the adverse party, MICRON TECHNOLOGY, INC., was represented by counsel at the deposition.

I further certify that the deposition of JACK C. LEE, Ph.D., occurred remotely via Zoom on Tuesday, December 23rd, 2025 at 9:01 A.M. to 4:28 P.M. Central Time.

I further certify that I am not related to any of the parties to this action by blood or marriage, I am not employed by or an attorney to any of the parties to this action, and that I am in no way interested, financially or otherwise, in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my Hand this 29th day of December, 2025.



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NOTARY PUBLIC IN AND FOR THE STATE OF NEW YORK

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