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UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICRON TECHNOLOGY, INC.,
Petitioner
v.
YANGTZE MEMORY TECHNOLOGIES COMPANY, LTD.,
Patent Owner

Case Nos. IPR2025-00791 & IPR2024-00911

U.S. Patent No. 10,658,378

VOLUME II DEPOSITION OF WOODWARD YANG, PH.D.

(CONDUCTED REMOTELY)

PAGES 1 - 94

Thursday, April 24, 2025

2:01 p.m.

CONFIDENTIAL -- ATTORNEYS' EYES ONLY

STENOGRAPHICALLY REPORTED BY:
LINDSAY A. STOKER, RDR, RMR, CRR, CRC
CA CSR No. 14373
Job No.

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COMPANY, LTD.,)
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Patent Owner.) PAGES 1 - 94
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Videotaped deposition of Woodward Yang, taken on
behalf of the Plaintiffs Pursuant to Notice via remote
teleconference in Huntington Beach, California,
commencing at 2:01 p.m., on Thursday, April 24, 2025,
before Lindsay Anne Stoker, an NCRA Registered Diplomate
Reporter, Registered Merit Reporter, Certified Realtime
Reporter, Certified Realtime Captioner, and Certified
Shorthand Reporter No. 14373 in and for the State of
California.

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A P P E A R A N C E S

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1 STENOGRAPHIC REPORTER APPEARING REMOTELY

2 HUNTINGTON BEACH, CALIFORNIA

3 Thursday, April 24, 2025, 2:01 p.m.

4 WOODWARD YANG,

5 called as a witness, having been first duly sworn,
6 was examined and testified as follows:

7 MR. SAGDEO: This is Parth Sagdeo with Orrick
8 Herrington, representing Micron Technology, the
9 petitioner.

10 MR. CROSS: Allen Cross with Ropes & Gray on
11 behalf of Yangtze Memory.

12 EXAMINATION

13 BY MR. SAGDEO:

14 Q. Hello, Dr. Yang.

15 A. Hello.

16 Q. Looks like you are still at your home in
17 Thailand; is that right?

18 A. Yes, yes.

19 Q. Thank you again for meeting at an early
20 hour for you. Before we get to the substance, I
21 hope you will forgive me for asking some of the same
22 housekeeping questions as a couple of days ago.

23 Is there anybody in the room with you?

24 A. No.

25 Q. Other than the computer you are using for

1 this Zoom, do you have any computers or documents or
2 other information in your presence right now?

3 A. No. There is just an iPad, just like I
4 mentioned last time, that's on the desk as well as
5 another -- an additional screen but nothing on it.
6 And I have a PDF window open with the last depo's
7 test document, just to be prepared to receive any
8 other PDFs in the future. But nothing -- nothing of
9 substance is on my desktop.

10 Q. Like last time, I will ask that you not
11 look at any documents unless I ask you to
12 specifically. Is that okay?

13 A. Yes. I'll try to be able to answer them.
14 But if I require something, I'll ask because my
15 memory is not perfect.

16 Q. Sounds good. Do you understand that you
17 have been administered an oath today?

18 A. Yes.

19 Q. Do you understand that you are obligated to
20 testify fully and truthfully as if you were in
21 court?

22 A. Yes.

23 Q. If I ask a question and you don't
24 understand it, please let me know, and I'll either
25 repeat it or rephrase it. Is that okay?

1 A. Yes.

2 Q. Are you under the influence of any drugs or
3 medication? Or is there any other reason you might
4 not be able to testify today fully and truthfully?

5 A. No.

6 Q. Dr. Yang, how did you prepare for this
7 deposition?

8 A. I reviewed my declaration. I read the
9 patent for maybe the one thousandth time. I
10 reviewed Dr. Lee's declarations and his transcripts
11 of his depositions as well. I did review briefly
12 some of the other documents that I also considered
13 in forming my opinions as well.

14 Q. Did you meet with anyone as part of your
15 preparation?

16 A. Yes. I had a brief meeting to discuss
17 the -- to discuss the upcoming deposition with
18 counsel.

19 Q. And who attended that meeting?

20 A. It was -- I am trying to recall because I
21 don't think the other person turned on his video.
22 But I do believe he was there. Allen Cross, Chris
23 Bonny, and Megan -- Mehmet Dogan.

24 Q. And how long was that meeting?

25 A. I don't recall. I don't think it was

1 even -- it would be more than an hour, less than two
2 hours.

3 Q. Other than that meeting, did you meet with
4 anyone to prepare for this deposition?

5 A. I had a brief -- I guess it was a brief
6 meeting, five minutes with Allen Cross, my time
7 last -- just before dinner yesterday.

8 Q. Sorry. I think you might have cut out just
9 for a second.

10 You said "my time just before dinner." Okay.

11 A. Yeah. My time just before dinner.
12 Yesterday I had, like, a five-minute, I guess, Zoom
13 call, phone call with Allen Cross.

14 MR. SAGDEO: Dr. Yang, I have uploaded to the
15 chat a document -- actually, I have not yet. So
16 there's an issue. All right. I have now uploaded
17 to the chat a document I have marked as Exhibit 1.
18 Can you let me know when you have that document
19 open?

20 (Exhibit 1 was marked for
21 identification.)

22 THE WITNESS: Yes.

23 BY MR. SAGDEO:

24 Q. Could you let me know what the document is
25 showing?

1 A. I think it's showing a picture of a mobile
2 phone.

3 MR. CROSS: Sorry, if we can hold off for a
4 second. I got a notice that it was corrupted. Let
5 me try redownloading it again. Does it end in
6 "webp"?

7 MR. SAGDEO: Yes.

8 MR. CROSS: What application do you use to open
9 that?

10 MR. SAGDEO: I guess any sort of web browser, I
11 think, should do.

12 MR. CROSS: I think that's the problem. It was
13 trying to open with the photo app. There we go.
14 Thank you.

15 THE WITNESS: So would you like to ask the
16 question again, and then I can answer cleanly.

17 BY MR. SAGDEO:

18 Q. Right. So, Dr. Yang, you mentioned this
19 photo was of -- did you say a mobile phone?

20 A. Yes. I guess you originally asked me what
21 is this, and I said this appears to be a photo of a
22 mobile phone. I am guessing, from the looks of it,
23 it appears to be an Apple iPhone, but I can't be
24 certain.

25 Q. Is Exhibit 1 a photo of a device?

1 A. Sure. I guess it depends on what you mean
2 by "device." Yes. It could be -- looks like a
3 photo of a device. I have to understand the context
4 of what you mean by "device" but yes.

5 Q. Just in, I guess, under the ordinary
6 meaning of "device," as you understand it, would you
7 say that it is a photo of a device?

8 A. Oh, yes. I mean, under normal
9 conversation, I would call that a device. But I
10 mean, there might be a sort of specific context of
11 what a device constitutes. So, for example, if you
12 were to say -- I don't know -- "communication
13 device," it probably falls within the scope of a
14 communication device if it's a mobile phone. But it
15 may not fall within the scope of some other device
16 that you -- or your definition of "devices."

17 MR. SAGDEO: I have uploaded to the chat a
18 document that I've marked exhibit 2.

19 (Exhibit 2 was marked for
20 identification.)

21 MR. SAGDEO: Dr. Yang, can you let me know when
22 you have that open.

23 THE WITNESS: Yes.

24 BY MR. SAGDEO:

25 Q. What's being shown in Exhibit 2?

1 A. It seems to be -- and I can only tell this
2 because the label that's on it. It seems to be a
3 solid state drive that appears to have a size of 2
4 terabyte.

5 Q. Is the solid state drive a device?

6 A. Again, with the preface that it depends on
7 what you mean by "device"; but, yes, in a general
8 overall sort of -- everyday sort of context of the
9 word "device," yes, it appears to be, for example, a
10 memory storage device.

11 MR. SAGDEO: I have uploaded to the chat a photo
12 that I've marked Exhibit 3. Could you let me know
13 when you have that one open?

14 THE WITNESS: Yes.

15 (Exhibit 3 was marked for
16 identification.)

17 BY MR. SAGDEO:

18 Q. What is shown in Exhibit 3?

19 A. I'm just trying to sort of read all the
20 captions and understand exactly what it is. I think
21 what's trying to be shown there -- or someone is
22 trying to illustrate -- again, it doesn't have any
23 captions on it, but I think what they're trying to
24 illustrate there is some kind of photo connection
25 device, or perhaps it is some type of -- seems to be

1 implying that some type of charge-coupled device,
2 although what is really drawn there won't really
3 work but anyway.

4 Q. But perhaps you already answered my
5 question. But would you say that what's being shown
6 in Exhibit 3 is a device?

7 A. It depends on what you mean by "device";
8 right? It could be a -- it could be one device. It
9 could actually be three devices because there's
10 three gates. So it really depends on what you mean
11 by "device." But, yes, you could construe this one
12 thing as being a device, depending on what your
13 definition is.

14 Q. Are you saying that a device could include
15 multiple devices within that device?

16 MR. CROSS: Objection. Form.

17 THE WITNESS: I mean, I think that depends on
18 what you define a "device" and "multiple devices
19 within a device," yes. But I think a device can
20 have multiple elements within it. And devices can
21 be combined together to form other devices.

22 MR. SAGDEO: I have uploaded to the chat a
23 document -- photo that I've marked as Exhibit 4.
24 Could you open that one up, Dr. Yang?

25 (Exhibit 4 was marked for

1 identification.)

2 THE WITNESS: Yes. I have opened it.

3 BY MR. SAGDEO:

4 Q. What is Exhibit 4?

5 A. My guess is it is, in the context of
6 everything that has been shown so far -- well, what
7 it appears to be is some type of semiconductor chip
8 inside a package, and that package appears to have a
9 glass lid on it, and it appears to have some
10 apparent leads to connect to it on the outside.

11 The fact that you put a device with a glass lid
12 on it, which is an expensive thing to do, is
13 probably indicative that it is some type of image
14 sensor, although it's impossible to tell what type
15 of image sensor it is. So I'm just sort of guessing
16 what I think it is. Again, there's no caption; so
17 it's hard to tell.

18 Q. If I were to tell you that it's an SCCD
19 from a digital camera, would that surprise you?

20 A. Could you say that again?

21 Q. A CCD -- a charge-coupled device from a
22 digital camera?

23 A. I don't think that would particularly
24 surprise me, no.

25 Q. Would you consider this Exhibit 4 to be

1 depicting a device?

2 A. Again, with the caveat that it depends what
3 your definition of "device" is; but, yes, this fits
4 the general sort of vernacular of what someone would
5 consider a device, you know, the package thing being
6 a device.

7 (Exhibit 5 was marked for
8 identification.)

9 MR. SAGDEO: I have uploaded a photo that I have
10 marked as Exhibit 5. Dr. Yang, can you open that
11 and let me know when you have?

12 THE WITNESS: Yes, I've opened it.

13 BY MR. SAGDEO:

14 Q. What is Exhibit 5 depicting?

15 A. I'm not intimately familiar with it, but
16 just from the photo, it appears to be a photo of a
17 digital camera, a Sony digital camera.

18 Q. Would you say that this digital camera is a
19 device?

20 A. Again, with the caveat of what your
21 definition of "device" is, certainly, it could
22 satisfy a "device."

23 Q. What about, like, a plain and ordinary --
24 like, an ordinary meaning of device? Under that
25 ordinary definition, would you consider this exhibit

1 to be depicting a device?

2 MR. CROSS: Objection. Form.

3 THE WITNESS: I mean, in the plain and ordinary
4 definition of a photographic recording device, yes.

5 It's clearly a photographic recording device. I
6 don't know what a generic device is; right? So I am
7 not exactly sure. I just want to be careful that I
8 don't just slap the word "device" on anything. I
9 have to understand the context.

10 BY MR. SAGDEO:

11 Q. Well, I guess maybe it would -- would you
12 be able to provide a definition of "device"?

13 MR. CROSS: Objection. Form.

14 THE WITNESS: A general definition of "device"?

15 BY MR. SAGDEO:

16 Q. Yeah. A definition based on its ordinary
17 meaning.

18 MR. CROSS: Objection. Form.

19 THE WITNESS: I think within the context of this
20 particular photo, I am happy to call that a camera
21 device. I am happy to call that a photographic
22 recording device. I am happy to call that some type
23 of sensing and recording device, you know.

24 So that type of device would all sort of be
25 satisfied there. It appears to have GPS; so it

1 might even qualify as a GPS device to know its
2 location.

3 So you could see why -- I just want to be
4 cautious, that's all. I don't want to slap labels
5 on stuff without thinking about it carefully,
6 especially within the context of this discussion
7 that we're having. If this was just on the street,
8 you know, it would be a different type of
9 conversation. But I'm under oath, and I'm trying to
10 give clear answers, clear and carefully considered
11 answers.

12 BY MR. SAGDEO:

13 Q. We covered this a couple days ago, but
14 would you consider yourself a person of ordinary
15 skill in the art in the field of flash memory?

16 MR. CROSS: Objection. Lacks foundation.

17 THE WITNESS: I believe that I know what a
18 person of skill in the art in flash memory would
19 understand and analyze, especially with respect to,
20 you know, something like the patents at issue.

21 BY MR. SAGDEO:

22 Q. Are you able to provide a definition of the
23 word "device" in the field of flash memory?

24 MR. CROSS: Objection.

25 THE WITNESS: I believe that the definition --

1 MR. CROSS: If you can wait until I finish my
2 objection.

3 THE WITNESS: Sure.

4 MR. CROSS: Objection. Calls for a legal
5 conclusion.

6 THE WITNESS: All right. So I believe that
7 "device" within the field of flash memory can apply
8 to many different elements of a flash memory.

9 So, for example, in the solid state drive that
10 you showed me earlier, that particular device, you
11 know, is a flash memory device. It is composed of
12 flash memory, I believe.

13 But within it there will be many components
14 within there. There will be things like voltage
15 regulators. There will be things like connectors.
16 There will be things like interface chips in
17 addition to the actual device chip itself.

18 And so all of those things may be called
19 devices. So, again, I would like to be careful
20 about what I call a device. Perhaps the whole thing
21 wants to be called a device, depending upon the
22 context of what a patent is covering.

23 Maybe the patent is covering how solid state
24 drives are actually manufactured, or it might
25 actually -- the device at issue might actually be an

1 actual sort of structure within the actual flash
2 chip -- might be called a device. And so you just
3 need to be careful about just slapping "device" on
4 things. You should provide some sort of context.

5 BY MR. SAGDEO:

6 Q. You mentioned that in some context the
7 structure is -- or a structure within a flash memory
8 chip might be called a device. Did I have that
9 right?

10 A. Yes. Depending upon how the context of how
11 the word "device" was used.

12 Q. Could you give me an example of a device in
13 that context?

14 A. Sure. An nMOS transistor is a lot of times
15 called a device. And so you would say the nMOS
16 transistor is a device that's inside the flash
17 memory chip if there's an nMOS transistor inside it.

18 MR. SAGDEO: I have uploaded to the chat a photo
19 that I have -- or a document, I should say, that I
20 have marked as Exhibit 6. Dr. Yang, can you open
21 that up and let me know when you have it.

22 (Exhibit 6 was marked for
23 identification.)

24 THE WITNESS: Okay. Can I close the other
25 exhibits now?

1 MR. SAGDEO: That's fine.

2 THE WITNESS: It's just the screen is getting a
3 little crowded.

4 BY MR. SAGDEO:

5 Q. So, Dr. Yang, do you have Exhibit 6 open?

6 A. Yeah. It is not labeled Exhibit 6, but it
7 seems to be a picture.

8 Q. What is it a picture of it?

9 A. It seems to be a geometric figure that
10 seems to be a rectangle or the outline of a
11 rectangle.

12 Q. What would you say is the periphery of that
13 rectangle?

14 MR. CROSS: Objection. Form.

15 THE WITNESS: Could you be a little bit clear
16 about "periphery."

17 BY MR. SAGDEO:

18 Q. Well, I am just asking -- let's assume that
19 I'm asking you based on sort of the ordinary meaning
20 of "periphery," as you understand it.

21 Let me go back. I guess, do you have an
22 understanding of the word "periphery"?

23 A. Yes. But I'm taking this as a geometric
24 figure. So I believe that, if I were to apply the
25 word "periphery" to this, I probably need to make

1 certain assumptions about the figure that I'm
2 looking at, which aren't immediately apparent when I
3 look at it.

4 So when I see something like this, I'm reminded
5 of elementary school; and, you know, I was shown a
6 picture of a rectangle, and I recall like the math
7 question you would get would be, like, what is the
8 perimeter of this rectangle; right? So a perimeter
9 I'd be familiar with. But "periphery" I believe
10 carries some additional meanings to it.

11 And so I have a little bit more context to
12 understand what you mean by "periphery" or what I'm
13 looking at here.

14 Q. So let's just sort of take it as a
15 rectangle, as you described it.

16 If I asked you what's the periphery of this
17 rectangle, how would you answer that question?

18 MR. CROSS: Objection. Form.

19 THE WITNESS: So let me get to the crux of the
20 thing that's kind of bothering me, but it is -- I
21 guess I am just a little bit sort of cautious about
22 this because I believe that this is a rectangle,
23 which just means it is a set of four lines.

24 Now, the lines seem to have some sort of width.
25 But I believe that, if you want to say "periphery,"

1 then you probably need to assume that the inside of
2 the rectangle is different than the outside of the
3 rectangle. And then I also need to assume what's in
4 the foreground, what's in the background.

5 So just from looking at the sort of black and
6 white geometric picture, "periphery" is implying
7 some type of three-dimensional aspect of something.

8 Perimeter I understand. And so perimeter, like
9 I mentioned, is sort of that geometric thing that I
10 was asked to give an answer to in elementary school.

11 But "periphery," I think, implies that I need
12 to -- I need to make some sort of assumptions about
13 what it is I'm looking at and how I apply the word
14 "periphery" to what I'm looking at. That's all.

15 So I just hope you understand I'm trying to be
16 precise with words here.

17 MR. SAGDEO: I have uploaded another exhibit,
18 which I will mark Exhibit 7. Could you open
19 Exhibit 7, Dr. Yang?

20 (Exhibit 7 was marked for
21 identification.)

22 THE WITNESS: Yes.

23 BY MR. SAGDEO:

24 Q. How, if at all, is this exhibit different
25 from Exhibit 6?

1 MR. CROSS: Objection. Form.

2 THE WITNESS: It seems to have the,
3 quote/unquote, "interior of the rectangle shaded
4 gray."

5 BY MR. SAGDEO:

6 Q. Does this provide any sort of context that
7 would help you answer the question of what is the
8 periphery of this rectangle?

9 A. I think that the additional coloring in the
10 image is informative, especially when compared to
11 the previous image. It gives the impression that
12 the image that I'm looking at is showing a rectangle
13 that has a what you might say an interior and an
14 exterior.

15 So then we can probably apply the notion of
16 periphery a little bit more accurately. Although
17 the question is am I looking at something that's
18 white and a rectangular hole in it? Or am I looking
19 at something that's gray with a white background.

20 So then, again, you know, periphery then could
21 apply to kind of the interior dimension of that hole
22 if I was looking at a hole of something white; or it
23 could apply to sort of the exterior of that if I'm
24 looking at the -- at a gray object on a white
25 background.

1 So I hope you -- you know, I know I'm mincing
2 words, but I'm trying to be precise. That's all.

3 Q. Well, let's take, I guess, the second
4 framing that you mentioned, which is a gray object
5 on a white background. If we take that context,
6 what would you say the periphery is?

7 A. Assuming that that black border is a piece
8 of the gray object, it appears to be the outer edge
9 of that black border going around the four sides of
10 the rectangle -- of the gray rectangle.

11 (Exhibit 8 was marked for
12 identification.)

13 MR. SAGDEO: I've uploaded a document that I
14 have marked Exhibit 8 to the chat. Dr. Yang, could
15 you let me know when you have that open, and you can
16 close out of any other documents you have.

17 THE WITNESS: Okay.

18 BY MR. SAGDEO:

19 Q. What is Exhibit 8 depicting?

20 A. Again, without any sort of context, it's
21 depicting what appears to be an outline of a circle.
22 And the interior of the circle seems to be shaded
23 gray on a white background.

24 Q. What is the periphery of the circle that
25 you mentioned?

1 A. With all the caveats I gave before about --
2 I am not sure if I'm looking at a hole through a
3 white thing or a gray thing on a white background.
4 I would probably have to know those in order to
5 understand or give you a good description of what
6 the periphery is.

7 Q. Well, let's say that it is a gray thing on
8 a white background. Does that help you answer the
9 question of what the periphery is?

10 A. Is the black border part of the gray thing?

11 Q. The black border is part of the gray thing,
12 yes.

13 A. Okay. The periphery of the object that
14 appears on the white background would probably be
15 the outer edge of that black border going all the
16 way around.

17 Q. All right. You can close out of Exhibit 8.

18 Okay. Dr. Yang, have you heard the phrase "gate
19 replacement" in the context of NAND flash memory?

20 MR. CROSS: Objection. Form.

21 THE WITNESS: Yes. There's something called a
22 gate replacement process, yes, within a 3D NAND
23 flash that's used.

24 BY MR. SAGDEO:

25 Q. Is that a process that was known in 2018?

1 A. If we are referring to the same gate
2 replacement process that I think you're talking
3 about, yes, that is something that was known in
4 2018.

5 Q. Could you describe at a high level anyway
6 what that process entails?

7 MR. CROSS: Objection --

8 THE WITNESS: Yeah, at a high level -- yeah. It
9 is an absolutely crazy process. So, if you have a
10 stack of two different types of dielectric, you can
11 make this stack -- let's make a sandwich, and you
12 cut a slice down the stack.

13 And then what can happen is you can introduce an
14 etchant into the top of the stack, and it can go in,
15 and it will eat -- preferentially, eat out just one
16 of the dielectrics.

17 And so that would remove that dielectric out of
18 the stack. So you basically have a sandwich with
19 basically nothing in between kind of slices of
20 bread.

21 And then after you removed it, you would
22 introduce a gas that would literally kind of deposit
23 metal kind of on the slices of bread, and it would
24 continue to grow until you completely filled up
25 those empty spaces between the other dielectric.

1 And that thing would be the gate replacement.

2 Typically, you would deposit a conductor in
3 there, and that would become the control gate or the
4 word lines in the NAND flash memory.

5 It is really quite amazing that that works. It
6 is, I think, one of the miracles of semiconductor
7 manufacturing; but that does work, and it works
8 reliably.

9 BY MR. SAGDEO:

10 Q. You mentioned cutting a slice down that
11 stack.

12 When we're talking about, you know, a real NAND
13 flash device and not just, I guess, a sandwich, what
14 does that mean?

15 MR. CROSS: Objection. Form.

16 THE WITNESS: So there are probably many ways to
17 build or achieve that type of structure or form.
18 One way is you would actually etch. And so you
19 would etch through the vertical stack in order to
20 create -- and this is a word that is actually used
21 in the '806 patent.

22 It is sometimes called a "slit structure" --
23 sometimes called a "slit structure." People
24 sometimes call it different things, but that would
25 be the slit structure that is referred to in, for

1 example, the '806 patent.

2 BY MR. SAGDEO:

3 Q. Besides the slit structure, is there
4 anything else that you're aware that -- that
5 structure being called?

6 MR. CROSS: Objection. Form.

7 THE WITNESS: Sometimes those are called -- in
8 the prior art, sometimes those are also called
9 "through array contacts" because a slit structure is
10 something that cuts all the way through the vertical
11 stack.

12 It also happens to be a very convenient way to
13 make a electric connection through the entire sort
14 of dielectric stack. And that stack is a stack of
15 memory cells. And so a lot of times people will use
16 that to make a through array contact.

17 BY MR. SAGDEO:

18 Q. Are these -- what you're describing, are
19 they sort of alternative ways of making -- doing
20 that gate replacement process? Do you have to use
21 both?

22 MR. CROSS: Objection. Form.

23 THE WITNESS: So let me rephrase -- or let me
24 state my understanding of your question, and I will
25 then try to answer it.

1 So in a gate replacement process, is it
2 necessary to use a slit structure or a through array
3 contact in order to perform the gate replacement
4 process? Was that your question?

5 BY MR. SAGDEO:

6 Q. Yes. And in particular, do you have to use
7 one or the other? Or could there be a third option?

8 MR. CROSS: Objection. Form.

9 THE WITNESS: There could be lots of different
10 options, yes. There could be lots of different
11 options.

12 So, if we're talking just broadly about 3D NAND
13 flash technology, there could be many different
14 options.

15 Sometimes people don't call them slit
16 structures. Sometimes they call them something
17 else. Sometimes people can use a through array
18 contact. I believe people can use all sorts of
19 different types of structures, but the basic
20 function of that structure, whatever you want to
21 call it, is to allow access for dopants -- or not
22 dopants, etchants to get in to remove the
23 sacrificial gate and allow access for the deposited
24 material to go into the void that was left behind by
25 removing that sacrificial gate dielectric.

1 So I think that whatever you call it, you need
2 something like that to help perform.

3 Now, is there a way of doing it without it? I
4 suppose; right? People are very inventive. They
5 come up with new ideas. But those -- that is
6 roughly the way I understand that it is done -- is
7 by providing some access point, whatever you want to
8 call it. You allow etchants to go in and the
9 material you want to replace it with to go in as
10 well.

11 MR. SAGDEO: I have uploaded a document to the
12 chat. It is actually uploading. It is a bit bigger
13 than the last one -- a document that I have called
14 Exhibit 9. Dr. Yang, can you open up that exhibit.

15 (Exhibit 9 was marked for
16 identification.)

17 THE WITNESS: Yes.

18 BY MR. SAGDEO:

19 Q. Do you recognize Exhibit 9?

20 A. Yes. From the face of it, it says it's a
21 patent application by Toyama, and I believe that
22 this is the same patent application that was used by
23 the petitioner in this IPR.

24 Q. Have you read the Toyama reference before?

25 A. Before what?

1 Q. Before just now.

2 A. Oh, yes. Oh, I mean -- I don't know.

3 Before this IPR? No. But, yeah, before this --
4 before this depo, yes.

5 Q. Okay. Got it.

6 Would you say that you understand the Toyama
7 reference?

8 A. I believe I have an understanding of the
9 Toyama reference. I won't say that I one hundred
10 absolutely completely understand every aspect of it.

11 Q. Are you familiar with Toyama's -- sorry. I
12 didn't want to cut you off. Go ahead.

13 A. So, for example -- I studied, for example,
14 the particular references that the petitioner
15 referenced a great deal. The two enablements, which
16 are the first exemplary structure. I think I got
17 that right. And the other one -- well, I know them
18 by their abbreviations FES, and the second one is a
19 second modification, I think, of the fourth. But I
20 just call it SM for second modification.

21 But those are the two that I referred to
22 specifically. So those are the ones that I studied
23 more carefully than the others.

24 Q. So how does gate replacement work in
25 Toyama's first exemplary structure?

1 MR. CROSS: Objection. Form.

2 THE WITNESS: Would you -- I just want to make
3 sure I'm getting the right exemplary structure.

4 Would it be possible to see my declaration or to
5 see Dr. Lee's declaration? I just want to make sure
6 I'm looking at the right structure that's being
7 referred to as the first exemplary structure.

8 MR. SAGDEO: Sure. Let's see if I can find that
9 for you. In the meantime, feel free to review the
10 reference itself.

11 THE WITNESS: Yes.

12 MR. SAGDEO: So, Dr. Yang, I've uploaded to the
13 chat a document I've marked as Exhibit 10, which I
14 will represent is Dr. Lee's IPR declaration in
15 IPR2024-00791.

16 (Exhibit 10 was marked for
17 identification.)

18 THE WITNESS: Your question was about the first
19 exemplary structure; correct?

20 BY MR. SAGDEO:

21 Q. Correct.

22 A. Okay. I believe I am familiar with this
23 structure. And then your question was how does the
24 gate replacement process work in the first exemplary
25 structure?

1 Q. Correct.

2 A. Okay. There's so many ways -- different
3 ways to do it. I now need to look at the body of
4 the text to make sure I have the exact understanding
5 of how that's done.

6 Unfortunately, the document that you gave me --
7 or no, it is -- no. It is fine. Sorry. It is a
8 large patent, as you know.

9 Q. Take your time.

10 A. Okay. Can I write some notes down on a
11 piece of paper so I can refer to where certain
12 things appear when I give you my answer.

13 Q. Sure. We just ask that we get a copy of
14 those notes as an exhibit or supplement to the
15 record, if that works?

16 A. Sure. I will put it up, or I can send you
17 a picture of it.

18 Q. Sounds good.

19 A. Does that work? It's just that this is
20 such a huge patent. I want to be precise about
21 which references say what.

22 Q. Okay.

23 A. Okay. Could you repeat your question one
24 more time to make sure the answer that I was
25 planning to give you answers your question.

1 Q. How does gate replacement work in Toyama's
2 first exemplary structure?

3 MR. CROSS: Objection. Form.

4 THE WITNESS: Okay. Roughly, the way that the
5 gate replacement process works in Toyama's first
6 exemplary structure requires you to look at the
7 exact processing sequence that's described in the
8 patent.

9 And when you look at this patent or patent
10 application, I'm sorry, you can see that this is --
11 you would understand that the step that where this
12 is starting to happen is happening in Figure 9A, and
13 you can see this in paragraph 0199 -- is where
14 they're starting to describe this.

15 So if you look at Figure 9A -- it is a big
16 patent. You have to go back and forth a lot.

17 So, if you look at Figure 9A -- 9A, 9B, 9C, they
18 are related, apparently. Then you can see that --
19 it is a rather complicated structure. So that's why
20 I need to check and make sure how they're doing it,
21 but they're doing the gate replacement process for
22 the upper deck and the lower deck at the same time.

23 And so they've opened clearings, and they are
24 going to replace the sacrificial gate dielectric,
25 both the upper and lower deck at the same time.

1 And so the upper deck is -- I don't know if
2 that's what they use, but that's what a POSITA would
3 call it. The upper deck would be considered the
4 dielectric, the stack in the 265. And the lower
5 deck would be considered the stack kind of at the
6 level of the 165 dielectric.

7 And so those sacrificial gate dielectrics are
8 being replaced with a conductive or through some
9 slits or via channels.

10 I don't know exactly the terminology that they
11 used; so let me see the exact terminology they use,
12 which I can find in paragraph 099 -- 0199.

13 (Reporter Clarification.)

14 THE WITNESS: Yeah. That's roughly my imprecise
15 -- just POSITA speaking about the technology. I
16 want to use the exact wording from the patent. So I
17 will find their exact wording.

18 They call them just "second-tier memory openings
19 extending through the second tier structure (232,
20 242, 270) are formed areas overlaying the
21 sacrificial memory fill portions 131."

22 They don't say it there. So I am going to have
23 to try another way to find the exact word that they
24 use.

25 It is a weird name. This is really

1 inconvenient. I am spending a huge amount of time
2 trying to go from the description to the diagram and
3 description to the diagram. Is there some way that
4 I can try to open a picture of the diagram and read
5 the text at the same time without having to flip
6 back and forth?

7 BY MR. SAGDEO:

8 Q. Yeah. That's fine, from my perspective.

9 A. Okay. So, if you don't mind, can I open it
10 on my iPad and look at the figure and then and read
11 the description because it's a little bit confusing
12 to see exactly what it is they're using to get the
13 dopants in or the etchings in.

14 Q. Okay.

15 A. Okay. This was Exhibit 9; right?

16 Q. Right.

17 A. I will try to move this over to my iPad.
18 Okay. I think I have all this stuff now lined up;
19 so I think I can give you a complete answer. It
20 took a while to get all this in the right place with
21 all the right notations.

22 So I forgot where I left off my answer. If you
23 want to ask the question again, I can try to answer
24 it in totality.

25 Q. Sure. How does gate replacement work in

1 Toyama's first exemplary structure?

2 MR. CROSS: Objection. Form.

3 THE WITNESS: In Toyama's first exemplary
4 structure, it is shown clearly in Figure 17A -- or
5 in Figure 17, which is a lot of the figures that are
6 used by the petitioner. And in order to understand
7 how it's formed, you need to go back to the patent
8 and look carefully and read carefully the patent.

9 But the patent seems to be describing the
10 processing sequence, which occurs in the earlier --
11 which is shown in the earlier figures.

12 Perhaps one of the earliest figures is Figure
13 9A, and this shows that the stack is composed of
14 132, 142 for the lower deck. And 132 and 142 are
15 both insulating layers. 142 is actually known as a
16 sacrificial layer, and for the upper deck, it is
17 known as 232 and 242. And 242 would be the
18 sacrificial layer.

19 And so the processing occurs from Figure 9. And
20 so the channels are formed -- different things are
21 formed. And, basically, the key step in the gate
22 replacement process occurs right at -- between
23 Figure 14A, B, C and Figure 15.

24 And you can tell that the gate replacement has
25 happened when you compare Figure 14 to Figure 15.

1 You can see that the -- that they made a typo. But
2 you can see that the picture for the sacrificial
3 layer 142 has -- or 142 has been replaced by 146.
4 So that would be the gate replacement.

5 And this is the difference in Figure 15 to 14.
6 And that gate replacement was done by introducing
7 etchants, which are described in 0223, paragraph
8 0223. And those etchants were introduced to remove
9 the sacrificial layer through a passageway that's
10 called the backside contact trench 79, and I believe
11 that you can see 79 clearly in Figure 14C. And that
12 is the pathway that was used to remove the
13 sacrificial gate dielectric and introduce the
14 replacement gate, more conductive material into that
15 hole.

16 Subsequently, that trench was -- that 79 have to
17 be etched out because what happens, when you do gate
18 replacement process, is that you get metal not only
19 into the -- in between the slices of the bread, but
20 you get it also lining your trench.

21 So what happens is that metal is all shorted
22 together. And so that trench needs to be cleared
23 out. When you clear that trench, you release all
24 the word lines from being electrically shorted to
25 each other.

1 And then after you do that, you replace -- you
2 need to fill that trench with a liner, and I believe
3 the liner there is 74, and then you can backfill
4 that trench with a piece of metal. And that trench
5 could then act conveniently as an electrical contact
6 down through the whole upper deck and lower deck.

7 And that liner 74 is called liner, sometimes
8 called dielectric layer. It is actually also
9 present in the '086 patent. It is actually
10 mentioned specifically as dielectric layer 1008. I
11 believe you can see in Figure 10 of the '806 patent,
12 and that's exactly the same liner there as -- or it
13 serves the same function as the liner 74 in Toyama.

14 And I think that's a pretty good indication
15 that, in the '806 patent, they knew of these liners,
16 and they've distinguished -- they made a very
17 distinguishing sort of reference that the liner is
18 different than the dielectric structure of the '806
19 patent. So just sort of one ties them back
20 together.

21 BY MR. SAGDEO:

22 Q. One thing you mentioned, I think, is that
23 Element 74 -- was it? -- was what allowed the metal
24 to get into the alternating stack. Is that right?
25 I am sorry. I might have misstated that. 79 --

1 A. Yes.

2 Q. Backside contact trench 79.

3 So is it accurate to say that that backside
4 contact trench 79 is what becomes the slit
5 structures?

6 A. I believe that there's a great deal of
7 similarity between the backside contact trench 79 of
8 Toyama and the slit structures that are sometimes
9 referred to in other NAND flash references, yes.

10 Q. I guess to zoom out a little bit, it seems
11 to me -- and correct me if I'm wrong -- that
12 Toyama's first exemplary structure does gate
13 replacement using the slit structures?

14 A. I believe that it uses slit structures, but
15 I probably need to look more carefully again to see
16 that -- whether it's being used in other places. If
17 you give me a moment, I will make sure that that --
18 I believe that it is also used in another place as
19 well. But I'd like to have some time to just make
20 sure and look at the figures again very carefully.

21 Q. Sure.

22 A. Okay. So I have confirmed that the
23 backside -- or that the gate replacement process is
24 actually accessing the sacrificial layers and
25 depositing replacement not only through those

1 backside contact trenches, but it is also doing this
2 through what is called "through a memory-level
3 openings 679." And that can probably be more
4 clearly seen in Figure 47A. And Figure 47A leads up
5 to the Figure 49, which is the figure that the
6 petitioner uses in making some arguments.

7 So it's important to understand where figure --
8 how Figure 49 -- how that structure was made to
9 understand how things were used and -- especially if
10 you wanted to understand whether a modification to
11 it was possible to manufacture.

12 And so in looking at that and when you refer to
13 Figure 47A and B, this is -- you can find
14 particularly this quote in paragraph 0337, and it
15 says, "Subsequently" -- it says somewhere in the
16 middle of the paragraph. I'll just read the
17 relevant sentence, "Reactants can be introduced
18 through the backside contact trenches 79 and the
19 through-memory-level openings 679 to deposit the
20 electrically conductive layers (146, 246)."

21 So I think this is the relevant statement that
22 the gate replacement process is occurring through
23 the whole 679 as well as through 79.

24 And so a person of ordinary skill in the art
25 would understand that the gate replacement process

1 is performed by not only through a backside trench
2 but also this -- let me get the word right --
3 through-memory-level openings 679.

4 Q. Do you recall that my question was about
5 the gate replacement process in the first exemplary
6 structure?

7 A. Yes.

8 Q. Is what you mentioned in the paragraphs you
9 mentioned and the figures you mentioned, and that's
10 not related to the first exemplary structure?
11 Right?

12 MR. CROSS: Objection. Form.

13 THE WITNESS: I believe it -- oh, yes. Yes, I
14 take that back. Between the first exemplary
15 structure and the second modification, yes, I stand
16 corrected.

17 The Figure 49 I thought was representative of
18 the first exemplary structure. So this is why I was
19 going back to Dr. Lee's report. I see that what I
20 was discussing was talking about the second
21 modification of -- I forgot. Second modification or
22 the fourth, whatever -- the second modification,
23 which is shown in Figure 49, which is what is being
24 referred to in Dr. Lee's declaration.

25 So, yeah, I made a mistake. I thought that that

1 was the first exemplary structure. That's the
2 second modification.

3 BY MR. SAGDEO:

4 Q. Okay. Let me re-ask my original question,
5 then.

6 A. Okay.

7 Q. In the context of Toyama's first exemplary
8 structure, the gate replacement is done using the
9 slit structures; right?

10 A. Could you repeat your question one more
11 time.

12 Q. In the context of first exemplary -- strike
13 that.

14 In the context of Toyama's first exemplary
15 structure, the gate replacement process is done
16 using the slit structures; right?

17 MR. CROSS: Objection. Form.

18 THE WITNESS: In the specifications of the
19 Toyama patent application, the gate replacement
20 process is performed through the backside trenches.

21 79 is the particular element whose function is
22 described; however, the patent application seems to
23 be silent about whether other access structures or
24 other types of structures are being used as well.

25 They seem to primarily be focused about the gate

1 replacement process near the staircase structure
2 only.

3 BY MR. SAGDEO:

4 Q. So you mentioned backside trenches 79.
5 Would you say that that is an -- or strike that.

6 Would you say that backside trenches 79
7 ultimately become the first exemplary structure's
8 slit structures?

9 MR. CROSS: Objection. Form.

10 THE WITNESS: I would say that the backside
11 contact trench 79 shares similarities to what other
12 3D NAND flash processes would call their slit
13 structure; however, the Toyama patent application --
14 the Toyama patent application is primarily focused,
15 in this particular portion, to talk about the gate
16 replacement in and near the staircase region.

17 And so there might be other structures just not
18 talked about, but a person of skill in the art would
19 know you may need other structures in order to make
20 sure that the gate replacement process happened
21 manufacturably, meaning reliably and with good
22 yield.

23 BY MR. SAGDEO:

24 Q. What other structures would you need?

25 A. So I think the other structures you might

1 need --

2 MR. CROSS: Objection. Form.

3 THE WITNESS: Right. The other structures you
4 might need is you might need some additional larger
5 access points, intermediate access point. And I
6 think a good example of that is the second
7 modification that I talked -- that was mentioned by
8 Dr. Lee, where second modification, I guess, the
9 fourth embodiment. But basically you are using 679
10 to provide additional access to make sure the gate
11 replacement process happens reliably.

12 BY MR. SAGDEO:

13 Q. Can you point to any structure besides
14 backside contact trenches 79 that provide access for
15 gate replacement in Toyama's first exemplary
16 structure?

17 A. No, I cannot because Toyama's first
18 exemplary structure and description is focused near
19 the staircase region. And so I guess that they felt
20 that that would be good enough with just the
21 backside trench structures.

22 But perhaps more in the middle of the array,
23 further away from the trench -- from the staircase
24 region, they felt that maybe other structures might
25 be useful to have, as they described, for example,

1 in their second modification as shown in Figure 49
2 in Toyama.

3 Q. Well, Dr. Yang, I think I'm asking you a
4 yes-or-no question. Can you point to any structure
5 besides backside contact trenches 79 that provide
6 access for gate replacement in Toyama's first
7 exemplary structure?

8 MR. CROSS: Objection. Asked and answered.

9 BY MR. SAGDEO:

10 Q. I did not get a yes-or-no answer, and I
11 think --

12 MR. CROSS: Yes, you did.

13 BY MR. SAGDEO:

14 Q. -- I am entitled to one.

15 Dr. Yang, can you answer that question with a
16 yes or no?

17 MR. CROSS: Asked and answered.

18 THE WITNESS: I think I've already answered it.
19 I believe that, if you look at the literal written
20 description of the Toyama, you won't find anything
21 specifically referencing the first exemplary
22 structure. But I believe, as I mentioned, that's
23 because the first exemplary structure is focused on
24 the staircase region.

25 And I believe that a person of skill in the art

1 would understand that it might be wise, beneficial,
2 enhance yield manufacturability by including other
3 structures to help in the gate replacement process.

4 BY MR. SAGDEO:

5 Q. Can you state in one word, yes or no,
6 whether Toyama discloses any structures besides
7 backside contact trenches 79 that provide access for
8 gate replacement in Toyama's first exemplary
9 structure?

10 MR. CROSS: Objection. Form. Asked and
11 answered.

12 THE WITNESS: I think I have already answered
13 it. I will try to answer it again. Toyama's first
14 exemplary structure shows backside contact trenches
15 because it is primarily focused on the staircase
16 region where the backside contact trenches might be
17 very effective.

18 However, a person of skill in the art might
19 understand that additional structures might be
20 necessary to do the gate replacement process
21 efficiently, effectively with high yield in regions
22 further away from the staircase structure.

23 BY MR. SAGDEO:

24 Q. So is your answer yes? Or is it no?

25 MR. CROSS: Objection. Asked and answered.

1 This is the fourth time you've asked this question,
2 Parth. I think you should move on.

3 THE WITNESS: I think I've answered it.

4 BY MR. SAGDEO:

5 Q. So is your answer yes or no?

6 MR. CROSS: Objection. Asked and answered.
7 We're getting to the point where this is badgering.

8 BY MR. SAGDEO:

9 Q. I just want one word. Dr. Yang, are you
10 not able to provide one word?

11 MR. CROSS: Parth, we can take this off the
12 record, or we can keep it on the record, up to you.
13 But you are allowed to ask the questions. You are
14 not allowed to a particular type of answer. He has
15 answered your question.

16 MR. SAGDEO: If Dr. Yang doesn't think my
17 question can be answered in one word, he can say so.
18 He hasn't said that, has he?

19 MR. CROSS: He has given an answer over and
20 over.

21 MR. SAGDEO: He hasn't answered my question. I
22 am entitled to an answer to my question. I asked
23 the question that can only be answered with a yes or
24 a no. I haven't gotten a yes or a no.

25 MR. CROSS: Just because it can be answered with

1 a yes or a no doesn't mean he has to give a yes-or-a
2 no answer.

3 MR. SAGDEO: Yes, it does.

4 MR. CROSS: No, it doesn't.

5 MR. SAGDEO: I asked for a yes or a no, and
6 those are the only acceptable answers.

7 MR. CROSS: Those are not the only acceptable
8 answers. I am sorry. You are not entitled to the
9 answers you want, Parth.

10 BY MR. SAGDEO:

11 Q. Let me try.

12 Dr. Yang, can you point to anything in this
13 specification -- or strike that.

14 Dr. Yang, please point to a paragraph or a
15 figure in the specification that discloses in the
16 context of the first exemplary structure access for
17 gate replacement through something other than
18 trenches 79?

19 MR. CROSS: Objection. Form.

20 THE WITNESS: We're getting down to mincing
21 words. So could you repeat that again. I'm not
22 sure I heard the entire question.

23 BY MR. SAGDEO:

24 Q. Please point to a paragraph or a figure in
25 the specification that discloses in the context of

1 the first exemplary structure access or gate
2 replacement through something other than backside
3 contact trenches 79?

4 MR. CROSS: Objection. Form.

5 THE WITNESS: So let me try to answer this once
6 again.

7 Within the literal descriptions of the Toyama
8 patent application, with respect to literally
9 speaking the first exemplary structure, the backside
10 contact trench is described as the -- what should we
11 call it? -- the via hole or the via passageway for
12 doing gate replacement.

13 The first exemplary structure of Toyama focuses
14 on the region near the staircase structure. So a
15 person of skill in the art would understand that the
16 backside contact trench might be sufficient to
17 perform gate replacement in that area.

18 However, a person of skill in the art -- and who
19 wanted to make sure his company didn't go
20 bankrupt -- might carefully consider the use of
21 other structures to make sure the gate replacement
22 process happened effectively in other areas away
23 from the staircase structure.

24 (Reporter request.)

25 THE REPORTER: The time is 3:41 p.m. We are

1 going off the record.

2 (Recess.)

3 THE REPORTER: The time is 3:51 p.m., and we
4 back on the record.

5 (Exhibit 11 was marked for
6 identification.)

7 BY MR. SAGDEO:

8 Q. Welcome back, Dr. Yang. I have uploaded to
9 the chat a document that I've marked Exhibit 11.
10 Could you let me know when you have that open?

11 A. Can I close out the other documents or --

12 Q. Sure.

13 A. Okay. And then what should I do with my
14 piece of paper that I have written on?

15 Q. Why don't you just take a picture of it,
16 and if you could send it to Allen, and he can
17 forward it to us?

18 A. Okay. At the end of the --

19 Q. Yeah.

20 A. At the end of the deposition?

21 Q. That's fine.

22 A. Okay. So I am going to tear the page out
23 and put away the pad of paper.

24 MR. CROSS: Do you want to mark it as an
25 exhibit, Parth, or --

1 MR. SAGDEO: Sure. We will mark it as
2 Exhibit 12 just as a placeholder.

3 THE WITNESS: Should I write it on the document?

4 MR. SAGDEO: Sure.

5 (Exhibits 12-13 were marked for
6 identification.)

7 THE WITNESS: I'll set this aside.

8 BY MR. SAGDEO:

9 Q. Actually, I realized I meant to -- oops.

10 A. Exhibit 11?

11 MR. SAGDEO: I am uploading to the chat a
12 document I have marked as Exhibit 13. And, Dr.
13 Yang, if you could close out of Exhibit 11 but open
14 up Exhibit 13.

15 THE WITNESS: Okay.

16 BY MR. SAGDEO:

17 Q. Dr. Yang, do you have Exhibit 13 open?

18 A. Yes, I do.

19 Q. And what is Exhibit 13?

20 A. A really bad copy of the '806 patent.

21 Q. Is it --

22 A. It is very unclear on my screen the images
23 and things. But, yeah, maybe that is --

24 Q. I can look for a better copy, but is it
25 legible? Are you able to read it right now.

1 A. It is getting better. It is slowly
2 resolving and getting better resolution. So, yeah,
3 it seems to be okay now.

4 Q. Could I have you turn to Figure 1A?

5 A. Yes.

6 Q. What is Element 126 in this figure?

7 A. So, if I can get the exact words, the words
8 they use for 126 in Figure 1A is "TAC structure."

9 Q. Do you see a gray box surrounding the TAC
10 structures 126 in Figure 1A?

11 A. Are you referring to Element 120.

12 Q. Right. So what is Element 120?

13 A. I want to make sure I get the exact word
14 right. 120 is referred to as TAC region.

15 Q. What is the composition of the material in
16 TAC region 120?

17 A. Well, you would have to read the context of
18 the '806. And, for example, this basically says,
19 "TAC region 120 in dielectric structure 124."

20 So you would understand that the TAC region is
21 inside the dielectric structure 124.

22 Q. What are Elements 22 -- sorry, strike that.
23 What are Elements 122?

24 A. They are called dubbing channel structures,
25 non-electrically functional channel structures.

1 Q. And do you see Elements 112?

2 A. Yes.

3 Q. What are those?

4 A. Just let me make sure, those are referring
5 to NAND strings.

6 Q. I know it is not directly shown, but is
7 there an alternating stack underneath what we see in
8 Figure 1A?

9 MR. CROSS: Objection. Form.

10 THE WITNESS: Within the context of the '806
11 patent and reading everything, a person of skill in
12 the art would understand that the channel is --
13 could you repeat your question again so I get the
14 wording exactly right?

15 BY MR. SAGDEO:

16 Q. Is there an alternating stack underneath
17 the view in Figure 1A?

18 A. Within the context -- a person of skill in
19 the art, reading the '806 patent, would understand
20 that the channel structure was built into an
21 alternating conductor dielectric layer stack in
22 order to form the channel structure, and that can be
23 seen as kind of a representative cross-section of
24 what that channel structure might look like in
25 Figure 2.

1 Q. Got it. So, if we sort of tunneled our way
2 into the page, so to speak, we would encounter some
3 alternating layers of dielectric and conductor in
4 Figure 1A; is that right?

5 MR. CROSS: Objection. Form.

6 THE WITNESS: Yes. As much as Figure 1A
7 represents kind of the final structure, not just the
8 layout, but if it was representative of a schematic
9 of the final structure, yes, that's what you would
10 find.

11 BY MR. SAGDEO:

12 Q. So this alternating stack that we've been
13 talking about, does it comprise of gate layers?

14 A. Could you be a little bit more specific
15 about what you mean by "gate layer"?

16 Q. Well, let me ask you: What -- in sort of
17 the field of flash memory, in the field of the '806
18 patent, does the term "gate layer" mean anything?

19 A. Gate layer can mean many different things
20 to a person of skill in the art in manufacturing.
21 But in the '806 patent, I'm not aware that the gate
22 layer is specifically used. I think I know what
23 you're talking about, but I'm just trying to be very
24 careful with how I use words here. That's all.

25 Q. If I were to ask you sort of in the

1 context -- and I am using the word -- or the term
2 "gate layer" and I wanted to ask you: Does the '806
3 patent have gate layers? How would you respond to
4 that?

5 MR. CROSS: Objection. Form.

6 THE WITNESS: So, if this was a conversation of
7 POSITA-to-POSITA, I think that we could understand
8 that gate layer -- something like a gate layer is
9 present certainly in the '806 patent. That would be
10 basically that conductor layer that was placed and
11 is acting as the gate of the memory cells in the
12 NAND channel.

13 However, within the context of this deposition
14 and these proceedings, we do have to be careful
15 about words. And specifically the exact words "gate
16 layer" were never used to refer to this layer in the
17 '806 patent, although I think a person of skill
18 would understand that that is a layer because you
19 replaced it and that is being used as a gate like a
20 word line, but those specific words weren't used in
21 the context of the patent. So just have to be
22 careful. That's all.

23 BY MR. SAGDEO:

24 Q. Is it fair to say that the term "conductor
25 layer" in the '806 patent is in some ways synonymous

1 with gate layer because the conductor layer is being
2 used as gates for the various NAND strings?

3 MR. CROSS: Objection to form.

4 THE WITNESS: Yes. That's roughly what I said:
5 If it was just a POSITA to POSITA having sort of a
6 discussion in the hallway of the lab or the factory.

7 However, in the context of this discussion,
8 specifically just want to be very careful about how
9 I use that word because it appears as -- it doesn't
10 appear specifically as gate layer in the '806
11 patent. That's all.

12 BY MR. SAGDEO:

13 Q. Is it fair to say that Figure 1A is sort of
14 bird's eye view of a memory device or at least part
15 of a memory device?

16 A. Yes. Bird's eye view means a top-down
17 look. It's kind of like what you would look at if
18 you were designing the masks and you were processing
19 the chip. So, if the wafer were kind of on the XY
20 plane, this would be sitting the Z direction above
21 looking down. So, yes, a bird's eye view is an
22 accurate representation of what it is.

23 Q. And as we're looking at Figure 1A, what
24 parts of that figure have a conductor layer
25 underneath what we see actually depicted?

1 MR. CROSS: Objection. Form.

2 THE WITNESS: I think it is difficult to say
3 what the absolute final structure of the device is
4 because the '806 patent only talks about some
5 embodiment. And so you don't know what the actual
6 final embodiment of everything is.

7 It also depends on how far in depth you want to
8 consider below; right? Is it just, like, a couple
9 of microns below? Is it, like, 10 microns below?
10 Is it, like, one foot below of what we're looking
11 at. So I don't know how far below you want to
12 consider.

13 But I think that it is apparent that, at least
14 in Figure 1A, there seems to be some type of
15 conductive gate structure -- that conductive gate
16 layer -- that conductive layer, which was that
17 replacement gate, in probably everywhere except 120.

18 Now, what happens below 120, it is hard to say.
19 What happens above this layer that we're looking at
20 is also difficult to say because, above this layer,
21 this is -- there's actually -- sitting above where
22 the bird might be is actually interconnect
23 structures.

24 And so, you know, you are kind of looking at a
25 slice and then looking at the top view. Does that

1 make sense?

2 BY MR. SAGDEO:

3 Q. Yeah. I think, you know, if I'm -- if I'm
4 understanding correctly, you're saying that the
5 conductive layers are not going to be within 120; is
6 that right?

7 A. They're not going to be within 124 at
8 least, where 124 is a dielectric structure.

9 I think that 120 is the TAC region, which can be
10 defined within the dielectric structure 124. So I
11 would say those conductive layers are not coincident
12 with 124.

13 I don't know what happens below the dielectric
14 structure. If this is the invention, then we know
15 there's an isolation structure underneath that.

16 But underneath that, there's going to be
17 something else, and I think that that's left
18 unspecified by the patent.

19 In addition, above 124 the dielectric structure,
20 there's going to be additional things such as
21 interconnects, electrical contacts, and things like
22 this.

23 So, you know, yes, when you said it's a bird's
24 eye view, it is kind of -- if I sliced it and threw
25 away the top part and looking at this, that will be

1 correct. But you do have to consider that there
2 might, in the final structure, other stuff above
3 what we're looking at here.

4 Q. What's the purpose of these conductor
5 layers that we're talking about in the context of
6 the device as a whole?

7 A. Which conductive layers were you talking
8 about or referring to, just to be clear?

9 Q. Well, I think the patent refers to it at
10 times as conductor layer 206.

11 A. Yeah. Conductor layer 206, those would be
12 that conductive layer that replaces the sacrificial
13 dielectric and that acts as the control gates for
14 the NAND channel memory.

15 Q. Why do we need control gates in a NAND
16 memory?

17 A. If you don't have a control gate, you won't
18 have formed kind of a storage cell -- storage cell
19 transistor. So the gate acts as the gate of the
20 transistor that's in the channel.

21 Q. Is it -- strike that.

22 When we're talking about reading or writing to
23 those NAND strings we talked about, the transistor
24 you just mentioned, what purpose does that conductor
25 layer serve?

1 A. Electrical purpose, functional purpose as
2 functioning for a memory or which --

3 Q. Let's start with the functional purpose.

4 A. Okay. The functional purpose and the
5 electrical purpose, it provides -- the connective
6 layer allows you to apply a voltage on the gate of
7 the transistor that's being effectively formed in
8 the NAND memory channel.

9 And that gate voltage allows you to either read
10 the value that's stored in that NAND memory cell --
11 in that memory cell, or it also allows you to erase,
12 and it can also allow you to possibly program that
13 cell depending upon the voltages that you apply on
14 the other parts of the NAND channel.

15 Q. How does the signal, if you will, that --
16 to do all of those functions, reading or
17 programming, how does that signal get to the
18 conductor layer?

19 A. There is a contact -- go ahead. Sorry.

20 MR. CROSS: Objection. Form.

21 THE WITNESS: Those control gates are basically
22 going to be electrically contacted probably in some
23 kind of staircase region, and they'll be sort of
24 interconnects that will connect to other parts of
25 the memory device, which generate the appropriate

1 bias voltage so that the right voltage will be
2 applied on that gate.

3 BY MR. SAGDEO:

4 Q. Turning back to Figure 1A, does that figure
5 show the staircase that you're talking about?

6 A. It shows one level of a staircase.

7 Q. And how does the signal travel through
8 Figure 1A?

9 MR. CROSS: Objection. Form.

10 THE WITNESS: So one of the signals -- there are
11 many of these gates, but the very top one is called
12 the top select gate. That's the topmost gate in the
13 NAND channel -- is its -- the signal to that top
14 select gate is coming through what's labeled as 132.

15 132 is an electrical contact that is called the
16 TSG contact. TSG, I believe, stands for top select
17 gate.

18 And so an electrical signal is coming in there
19 through the top select gate, TSG 132. It is
20 attached to the topmost layer, the layer closest to
21 the top of the channel. And it is basically -- if
22 it is a high voltage, it is allowing access to the
23 channel. If it is a low voltage, it is probably
24 shutting it off and making an open circuit.

25 So that's what's -- that is one of the signals

1 that's being put into the conductive layer.

2 BY MR. SAGDEO:

3 Q. So you mentioned the top select gate being
4 connected to the topmost layer. What about all the
5 other layers? How are they electrically connected
6 to a signal?

7 A. Well, usually -- there could be other ways
8 to do it, but usually this is done in a structure
9 that's kind of like what's shown in Figure 1C. And
10 in Figure 1C, you will see this is the same array,
11 but we're looking now at the edge of the array in
12 what is primarily known as the staircase region.

13 And so every one of those little lines that kind
14 of pass through are different levels of the
15 staircase.

16 And so those contacts that are there on the left
17 are contacting all the different levels within that
18 conductive -- within that stack of conductor
19 dielectric layers.

20 So, if there are 96 layers, there's probably at
21 least 95 of those steps because one step was done in
22 Figure 1A.

23 Q. So turning back to Figure 1A, I guess,
24 would those staircase regions be -- I guess where
25 would those staircase regions be in relation to

1 Figure 1A?

2 A. In Figure 1A -- in relation to Figure 1A,
3 those staircase regions would probably occur either
4 to the left or to right of Figure 1A.

5 Q. Could it be both?

6 A. Sure. It could be both. It is a design
7 choice.

8 Q. In the event that, let's say, the staircase
9 region is just to the left of Figure 1A, how does
10 the signal, I guess -- from those vias that you
11 mentioned -- get to the right part. And in
12 particular, how do they get to region 110 on the
13 right?

14 MR. CROSS: Objection. Form.

15 THE WITNESS: Right. The vias that you are
16 talking about, which vias are you talking about? If
17 you are talking about 132, the top select gate
18 contact? Or are you talking about the signal that's
19 coming in through perhaps the vias on the left
20 through the staircase region?

21 BY MR. SAGDEO:

22 Q. So the vias on the left through the
23 staircase region?

24 A. Okay. The vias on the left of the
25 staircase region are unfortunately unnamed in Figure

1 1C. But a person of skill in the art would know
2 there's something very similar to 132 in the vias in
3 the staircase region of Figure 1C.

4 And when they contact that electric -- that
5 conductive sheet -- that conductive sheet is like a
6 metal -- or it is a metal usually. It is like
7 tungsten. So when you touch it, the voltage, then
8 -- it is just a conductor. So it is just kind of
9 like it conducts the electricity. So that signal
10 goes through the conductive layer itself.

11 (Reporter Clarification.)

12 THE WITNESS: Yes. Vias as in plural of vias --
13 via.

14 BY MR. SAGDEO:

15 Q. And in this sort of -- in the case we're
16 talking about where the vias are on the left, does
17 that signal -- I guess in order to get from the left
18 off the page, if you will, on Figure 1A to the
19 right-hand region 110, I guess those signals would
20 pass around the dielectric structure 124; right?

21 A. Oh, I see. So you mean -- because there
22 are two 110s.

23 Q. Right.

24 A. Yeah. Regardless, it doesn't matter.
25 There's a conductive layer that still extends all

1 the way over from the left 110 all the way over to
2 the right 110. And you can see that it is still
3 contiguous because the slit structure, which is
4 shown as 114, don't quite hit the dielectric
5 structure 124.

6 So you can see that they are all electrically
7 connected there and they all kind of -- they form
8 one contiguous sheet. And so they can conduct the
9 same voltage, conduct the same signal from the left
10 to the right, from top to bottom, along that same
11 level.

12 Q. So you were referring to the slits -- are
13 you referring to the -- strike that.

14 You are referring to 114, which is the slit
15 structure; right?

16 A. I just want to make sure I spoke correctly.
17 Yes. Plurality of slit structures 114.

18 Q. Okay. And what about the conductor layers,
19 how do they -- how does their signal get across past
20 the dielectric structure 124?

21 A. Well, you would understand that -- if we
22 just took a look at this, you would understand that
23 there is going to be a conductive layer that's going
24 to be separated from a slit structure 114. There's
25 going to be an insulating liner between the two.

1 That's the liner 1,008, as described in the '806
2 patent. And so that liner is there.

3 So we have this conductive layer. If we just
4 take one layer of that dielectric conductor stack,
5 there's going to be one layer there. It is going to
6 be contiguous all the way from the left side of the
7 left of 110. It is going to be contiguous. It is
8 going to be extending from kind of that shaded
9 region of 110 to kind of the unshaded region of 130.
10 That is still contiguous. Those are still connected
11 together.

12 It is going to be contiguous all the way through
13 kind of that clear portion outside of 120. That is
14 all contiguous kind of sheet. And that is going to
15 be contiguous through 130 on the right and past 130
16 into the shaded sort of region of 110 and all the
17 way to the right side of 110.

18 That's all going to be kind of one literal sheet
19 of metal that is going to have holes punctuated in
20 it where all those NAND structures are.

21 But it is going to be like one sheet of metal.
22 And that same -- it's like one sheet of metal. It's
23 got the big hole in the middle of it where 124 is,
24 but it is still going to be even conducting down to
25 the bottom right corner of the area 110 above where

1 the slit structure is in the bottom right.

2 Q. It seems like, based on what you've
3 described, that there would be, in essence, a
4 restriction in the path of the conductor layer as it
5 essentially squeezes by the dielectric structure; is
6 that right?

7 MR. CROSS: Objection. Form.

8 THE WITNESS: I think it's fair to say that
9 probably the resistance in going from left to
10 right -- the electrical resistance -- the resistance
11 of the flow of the signal from left to right, as you
12 go, is going to be a little bit higher as we pass
13 the dielectric structure 124. So as you go through
14 that conductive layer from left to right, it is
15 going to be a little bit lower.

16 And so it would be an issue for a person of
17 skill in the art to design that properly, not to be
18 too narrow and to have sufficiently low resistance
19 so the signal could propagate effectively.

20 BY MR. SAGDEO:

21 Q. Would that be something that a person of
22 skill in the art could have done to design it such
23 that it remained electrically functional?

24 MR. CROSS: Objection. Form.

25 THE WITNESS: It's something that can be done,

1 but it is going to require sort of careful
2 balancing, careful tradeoff.

3 So you may have to make things larger. You may
4 have to make the dielectric smaller. You are going
5 to have to carefully consider how many NAND strings
6 are on the left of 110 and how many on the right in
7 110 because it is also a function of how long that
8 is and how large the capacitive is.

9 And so it is a formula. It is doable, but it
10 is -- I don't think it is completely straightforward
11 and requires some careful considerations.

12 BY MR. SAGDEO:

13 Q. What do you mean by "it is doable"?

14 A. Clearly, in the '806, they figured out an
15 appropriate balance for how to do it in order to get
16 things to function properly for their particular
17 implementation.

18 For another implementation, there may be other
19 details, and so you have to carefully consider it.
20 And it may consider significantly more
21 modifications.

22 But if you were -- so I think that it is
23 possible to do almost anything. Whether it is a
24 good idea or a bad idea it's probably another issue,
25 meaning whether it actually gives you an effective

1 or useful result is another question.

2 Q. You mentioned a few variables -- I will
3 characterize it and let me know if this is not
4 accurate -- things like the number of NAND strings
5 on the left and the right, how exactly big the
6 dielectric structure is and so forth.

7 Is it fair to say that these are sort of
8 variables that a person of skill would work with to
9 -- and essentially tweak to make sure that the
10 device works as intended?

11 MR. CROSS: Objection. Form.

12 THE WITNESS: I think that the design of
13 something, in order for it to be effective, is
14 something that is wholistic.

15 And so there are many factors that need to be
16 considered. Some of the factors that you mentioned,
17 also the manufacturing process, the details of how
18 it is manufactured, those things need to be
19 carefully considered to make sure that what you are
20 doing is going to yield the result that you want.

21 BY MR. SAGDEO:

22 Q. Are there any particular instructions in
23 the '806 patent that would tell someone, who is
24 implementing this, like, essentially how you would
25 solve this current restriction problem or how you

1 would design a system that would still work even in
2 the face of this potential issue?

3 MR. CROSS: Objection. Form.

4 THE WITNESS: I believe that the '806 is silent
5 about this, but I believe a person of skill in the
6 art would understand that this is a potential issue.
7 There's a huge number of potential issues, and I
8 don't think that the '806 attempts to be exhaustive
9 in all the issues you have to consider. I think
10 that they leave it to a person of skill in the art
11 to understand what the tradeoffs are.

12 BY MR. SAGDEO:

13 Q. Could I point you, Dr. Yang, to Claim 10 of
14 the '806 patent. Just let me know when you're
15 there?

16 A. Yes, I'm there.

17 Q. Do you see the limitation in Claim 10 --
18 excuse me.

19 Reading, "An etch stop plug interposed between
20 each local contact of the local contacts and each
21 channel structure of the first and second channel
22 structures."

23 A. Yes.

24 Q. Are you able to point to any etch stop plug
25 disclosed in the '806 patent that meets this

1 limitation?

2 (Reporter Clarification.)

3 MR. SAGDEO: Etch, e-t-c-h.

4 MR. CROSS: Objection. Form.

5 THE WITNESS: Could you repeat the last part.

6 Any or a or -- what was that again?

7 BY MR. SAGDEO:

8 Q. Well, let's -- let me back up.

9 A. Because the article is very important.

10 Q. I will start with "a". Are you able to
11 point to, well, an, a-n, etch stop plug meeting the
12 requirements of Claim 10?

13 A. In the '806?

14 Q. Right. In the specification.

15 A. Right. So a person of skill in the art,
16 reading this and looking at the specification -- so
17 within the '806, it seems to be fairly clear that,
18 in Figure 12, Element 224, which is called etch stop
19 plug, is an etch stop plug that meets the
20 requirements of -- is an etch stop plug that meets
21 the requirement of Claim 10, "an etch stop plug
22 interposed between each local contact of the local
23 contacts and each channel structure of the first and
24 second channel structures."

25 You would have to understand that you have to

1 find 224 on a first channel structure and a second
2 channel structure. So --

3 Q. What about -- I am sorry. I didn't mean to
4 interrupt. Go ahead.

5 A. Sorry, let me finish. So I think you can
6 see that, for example, if you were to understand --
7 now you would have to see more.

8 But if you were to understand, looking at Figure
9 12, you could see there's the 224 on the left of the
10 TAC region, and there's another equivalent 224,
11 although it is not labeled, on the right. And so
12 you can imagine that that might be a first channel
13 region and a second channel region.

14 So I think this is an example of an etch stop
15 plug that would meet -- that would help to meet
16 that.

17 Q. What about -- I will direct your attention
18 to Figure 2? Figure 2 also has an element labeled
19 224 that is an etch stop plug; is that right?

20 A. I believe it's consistent to the naming,
21 yes.

22 Q. And is that another example of an etch stop
23 plug that meets the requirements of Claim 10?

24 A. I think it's consistent with Figure 12 but
25 in the fact that there's two -- if the one on the

1 left were for the left first region and the one on
2 the right were for the second region, it seems to
3 meet the etch stop plug between the local contact of
4 the local contacts and each channel structure of the
5 channel structure -- of the first and second --
6 first channel -- let me get the exact wording right,
7 sorry.

8 An etch stop plug interposed between each local
9 contact of the local contacts and each channel
10 structure of the first and second channel
11 structures.

12 Q. So what -- when you say "each local contact
13 of the local contacts," what are those in the
14 context of -- well, let's start with Figure 12.
15 What are those in the context of Figure 12?

16 A. Well --

17 MR. CROSS: Objection. Form.

18 THE WITNESS: Right. I think to know what each
19 local contact of the local contacts are, we need to
20 understand the entire context of the claim. And the
21 claim -- Claim 10, which is where this comes from,
22 is dependent on Claim 8; right?

23 And so we need to read the two of them together.
24 And so I believe that in Claim 8, if you go down,
25 you can see that one of the -- one of the phrases

1 there is "local contacts disposed on the first and
2 second channel structures and the slit structure."

3 And so you would understand that that local
4 contacts -- at least those are the ones that have to
5 be referred to in each local contact of the local
6 contacts.

7 BY MR. SAGDEO:

8 Q. So turning back to Claim 10 -- actually, so
9 sorry. Let me strike that.

10 You mentioned local contacts on the channel
11 structures and on the slit structures; right?

12 A. Those are specifically mentioned in Claim
13 8, yes, which is the independent claim on which
14 Claim 10 depends.

15 Q. In Figure 12, what would be the local
16 contacts that you just mentioned that are referred
17 to in Figure 8 -- I mean, Claim 8.

18 MR. CROSS: Objection. Form.

19 THE WITNESS: Which figure was this again?

20 BY MR. SAGDEO:

21 Q. Figure 12.

22 A. Figure 12. So the local contact 224 -- I
23 mean, the local -- sorry.

24 The etch stop plug 224 is clearly one of the
25 etch stop plugs that are referred to in Claim 8. It

1 is an etch stop plug between a local contact to a
2 channel and a channel.

3 And another -- the other local contact to a slit
4 structure is not shown in 12 -- I don't think it is
5 really shown in 12 yet. But let me check because it
6 happens at different stages.

7 So I think that 238, which is called a slit
8 structure contact, could also be considered a local
9 contact. And that's a local contact -- that could
10 be considered a local contact with a slit structure.
11 Let me see -- let me get the full thing right.

12 So you are saying for Claim 8 -- you are saying
13 for Claim 8 or Claim 10?

14 Q. Well, let's start with Claim 8 first.

15 A. Okay. So what would you like to know about
16 Claim 8?

17 Q. What I'm wondering is, in the context of
18 Figure 12, what are the local contacts that are
19 referred to in Claim 8?

20 MR. CROSS: Objection. Form.

21 THE WITNESS: Could you repeat that again.

22 BY MR. SAGDEO:

23 Q. Let me --

24 A. No. Please read the figure with the claim.

25 Q. This is -- let me try to reframe things and

1 back up a little bit.

2 So we talked about Claim 10; right?

3 So Claim 10 recites an etch stop plug with
4 various requirements; right?

5 A. Yes.

6 Q. And we talked about two places in which the
7 specification discloses etch stop plugs meeting
8 those requirements -- right? -- and in particular,
9 Figures 2 and 12?

10 A. Yes. I specifically mentioned Element 224,
11 etch stop plug.

12 Q. Right. And at Element 224, etch stop plug
13 appears in both Figure 2 and Figure 12?

14 A. Yes.

15 Q. Is there anywhere else in the specification
16 that you're aware of that discloses an etch stop
17 plug meeting the requirements of Claim 10?

18 MR. CROSS: Objection. Form.

19 THE WITNESS: So within the context of Claim 10,
20 you're saying is there anything else which could be
21 interpreted as being an etch stop plug?

22 BY MR. SAGDEO:

23 Q. Right.

24 A. Or is there anything that could be
25 interpreted as being an etch stop plug interposed

1 between each local contact of the local contacts and
2 each channel structure of the first and second
3 channel structures?

4 Q. Basically, the second thing you said, the
5 thing you said after I said right.

6 A. So the whole phrase?

7 Q. Correct.

8 A. So this would mean that we really need to
9 parse the meaning of what is "each local contact of
10 the local contacts" and "each channel structure of
11 the first and second channel structures." That
12 means we need to parse that; right?

13 Q. Okay.

14 A. And so a person of skill in understanding
15 this would understand that local contact of the
16 local contacts means somehow a local contact of
17 either a slit structure or a first and second
18 channel structure. That's what the local contact
19 means.

20 And so somehow there needs to be an etch stop
21 plug between both of those and each channel
22 structure, and the channel structures are first and
23 second channel structures. So there needs to be an
24 etch stop plug between those -- those two.

25 And so we would understand that Element 224

1 would satisfy that. It would be an etch stop plug
2 interposed between each local contact of the local
3 contacts and each channel structure of the first and
4 second channel structures.

5 (Reporter Clarification.)

6 BY MR. SAGDEO:

7 Q. Other than etch stop plugs 224, are there
8 any examples you can think of in the specification
9 that meet the requirements -- all the requirements
10 of the etch stop plug in Claim 10?

11 MR. CROSS: Objection. Form.

12 THE WITNESS: I mean, etch stop plug is -- there
13 are many things that are described in the '806
14 patent that are acting as etch stop plugs, but the
15 only thing that's really being interposed between
16 each local contact of the local contacts and each
17 channel structure is really 224.

18 BY MR. SAGDEO:

19 Q. Can you explain to me how 224 is interposed
20 between the slit structure local contacts and the
21 channel structures?

22 A. Yes.

23 Q. Could you please do so?

24 A. Yes, yes. I am going to speak, and I am
25 going to describe how it all works together.

1 So I just want to -- allow me a bit of time to
2 compose my answer so I can give you a clean answer.

3 Q. Sure.

4 MR. CROSS: Parth, are we at a good stop --
5 breaking point.

6 MR. SAGDEO: I just have a few more things, if
7 that's okay. I think it should be -- there's a few
8 more questions.

9 THE WITNESS: Okay. So you can see that the way
10 that the etch stop plug on the channel stop acts as
11 a -- what should I say -- let's go back. We will
12 take a look at the reading of the claim again.

13 The way an etch stop plug interposed between
14 each local contact of the local contacts and each
15 channel structure, the first and second channel
16 structures, is disclosed in the '806 -- is I believe
17 that the first case is just the etch stop plug 224
18 is clearly a local contact to the first and second
19 channel structures and that is interposed already.

20 But the second local contact is the local
21 contact to the slit structure, and you can
22 understand that a local contact disclosed on the
23 slit structure would be actually a bit line, and the
24 bit line is shown, for example, in 250 as Element
25 250 in Figure 2 because it is unfortunately not

1 shown explicitly in Figure 1A.

2 But you can understand that the bit lines are
3 running in the BL direction. You can see in Figure
4 1A. So they are running top to bottom.

5 And those BL directions -- so the bit lines are
6 going to be -- there's going to be many lines
7 running from top to bottom, and they're going to be
8 touching and contacting some channels, not
9 contacting other channels, but a very fine pitch of
10 bit line is coming down, and they're going to pass
11 over the slit structure.

12 So, if you consider the bit line to be a local
13 contact disclosed on the slit structure, the bit
14 line actually does satisfy the Claim 10 -- or the
15 Claim 8 part of a local contact on a slit structure
16 as well as satisfy having a local contact that has
17 an etch stop plug interposed between it and the
18 channel structure of the first and second channel
19 structure, depending upon whether the bit line was
20 on the first channel region or the second channel
21 region.

22 BY MR. SAGDEO:

23 Q. So I think this might be the first time you
24 mentioned bit lines 250. So I have a few questions
25 about that.

1 In what sense is the -- in what sense are the
2 bit lines 250 on the slit structures?

3 A. They're disposed on the slit structure.
4 And so we know from the literal text of the patent
5 that "on" needs to be given its broadest possible
6 meaning, and if you give me a second, let me find
7 where that is in the patent.

8 Here it is, Column 2, line 26. "It should be
9 readily understood that the meaning of 'on'," in
10 quotes, "'above'," quote, "and 'over'," in quotes,
11 "in the present disclosure should be interpreted in
12 the broadest manner such that 'on'," in quotes, "not
13 only means 'directly on'," in quotes, "something but
14 also includes the meaning of 'on'," in quotes,
15 "something with an intermediate feature or layer
16 therebetween and that 'above'," in quotes, "or
17 'over'," in quotes, "not only means the meaning of
18 'above'," in quotes, "or 'over'," in quotes,
19 "something but can also include the meaning it is
20 'above'," in quotes, "or 'over'," in quotes,
21 "something with no intermediate feature or layer
22 therebetween (i.e., directly on something)."

23 So "on" has a very broad meaning within the
24 context of the '806 patent. So that's the way a
25 person of skill in the art would interpret Claim 8,

1 local contacts disposed on the first and second
2 channel structures. They can interpret that as
3 being physically on a first and second channel
4 structures.

5 And disposed on the slit structures, they can
6 interpret that as being physically above the slit
7 structures.

8 MR. CROSS: Sorry. Just for the record, that
9 was Column 4, line 26, not Column 2, line 26.

10 THE WITNESS: Sorry.

11 BY MR. SAGDEO:

12 Q. Thanks. So, Dr. Yang, so just looking at
13 Figure 2, you mentioned that, in the case of the bit
14 lines, they meet the definition of "on" in the sense
15 that not directly on but on with some layers in
16 between; right?

17 MR. CROSS: Objection. Mischaracterizes prior
18 testimony.

19 THE WITNESS: Could you please repeat that. I
20 just want to make sure the words are exactly right
21 because the words are very important.

22 BY MR. SAGDEO:

23 Q. So one thing you read from Column 4 in the
24 definition of "on" in the patent was that "'on'
25 means not only 'directly on' but includes the

1 meaning of 'on' something with an intermediate
2 feature or a layer therebetween."

3 Do I have that right?

4 A. I'll take your representation that that's
5 what the patent says; but, yeah, I just quoted what
6 the patent said.

7 Q. And so in the case of the bit lines and the
8 slit structure, is it your position that the bit
9 lines are on the slit structure because, even though
10 they are not directly on, they are on with an
11 intermediate feature or layer there between?

12 A. It was -- what I said was that a person of
13 skill in looking -- in the art in looking at what is
14 described in the '806 would understand that, looking
15 at Figure 1A, that the bit lines would, in fact,
16 be -- how should we say? -- quote/unquote, "flying
17 over the slit structures," and therefore the bit
18 lines would qualify as being disposed on the slit
19 structures.

20 Q. So looking at Figure 1A, you're saying that
21 the bit lines are going in the BL direction.

22 Do you see the arrow labeled "BL"?

23 A. Yes.

24 Q. And so you're saying, okay, well, the bit
25 lines are sort of, in essence, orthogonal,

1 perpendicular to the slit structures. And so you do
2 have them passing over the slit structures --
3 certain parts of the slit structures?

4 A. That is correct.

5 Q. And where do you see that in Figure 2?
6 Because in Figure 2, it didn't seem like that's the
7 case; right?

8 A. That's correct. It is because Figure 2 is
9 something that's typically done in the art when
10 people describe these things. These are actually
11 very complex 3D devices and a 2D cross-section is
12 kind of a simplification just to show what the
13 vertical or -- yeah, kind of what the vertical
14 cross-section looks like.

15 And so it is actually a slightly odd
16 cross-section. It is kind of a jig-jog, which is
17 not dissimilar to the type of jig-jog that is even
18 shown in Toyama's cross-sections as well.

19 So this is the problem with Zoom depositions. I
20 can't draw on this figure, and it can't become part
21 of -- I don't know. Is there some way for me to
22 draw on this figure to show you --

23 Q. If you are willing to share your screen?

24 A. I am happy to share my screen.

25 Q. Yeah.

1 A. But can you take a picture of it and put it
2 in.

3 Q. What I think we can do is, if you can say
4 "annotate" the figure, then we'll submit it. If you
5 can upload it back to the chat, then the court
6 reporter can essentially keep that as part of the
7 record. Does that make sense?

8 A. Okay. Yes, I think that makes sense. I
9 just hope I can draw well enough with my mouse so
10 that it will be discernible. I will now try my
11 best. I will share the figure with you, and I will
12 try in realtime to draw it. Hopefully, it will be
13 good enough.

14 This is the image. Are you getting this?

15 Q. Yes.

16 A. Are you getting the image? Okay. So I am
17 going to try to draw what I think the cross-section
18 sort of looks like. So the cross-section is kind of
19 drawn this way through here.

20 So this is kind of the cross-section that would
21 have been drawn in Figure 2. And when you can see,
22 you can see a slice of one channel. You see the
23 slice of a slit structure. You see a slice going
24 through the dielectric 124. You see a slice
25 through -- well, three TACs, but they are only

1 showing two TACS. And you see a slice back into
2 this slit structure, and you see another slice into
3 the NAND channel on the other side.

4 So that is roughly kind of the sequence of kind
5 of the things that you're seeing. It is not to
6 scale, but you know patent diagrams are never to
7 scale anyway. They are just supposed to be
8 illustrative of what the figure is. But that is
9 what a person of skill in the art would understand
10 the cross-section was representing.

11 Is that helpful? Would you like me to download
12 this and then upload this to the chat?

13 Q. Yeah. If you could, that would be great?

14 A. So I am going to stop sharing, try to
15 download and upload to the chat.

16 MR. SAGDEO: Just to make it probably easier for
17 folks, if you could, like, add a parentheses or
18 something at the end of Figure 13 saying like
19 "annotated" or something like that.

20 THE WITNESS: I will put it as "annotated." And
21 hopefully it's there. There.

22 MR. CROSS: Shouldn't this be Exhibit 14?

23 MR. SAGDEO: Yeah. That's a good question. I
24 haven't actually dealt with this, Allen. But -- I
25 guess, Lindsay, do you have a preference?

1 THE REPORTER: That's fine.

2 MR. SAGDEO: We are seeing Exhibit 13 because it
3 is essentially a drawn-on version, which, if we did
4 this in real life, there wouldn't be any other
5 Exhibit 13 except for the one that was marked and
6 drawn on.

7 THE REPORTER: We could do it 13A.

8 (Exhibit 13A was marked for
9 identification.)

10 (Discussion held off the record.)

11 MR. SAGDEO: I am a little sad I didn't get to
12 travel to Thailand out of this, though.

13 THE WITNESS: Well, you can hop on a plane next
14 time.

15 MR. CROSS: Are we at a good break point?

16 MR. SAGDEO: Yeah. Finally just break. It's
17 like five minutes. I actually don't have much left.

18 MR. CROSS: Okay. It is up to you what you
19 want.

20 MR. SAGDEO: I will want the five minutes either
21 way. Why don't we break now if that's okay.

22 THE WITNESS: Okay. Why don't we just break
23 now, and then I can -- is it okay to close these
24 documents?

25 MR. SAGDEO: Sure. I might be coming back to

1 some of them later.

2 THE WITNESS: I will leave them open. That's
3 fine. See you back in five minutes.

4 (Recess.)

5 THE REPORTER: There time is 5:01 p.m., and
6 we're back on the record.

7 BY MR. SAGDEO:

8 Q. Dr. Yang, could I have you pull up
9 Exhibit 9, which is Toyama?

10 A. Yes.

11 Q. Do you recall just before the break you
12 drew a not quite straight line on essentially a
13 bird's eye view of the '806 patent; right?

14 A. Yes.

15 Q. And that view was to represent essentially
16 Figure 2 and not exactly straight -- I forgot the
17 exact name you used for it but, like, sort of what
18 the cross-section was showing?

19 A. Yeah. A zigzag, jig-jog, whatever, yeah.

20 Q. Could I have you turn to Figure 17B of
21 Toyama?

22 A. 17 --

23 Q. B like "bravo"?

24 A. B like "bravo," yes.

25 Q. Do you see in sort of -- I guess it starts

1 on the left in the bottom corner-ish, not quite
2 corner, but there's a letter A, and it is kind of
3 hard to see. But it's like -- there's a dotted line
4 that starts from the A and that is sort of -- if I
5 may characterize it as a zigzag, it is sort of the
6 same sort of thing?

7 A. Yes. Roughly, I believe that this was what
8 I was referring to, but I might have something
9 similar. You can see A. It is a dashed line,
10 which, if you read the specification, it's saying
11 that this is kind of what the cross-section cut
12 looks like. You can see it cutting through some of
13 those round structures 488, I guess they are called.

14 And then it moves down and avoids it and kind of
15 moves along something and then cuts up and cuts
16 through -- I guess it is a staircase contact or
17 something. And then it cuts all the way through the
18 array.

19 And so you can see it is not, in fact, what you
20 would think if you were to take a knife and slice
21 it. This is kind of if you took a knife and then
22 looked at it. Something very similar.

23 Q. And then the A that is listed in Figure
24 17B, the A refers to -- that is the view in Figure
25 17A; is that right?

1 A. I believe it's saying that that is the
2 slice that, if you were to take from A to dashed A
3 on the right, which is horribly obscured by the NAND
4 strings, but if you look at that and you follow that
5 dashed line, that is kind of the thing that you're
6 looking at, I believe, in Figure 17A. That's the
7 cross-section you are looking at.

8 And the slice that you are looking at --
9 remember I said there is stuff above and below, that
10 is the B-B in Figure 17A. That is kind of the slice
11 that you had taken. You had sliced it and looked at
12 it from the top. That is roughly what you're
13 looking at in Figure 17B.

14 So it is a -- it is a technique that people use
15 to try to show these complex 3D devices in kind of
16 this limitation of just 2D figures.

17 MR. SAGDEO: No further questions on my end.
18 Thanks, Dr. Yang.

19 THE REPORTER: Mr. Cross, do you have any
20 redirect?

21 MR. CROSS: Yeah. Give me, let's say,
22 15 minutes. And I may have a redirect.

23 THE WITNESS: Should we come back in 20?

24 MR. CROSS: 8:20. All right.

25 (Recess.)

1 THE REPORTER: The time is 5:19 p.m., and we're
2 back on the record.

3 MR. CROSS: No further questions for me.

4 THE REPORTER: The time is 5:20 p.m., and we're
5 off the record.

6 (The deposition was concluded
7 at 5:20 p.m.)
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I certify or declare under declaration
under penalty of perjury that the foregoing testimony is
true and correct.

Executed this ____ day of _____,
2024, at _____, California.

WOODWARD YANG

1 STATE OF CALIFORNIA)
2) ss.
3 COUNTY OF ORANGE)

4 I, LINDSAY ANNE STOKER, RDR, RMR, CRR, CRC,
5 and Certified Shorthand Reporter of the State of
6 California, does hereby certify:

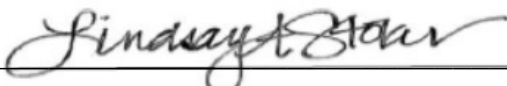
7 That the foregoing deposition was taken
8 before me at the time and place therein set forth, at
9 which time the witness was duly sworn by me;

10 That the statements made on the record were
11 recorded stenographically by me and were thereafter
12 transcribed; said transcript being a true and correct
13 copy of the proceedings thereof;

14 I further certify that I am neither counsel for
15 nor related to any party to said action, nor in any way
16 interested in the outcome thereof;

17 Further, that if the foregoing pertains to the
18 original transcript of a deposition in a federal case,
19 before completion of the proceedings, review of the
20 transcript was not requested/offered on the record.

21 In witness whereof, I have subscribed my name,
22 this 12th day of May, 2025.

23
24 
25 Lindsay A. Stoker, RDR, RMR, CRR, CRC
CA CSR No. 14373

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