1 UNITED STATES PATENT AND TRADEMARK OFFICE

2 _____

3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4

5 MICRON TECHNOLOGY, INC.

6 Petitioner,

7 vs.

8 YANGTZE MEMORY TECHNOLOGIES COMPANY, INC.

9 Patent Owner.

10 _____

11 Case: PGR2025-00021

12 U.S. Patent No. 12,010,838

13

14 DEPOSITION OF JACK LEE, Ph.D.

15 via videoconference

16 Thursday, October 30, 2025

17 10:00 a.m.

18

19 Job No.: 604620

20 Pages: 1 - 173

21 Stenographically Reported By:

22 Alison C. Webster, CSR-6266, RPR, RMR, CRR, RDR

YMTC
Exhibit 2030
Micron v. YMTC
PGR2025-00021

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4 Deposition of JACK LEE, Ph.D., produced as
5 a witness at the instance of the Patent Owner, and
6 duly sworn, was taken in the above-styled and
7 numbered cause on Thursday, October 30, 2025, from
8 10:00 a.m. to 4:13 p.m. Eastern Time, before Alison
9 C. Webster, RPR, CRR, RMR, RDR, CSR-6266
10 (Michigan); License No. 14559 (California); License
11 No. 084.004953 (Illinois); CSR-12432 (Texas),
12 reported by stenographic method, via
13 videoconference, pursuant to the Federal Rules of
14 Civil Procedure and the provisions stated on the
15 record or attached hereto.
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21
22

1 A P P E A R A N C E S
2
3 ON BEHALF OF THE PATENT OWNER
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22 Kieran Morrison, exhibit technician

1 T A B L E OF C O N T E N TS
2
3 Witness Page
4 JACK LEE, Ph.D.
5
6 EXAMINATION
7 BY MR. WATSON: 6
8
9 E X H I B I T I N D E X
10
11 Exhibit Page
12
13 (Exhibits retained by counsel.)
14
15 PREVIOUSLY MARKED EXHIBIT 1003 10
16 PREVIOUSLY MARKED EXHIBIT 1007 72
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22

1 DEPOSITION OF JACK LEE, Ph.D.
2 Thursday, October 30, 2025
3
4 STENOGRAPHER: The attorneys
5 participating in this deposition and the
6 witness have verified that he is Jack Lee,
7 Ph.D. In lieu of an oath administered in
8 person, the witness will visually affirm his
9 testimony in this matter is under penalty of
10 perjury.
11 The parties and their counsel consent
12 to this arrangement and waive any objections
13 to this manner of reporting or admissibility
14 of the transcript.
15 Would counsel please state their
16 appearance and any objections to proceeding,
17 starting with scheduling counsel.
18 MR. WATSON: Sure. I am Tom Watson
19 from Latham & Watkins, and I represent the
20 patent owner Yangtze Memory Technologies
21 Company Ltd.
22 MR. HERMAN: This is Patrick Herman

1 from Orrick Herrington & Sutcliffe, here on
2 behalf of petitioner Micron Technology Inc.
3 STENOGRAPHER: Thank you.
4 Hearing no objections, Dr. Lee, would
5 you please raise your right hand.
6 Do you swear or affirm the testimony
7 you are about to give in this matter will be
8 the truth, the whole truth, and nothing but
9 the truth?
10 DR. LEE: Yes.
11 STENOGRAPHER: Thank you.
12 You may proceed.
13 MR. WATSON: Good morning, Dr. Lee.
14 THE WITNESS: Good morning.
15 JACK LEE, Ph.D.,
16 was thereupon called as a witness herein, and
17 after having first been duly sworn to testify
18 to the truth, the whole truth and nothing but
19 the truth, was examined and testified as
20 follows:
21 EXAMINATION
22 BY MR. WATSON:

1 Q. Can you please state your full name for the
2 record?
3 A. Yeah, my full name is Jack C. Lee.
4 Q. Can you please state your home address for the
5 record?
6 A. Yes. It is 5803 Westslope. Westslope is one
7 word, W-e-s-t-s-l-o-p-e, Cove, C-o-v-e,
8 Austin, Texas 78731.
9 Q. And where are you currently located, Dr. Lee?
10 A. I am located at the address that I just
11 provided.
12 Q. Do you understand that your testimony today is
13 under oath and under penalty of perjury?
14 A. Yes.
15 Q. Is there any reason you cannot provide full
16 and truthful testimony today?
17 A. No.
18 Q. Based on what I can see, it looks like you do
19 not have any materials in front of you today;
20 is that correct?
21 A. No, I don't. Do not.
22 Q. Is there anyone else in the room with you?

1 A. No.
2 Q. And do you have a cell phone in front of you?
3 A. No.
4 Q. And can you agree not to open any document
5 during your deposition aside from those
6 provided through the court reporter software?
7 A. Yes.
8 Q. Dr. Lee, what did you do to prepare for your
9 deposition today?
10 A. I reviewed the material related to this case.
11 Q. What do you mean by "this case"?
12 A. This IPR. I reviewed all the material that I
13 cited in my declarations. I reviewed my
14 declarations. And if you can upload my
15 declaration, I can show you the list that I
16 have -- the list of materials or exhibits
17 that I have included in my declarations.
18 Q. Did you meet with anybody in preparation for
19 your deposition today?
20 A. Yes.
21 Q. Who did you meet with?
22 A. I met with counsel, Patrick Herman.

1 Q. Besides Mr. Herman, did you meet with anyone
2 else in preparation for your deposition today?
3 A. No, I have not.
4 Q. When did you meet Mr. Herman in preparation
5 for your deposition?
6 A. The last couple of days, Tuesday and
7 Wednesday of this week.
8 Q. And how long were each of those meetings?
9 A. I don't recall exactly, but I believe it's
10 approximately hour and a half to two hours.
11 Q. Besides you and Mr. Herman, was anyone else
12 present at these meetings?
13 A. No.
14 Q. Besides the attorneys in this case, have you
15 discussed this case with anyone else?
16 A. No.
17 Q. Besides the attorneys in this case, have you
18 discussed your deposition with anyone else?
19 A. No.
20 MR. WATSON: Let's pull up
21 Exhibit 1003.
22 ENTERED INTO THE RECORD:

1 PREVIOUSLY MARKED EXHIBIT 1003
2 10:05 a.m.
3 BY MR. WATSON:
4 Q. Dr. Lee, do you see Exhibit 1003 on your
5 screen?
6 A. No.
7 Oh, on the screen. I thought you
8 upload it. Sorry.
9 Q. Do you see Exhibit 1003 on your screen?
10 A. I see the front page. I believe that's --
11 hold on one second. Okay.
12 Yes, I see the front page.
13 MR. WATSON: And can we give Dr. Lee
14 control of the document here?
15 PLANET DEPOS TECH: All right, he
16 should have control.
17 BY MR. WATSON:
18 Q. Dr. Lee, can you confirm that Exhibit 1003 is
19 the declaration you submitted in
20 PGR2025-00021?
21 A. Hold on one second... how do I...
22 STENOGRAPHER: Counsel, would you

1 like to briefly go off the record so we can
2 assist Dr. Lee?
3 MR. WATSON: Sure.
4 (Off the record at 10:08 a.m.)
5 (Back on the record at 10:09 a.m.)
6 MR. WATSON: Can we put Exhibit 1003
7 onscreen? Thank you.
8 BY MR. WATSON:
9 Q. Dr. Lee, can you confirm that Exhibit 1003 is
10 the declaration you submitted in
11 PGR2025-00021?
12 A. Yes.
13 Q. Your declaration found in Exhibit 1003 focuses
14 on the validity of U.S. Patent Number
15 12,101,838. Correct?
16 A. Yes.
17 Q. And if I refer to this patent as the '838
18 patent, you will understand I'm referring to
19 U.S. Patent Number 12,010,838?
20 A. Yes.
21 Q. Does Exhibit 1003 contain your complete
22 opinions concerning the '838 patent?

1 MR. HERMAN: Objection. Form.
2 A. Can you rephrase the question?
3 BY MR. WATSON:
4 Q. Are you offering any opinions on the '838
5 patent that are not included in this
6 declaration?
7 A. No, but there's a couple places that I may
8 provide some clarification. But other than
9 that, the opinions that I have regarding this
10 case is included in my -- in the
11 Exhibit 1003.
12 Q. All your opinions concerning the '838 patent
13 are included in Exhibit 1003; is that right?
14 MR. HERMAN: Objection. Form.
15 A. My opinion regarding the validity of the
16 patent '838 are included in the Exhibit 1003.
17 As I mentioned, there's a couple points that
18 I would like to clarify during the
19 deposition, but it doesn't change the essence
20 of my opinion regarding the validity of the
21 patent '838.
22 BY MR. WATSON:

1 Q. The opinions you are offering in PGR2025-00021
2 are included in this Exhibit 1003 --
3 A. Yes.
4 Q. -- correct?
5 A. Yes.
6 Q. Who wrote this declaration?
7 MR. HERMAN: Objection. Form.
8 A. I collaborate with my counsel in drafting the
9 '838 patent.
10 BY MR. WATSON:
11 Q. In drafting the '838 patent or in drafting
12 this declaration?
13 A. Sorry. The declaration.
14 Q. And how long did you spend preparing this
15 declaration?
16 A. I don't recall.
17 Q. Did you spend more than 20 hours preparing
18 this declaration?
19 A. Yes.
20 Q. Did you spend more than 50 hours preparing
21 this declaration?
22 A. I don't recall exactly, but I would say at

1 least 50 hours, perhaps 50 to 75 hours. I
2 don't -- I don't recall the exact number.
3 Q. Did you talk to any nonlawyers in preparing
4 your declaration?
5 A. No.
6 MR. WATSON: Can I get control of the
7 document?
8 BY MR. WATSON:
9 Q. Dr. Lee, can you go to paragraph 17 of your
10 declaration?
11 A. Yes.
12 Q. Paragraph 17 of your declaration identifies
13 the documents you reviewed in preparing your
14 opinions in this PGR. Correct?
15 A. Yes.
16 Q. And you reviewed the 18 exhibits listed in
17 paragraph 17. Correct?
18 A. I'm sure you counted right. Yes. The list
19 is in paragraph 17.
20 Q. Did you review any other exhibits beyond those
21 listed in paragraph 17 in forming your
22 opinions in this case?

1 A. No. I have -- I have not. The opinion that
2 I form is based on the exhibit that I listed
3 in paragraph 17.
4 Of course, I also -- obviously I
5 reviewed the '838 patent and the file
6 history, which is not listed in the table,
7 but mentioned it in my -- in the
8 paragraph 17.
9 Q. So paragraph 17 lists all the materials you
10 reviewed in preparing your opinions for this
11 PGR. Correct?
12 A. That is correct.
13 Q. In preparing your opinions, you reviewed a
14 number of references that you identify as
15 what's called prior art. Correct?
16 A. That's correct.
17 Q. Who provided the prior art for your analysis?
18 A. I don't recall who provided which prior art
19 in the exhibits. I have access to the
20 library at the University of Texas at Austin
21 and I periodically search for certain
22 document and certain references.

1 As you know, there are multiple IPRs
2 in this lawsuit. Sometimes I work on multiple
3 IPRs at the same time, so I do not recall for
4 this particular IPR which prior art I provided
5 and which prior art provided by counsel.
6 Q. Since you signed your declaration in
7 Exhibit 1003, have you changed any of the
8 opinions you have offered?
9 A. No, I have not.
10 Q. And how much time have you put into this PGR
11 so far?
12 A. I do not recall. You mean in preparation, in
13 writing the PGR -- in writing the -- this
14 document, this declaration?
15 Q. Correct.
16 A. I thought that that was your question that
17 you asked previously.
18 Q. This question is a little bit broader, so let
19 me rephrase it if that's okay.
20 How much time have you spent between
21 preparing for your deposition, reviewing
22 references, and preparing this declaration for

1 this PGR?
2 A. Say it -- can you repeat the question again?
3 Q. How much time have you spent preparing for
4 your deposition, reviewing references, and
5 preparing this declaration in this PGR?
6 A. So what you're asking me is how much time in
7 total that I put in for this particular IPR.
8 Q. Correct.
9 A. I don't -- I have not taken into account of
10 the total number. Like I said, it's just
11 in -- that I work on multiple IPR in this
12 lawsuit, and sometimes more than one
13 simultaneously, so I do not know which one --
14 how many hours I prepare -- how many hours I
15 use for a particular IPR versus another IPR,
16 so I cannot give you certain numbers.
17 Q. You cannot provide me with a -- the amount of
18 time you spent on this PGR because you don't
19 know how many hours you spent on this PGR
20 versus another IPR; is that fair?
21 A. That is fair.
22 Q. Let's go to paragraph 62 of your declaration.

1 Can you let me know when you're
2 there, Dr. Lee?
3 A. Yes.
4 Q. In preparing your opinions for this PGR, you
5 applied the date of August 28th, 2017, as the
6 effective filing date of the '838 patent.
7 Correct?
8 A. That is correct, as I stated in my
9 declaration in paragraph 64. In fact, in
10 paragraph 62 to 64.
11 Q. Did you analyze the validity of the '838
12 patent under any other effective filing date?
13 A. No. I use August 28, 2017, as the effective
14 filing date of the '838 patent.
15 Q. Did you perform any analysis to determine
16 whether the '838 patent can claim priority
17 back to August 28th, 2017?
18 A. Sorry, can you repeat that question, please?
19 Q. Did you do any analysis to determine whether
20 the '838 patent can claim priority back to
21 August 28th, 2017?
22 A. What do you mean, "back to August 28th,

1 2017"? Do you mean prior to that date? So
2 for the purpose of this declaration I've been
3 instructed to use August 28, 2017, as the
4 effective filing date.
5 Q. Did you do any analysis to determine whether
6 the '838 can claim priority back to any other
7 date?
8 A. No. As I describe in paragraph 62 to 64, my
9 opinion in this declaration were formed from
10 the perspective of a POSITA as of
11 August 28th, 2017, including both the
12 knowledge of a POSITA at the time as well as
13 how a POSITA would have understood the prior
14 art.
15 So I did not use any other date as
16 the effective filing date of the '838 patent.
17 Q. And the reason you used the August 28th, 2017,
18 date as the effective filing date was because
19 that was what counsel instructed you to do.
20 Correct?
21 A. I'm not a lawyer, and so I rely on counsel to
22 inform me what is the effective filing date

1 of the '838 patent, and -- but the '838
2 patent itself identified as the -- as a
3 continuation of the U.S. application filed in
4 9-10-2018 and May 20th -- May 28, 2020, and a
5 PCT application filed in August 6th, 2018.
6 And as I stated in paragraph 63, it
7 also identified a foreign filing on August
8 28, 2017, so that's the earliest date related
9 to this patent. And for the purpose of this
10 declaration, counsel instructed me to use
11 this date, August 28th, 2017, as the
12 effective filing date of the '838 patent.
13 Q. Did you perform any analysis on whether the
14 '838 patent could only claim priority back to
15 later U.S. applications?
16 A. No.
17 Q. Let's turn to paragraph 90. Can you let me
18 know when you're there?
19 A. Yes.
20 Q. In performing your analysis of the '838
21 patent, you used the plain and ordinary
22 meaning of the terms. Correct?

1 A. Yes. As I described and stated in
2 paragraph 90, that in my opinion the terms of
3 the '838 patent claims do not require further
4 construction and can be afforded their plain
5 and ordinary meaning for purposes of the
6 analysis of the prior art that I'm conducting
7 in this declaration.
8 Q. You do not identify any terms that require
9 claim construction. Correct?
10 A. As I mentioned in paragraphs 87 through 90,
11 that the terms of the '838 patent claims can
12 be afforded their plain and ordinary meaning
13 for the purpose of this analysis. It means
14 that I do not use any other construction,
15 claim construction, for the analysis for the
16 purpose -- purposes of the analysis of the
17 prior art that I'm conducting in this
18 declaration.
19 Q. You did not provide any explicit claim
20 constructions of terms from the '838 patent.
21 Correct?
22 A. That is correct. Again, as I stated in

1 paragraph 87 to 90, I use plain and ordinary
2 meaning for the purposes of the analysis of
3 the prior art in conducting this declaration.
4 Q. And in your declaration, you do not identify
5 what those plain and ordinary meanings are.
6 Correct?
7 MR. HERMAN: Objection. Form.
8 A. I don't understand. Can you repeat that?
9 BY MR. WATSON:
10 Q. You applied the plain and ordinary meaning of
11 the terms in the '838 patent in reaching your
12 conclusions. Correct?
13 A. Yes.
14 Q. Do you, in your declaration, ever list out
15 what those plain and ordinary meanings are?
16 MR. HERMAN: Objection. Form.
17 A. You mean for each terms -- for each term or a
18 particular term in the patent whether I list
19 or declare what -- the plain and ordinary
20 meaning of a particular term?
21 BY MR. WATSON:
22 Q. Correct.

1 A. I believe that throughout these declarations
2 when I talk about certain terms, I discuss
3 what a person of ordinary skill in the art at
4 the time of alleged invention would
5 understand in plain and ordinary meaning what
6 this mean -- what the term means and what the
7 term not mean.
8 If you want, I can look through the
9 declaration and tell you for an example.
10 Q. Let's move on. Can you turn to paragraph 73
11 of your declaration?
12 A. Hold on. Yes.
13 Q. Are you at paragraph 73?
14 A. Yes.
15 Q. Dr. Lee, paragraphs 73 through 85 discuss the
16 prosecution history of the '838 patent.
17 Correct?
18 A. Yes.
19 Q. You reviewed the '838 patent's prosecution
20 history then?
21 A. Yes. As I discuss and mention in
22 paragraph 73, I have reviewed the '838 patent

1 prosecution history.
2 Q. And paragraphs 73 through 85 lay out your
3 discussion about that prosecution history.
4 Correct?
5 A. That's correct.
6 Q. In your declaration, you do not identify any
7 discussion in the prosecution history about
8 the curvature of surfaces in the XY-direction.
9 Correct?
10 A. So in paragraph 73 to 85 summarizes my review
11 of the '838 patent prosecution history, and I
12 did not discuss the term "curvature" in these
13 paragraphs.
14 Q. So in the paragraphs regarding the prosecution
15 history of the '838 patent, you did not
16 identify any parts of the prosecution history
17 that discussed the curvature of surfaces.
18 A. Can you repeat the question, please?
19 Q. In the paragraphs regarding the prosecution
20 history of the '838 patent in your
21 declaration, you did not identify any part of
22 the prosecution history that discussed how the

1 surfaces of the staircase structure should be
2 curved.
3 A. No, I did not. I do not recall any
4 discussion.
5 Q. And you don't recall any discussion in the
6 prosecution history about the curvature of
7 surfaces in the prosecution history?
8 Let me repeat that question. Sorry.
9 I think I -- I realized I screwed up.
10 You don't recall any discussion in
11 the prosecution history about the curvature of
12 surfaces.
13 A. Other than that the term "curved side
14 surface" were discussed -- were included in
15 some of the claims, I don't recall any
16 specific discussion regarding the curvatures
17 in the file history.
18 Q. In your declaration, you do not identify any
19 discussion in the prosecution history about
20 the first and second portions of the second
21 material layer. Correct?
22 A. When you say "discussion," what do you mean

1 by that? Of course, first and second portion
2 are -- the terms set first -- the terms
3 "first and second portion" have been
4 mentioned in the specifications, as well as
5 the claims. So obviously the file history
6 would have included the terms first and
7 second portion.
8 Q. You did not identify any parts of the
9 prosecution history -- strike that.
10 Was there anything in the prosecution
11 history that informed your understanding of
12 the meaning of the terms "first and second
13 portions of the second material layer"?
14 A. I believe that the terms "first portion" and
15 "second portion" can be understood by a
16 person of ordinary skill in the art afforded
17 plain and ordinary meaning, but I do not
18 recall any specific discussions other than
19 what's in the specifications and the claims
20 of the '838 patent.
21 Q. You do not recall any specific discussions in
22 the prosecution history that informed your

1 understanding of what the plain and ordinary
2 meaning of "first and second portions of the
3 second material layer" are?
4 A. I believe that this -- as I discuss in the
5 claim construction section, I believe that
6 the terms of the '838 patent claims,
7 including "first portion" and "second
8 portion," do not require claim construction
9 and can be afforded the plain and ordinary
10 meanings for the purpose of the analysis of
11 the prior art that are in this declaration.
12 And I do not recall any discussions
13 specifically regarding the understanding of
14 the terms "first portion" or the "second
15 portion" in the file history, but I don't
16 think a person of ordinary skill in the art
17 would require any claim constructions in
18 understanding the terms "first portion" and
19 "second portion" in the '838 patent.
20 Q. You do not recall any discussions in the file
21 history regarding the meaning of the terms
22 "first portion" or "second portion"?

1 A. No, I do not recall any discussion. As I
2 mentioned, that a person of ordinary skill in
3 the art would understand the terms "first
4 portion" and "second portion" and do not
5 require any claim construction.
6 My understanding of the prosecution
7 history, the relevant items in the
8 prosecution history are listed in
9 paragraphs 73 to 85.
10 Q. So your understanding of the relevant items of
11 the prosecution history are listed in
12 paragraphs 73 to 85 of your declaration.
13 Correct?
14 A. My understanding of the key event -- key
15 items in the prosecution history are listed
16 in paragraph 73 to 85.
17 Q. Let's turn to paragraph 77 real quick. Let me
18 know when you have that.
19 A. Yes.
20 Q. The original Claim 1 of the '838 patent did
21 not refer to a landing pad's side surfaces.
22 Correct?

1 A. The original Claim 1 of the '838 patent
2 differ from the issues Claim 1, so rather
3 than including the limitation related to a
4 landing pad's side surfaces, it referenced
5 the pad's bottom and top surfaces.
6 Q. So the original Claim 1 of the '838 patent did
7 not refer to the landing pad's side surfaces?
8 A. That's what is -- what I wrote in
9 paragraph 77.
10 Q. Instead, the original Claim 1 of the '838
11 patent referred to the landing pad's top and
12 bottom surfaces. Correct?
13 A. That's what I had written in paragraph 77.
14 Q. Let's go to paragraph 91 of your report. Let
15 me know when you're there.
16 A. 91... okay.
17 Q. In this declaration, you opine that Claims 1,
18 3 through 7, and 12 through 20 of the '838
19 patent are unpatentable as obvious over the
20 prior art. Correct?
21 A. That is correct.
22 Q. And your opinions in this declaration relate

1 to five grounds of invalidity?
2 A. As you can see in -- on page 2 to page 7, I
3 listed the -- my -- my patentability
4 analysis, and there I list five grounds.
5 Q. You don't offer any opinions on any grounds
6 other than these five grounds of invalidity.
7 Correct?
8 A. Correct.
9 Q. Is it your understanding that all five of
10 these grounds are based on obviousness?
11 A. So in paragraph -- in the heading between 128
12 and -- paragraph 128 and 129, I say Ground 1,
13 Claims 1, 4 through 7, 12 through 17, and 19
14 through 20 are obvious over Kim.
15 So in paragraph -- in the heading
16 before paragraph 293, for Ground 2, Claims 3
17 and 8 -- and 18 are obvious over Kim and Yang.
18 In Ground 3, Claims 1, 4 through 7,
19 12, 16 through 17, and 19 to 20 are obvious
20 over Lee.
21 In Ground 4, Claims 3 and 18 are
22 obvious over Lee and Haller.

1 And the heading before paragraph 457,
2 section F, Ground 5, Claims 13 to 15 are
3 obvious over Lee and Park.
4 So to answer your questions, I think
5 all these claims that I mentioned are invalid
6 based on obviousness argument.
7 Q. So all five of your invalidity grounds are
8 based on obviousness.
9 A. That's what I just said.
10 Q. Have you ever heard the term "anticipation" in
11 the context of patent law?
12 A. Yes.
13 Q. Do you understand what that term means?
14 A. I'm not an attorney, so I don't know -- I do
15 not recall exactly what that means, but my
16 understanding is that a single reference
17 discloses every claim limitation. You are an
18 attorney, you may want to add on to that.
19 But my understanding is that
20 "anticipation" means that it is a single
21 reference and discloses every claim
22 limitations of the claim, whereas

1 "obviousness" is -- has a different meaning,
2 as I describe in my section -- section 4,
3 Understanding of the Law.
4 Q. You are not offering the opinion in your
5 declaration that any claims of the '838 patent
6 are anticipated. Correct?
7 A. As I discussed earlier, that the -- each
8 ground of the five grounds, I prove that the
9 claims are invalid as obvious.
10 Q. You don't opine that any of the claims of the
11 '838 patent are anticipated. Correct?
12 A. That is correct.
13 Q. And you're not aware of any prior -- single
14 prior art reference that discloses every
15 limitation of any claim of the '838 patent.
16 Correct?
17 A. Throughout this declaration, I use the word
18 teach in describing that a reference
19 expressly discloses a claim element, but not
20 the entire claim, or that a reference
21 discloses a claim element of a dependent
22 claim, but not the independent claim.

1 So I'm not sure when -- your
2 question about a claim limitation, a
3 reference can disclose a claim element or
4 claim limitation, but not the entire claim.
5 And that's not anticipation, but it teaches
6 the claim limitation.
7 Q. Are you aware of any single prior art
8 reference that discloses every limitation of
9 any claim of the '838 patent?
10 MR. HERMAN: Objection. Form.
11 A. In my analysis, I do not use anticipation in
12 invalidating the claims, I use obviousness,
13 as I discuss in the heading of each ground of
14 the five grounds.
15 BY MR. WATSON:
16 Q. So are you aware of any single prior art
17 reference that discloses every limitation of a
18 claim in the '838 patent?
19 MR. HERMAN: Objection. Form.
20 A. Using the prior art that I have disclosed in
21 the table of exhibit, those prior art do not
22 disclose every element of the claim invention

1 as arranged in the claim. So I do not use
2 anticipation for analysis. I use, as I
3 discuss multiple times already, obviousness
4 in invalidating the claims that are listed in
5 each ground.
6 Am I aware any prior art that would
7 invalidate the claims of '838 patent based on
8 anticipation? There could be one in this
9 universe, but not the ones that I found in
10 communication with counsel that are listed in
11 the exhibit table.
12 BY MR. WATSON:
13 Q. Fair. So none of the prior art references you
14 cite in your declaration disclose every
15 limitation of a claim from the '838 patent.
16 MR. HERMAN: Objection. Form.
17 A. As I discuss previously, and multiple times,
18 that each ground of the five grounds I use
19 obviousness in invalidating the claims of the
20 '838 patent and I do not use anticipation in
21 invalidating the claims of the '838 patent.
22 BY MR. WATSON:

1 Q. You don't use anticipation because you aren't
2 aware of any prior art reference that
3 discloses each limitation of a claim from the
4 '838 patent.
5 MR. HERMAN: Objection. Form.
6 A. That's not what I said. What I said is the
7 prior art that I cited in the exhibit list do
8 not disclose every element of a claimed
9 invention arranged or stated in the claim.
10 BY MR. WATSON:
11 Q. So the prior art that you cite in your
12 declaration do not disclose every element of
13 the claimed invention arranged or stated in
14 the claim.
15 MR. HERMAN: Objection. Form.
16 A. The prior art -- the prior arts that I cited
17 in the table of exhibit in paragraph 17 do
18 not disclose every element of a claim
19 invention, wouldn't did you say, as arranged
20 or stated in the claim.
21 BY MR. WATSON:
22 Q. Let's turn to paragraph 130 of your

1 declaration. Let me know when you're there.
2 A. Yes, I'm there.
3 Q. Ground 1 of your declaration relies on a
4 reference called Kim, in view of the knowledge
5 of a person of ordinary skill in the art.
6 Correct?
7 A. Yes.
8 Q. Let's turn to paragraph 144. And let me know
9 when you're there.
10 A. Yes.
11 Q. Paragraphs 144 through 167 discuss what you
12 identify as limitations 1.A and 12.A.
13 Correct?
14 A. Yes.
15 Q. And limitations 1.A and 12.A recite "a first
16 material layer and a second material layer,
17 wherein the first material layer is disposed
18 over a first portion of the second material
19 layer; and"...
20 Correct?
21 A. That's what it says there.
22 Q. And it's your opinion that Kim teaches

1 limitation 1.A.
2 A. It's my opinion that Kim teaches "a first
3 material layer and a second material layer,
4 wherein the first material layer is disposed
5 over the first portion of the second material
6 layer."
7 Q. You do not rely on obviousness to show that
8 Kim invalidates limitations 1.A/12.A of the
9 '838 patent.
10 MR. HERMAN: Objection. Form.
11 A. Would you say that again?
12 BY MR. WATSON:
13 Q. You don't rely on obviousness to show that Kim
14 teaches this limitation.
15 MR. HERMAN: Same objection.
16 A. As I discussed earlier, that the claims
17 listed in Ground 1 are obvious over Kim, but
18 in a certain -- for a certain limitation such
19 as 1.A -- 1.A and 12.A, that "a first
20 material layer and a second material layer,
21 wherein the first material layer is disposed
22 over a first portion of the second material

1 layer," Kim teaches these claim limitations.
2 BY MR. WATSON:
3 Q. Can you go to paragraph 160 of your report?
4 A. Yes.
5 Q. Kim describes a layer 122 and a layer 110.
6 Correct?
7 A. Yes.
8 Q. And in your opinion, a person of ordinary
9 skill in the art would have understood that
10 layers 122 and layer 110 form a first material
11 layer. Correct?
12 A. That is what I have written in paragraph 160,
13 that because the layer 122 along with layer
14 110 is used -- used to define Kim's stack
15 structure, and because layers 110 and 122 are
16 formed from the same material such that they
17 form one structure, as Kim it state -- itself
18 states.
19 So in my opinion, a POSITA would
20 have understood that they, together, form a
21 first material layer.
22 Q. So layers 110 and 122 of Kim form a first

1 material layer, in your opinion. Correct?
2 A. That is correct. Because in paragraph 147, I
3 discuss what the '838 patent explain what a
4 layer is, that -- a layer does not need to be
5 only a single defined layer of homogeneous
6 material. Instead, a layer can include
7 multiple layers and can be inhomogenous.
8 The patent [as read]: Also explain
9 that a layer can simply and material located
10 between any set of horizontal plane.
11 Q. Okay. So, Dr. Lee, I appreciate your
12 explanation. I just want to make sure I
13 understand your opinions here.
14 Layers 110 and 122 of Kim form a
15 first material layer. Correct?
16 A. That is what I have written there.
17 Q. Okay. Let's go to paragraph 168 of your
18 report.
19 A. Okay.
20 MR. HERMAN: And also, Counsel, when
21 you get to a convenient point, I think we've
22 been going for about an hour and 20 minutes.

1 MR. WATSON: You know what? Let's
2 take a break right now, that works for me,
3 before we move on to the next topic. That
4 works.
5 (Off the record at 11:18 a.m.)
6 (Back on the record at 11:27 a.m.)
7 BY MR. WATSON:
8 Q. Dr. Lee, during the break did you talk to
9 anybody?
10 A. No.
11 Q. Okay. All right, let's turn to paragraph 168
12 of your declaration. Can you let me know when
13 you're there?
14 A. Yes.
15 Q. It's your opinion that Kim teaches a landing
16 pad disposed over a second portion of the
17 second material layer. Correct?
18 Dr. Lee, do you need me to repeat my
19 question?
20 A. No. In paragraph 168 I stated that, in my
21 opinion, Kim teaches the claim landing pad,
22 and the landing pad is disposed over the

1 second portion of the second material later.
2 Q. Let's turn to paragraph 175 of your report.
3 A. Okay.
4 Q. Paragraph 175 shows an annotated version of
5 Kim Figure 4B. Correct?
6 A. That's right.
7 Q. Now, you label the first portion of the second
8 material layer of Kim so that it extends
9 beneath the first material layer. Correct?
10 MR. HERMAN: Objection. Form.
11 A. Can you repeat that again?
12 BY MR. WATSON:
13 Q. You label the first portion of the second
14 material layer in Kim so that it extends
15 beneath the first material layer.
16 MR. HERMAN: Objection. Form.
17 A. I don't -- I do not understand your question.
18 BY MR. WATSON:
19 Q. All right, let me try -- let me try to
20 rephrase these -- the questions a little bit.
21 You label the landing pad --
22 THE WITNESS: Just one second. Hold

1 on one second. I'm sorry.
2 MR. WATSON: Do we want to go off the
3 record real quick? I don't know where he
4 went.
5 THE WITNESS: Go ahead.
6 BY MR. WATSON:
7 Q. Okay, welcome back, Dr. Lee. Everything okay?
8 A. Yeah. Yeah, yeah.
9 Q. Okay. Dr. Lee, you label, in paragraph 175,
10 the landing pad in gold; is that right? Or
11 strike that.
12 Dr. Lee, in paragraph 175 you label
13 the landing pad orange; is that right?
14 A. Some brownish color, yes.
15 Q. Okay. And you label the first portion of the
16 second material layer of Kim with a red
17 ellipsis; is that fair?
18 A. A bracket, yeah.
19 Q. A bracket. Okay. And you label the first
20 material higher in blue. Correct?
21 A. Yes.
22 Q. The bracket that you used to label the first

1 portion is the same width in the X direction
2 as the first material layer. Correct?
3 A. Well --
4 MR. HERMAN: Objection. Form.
5 A. -- Figure 4B annotated on page 51, I have
6 another -- if you turn to page 59 -- sorry.
7 Sorry, 57.
8 Okay, this is a zoom-in -- that right
9 there. This is a zoom-in figure of the
10 zoomed-out figure on page 51 of my
11 declaration. This zoomed-in figure is more
12 accurate, while the one that you just
13 presented on the screen earlier is a zoom-out
14 figure, is less precise.
15 So what I've shown here is that the
16 second portion is designated such that the
17 landing pad is in the middle of the second
18 portion, symmetrical with respect to the
19 landing pad. That is, the second portion
20 would have an equal amount of space on the
21 left and on the right of the landing pad.
22 So the second portion is shown in the

1 Figure 4B, annotated Figure 4B on page 57, and
2 the rest of the second material layer is the
3 first portion.
4 Q. So using the Figure 4B from paragraph 196 of
5 your declaration, the first portion is the
6 portion of the second material layer that you
7 have not labeled as second portion.
8 A. So the rest of the gate electrode layer that
9 is -- sorry. Yeah, the rest of the gate
10 electrode layer, that is the second material
11 layer that is not labeled second portion in
12 paragraph 197, is the first portion.
13 Q. So the rest of the gate electrode layer, that
14 is the second material layer that is not
15 labeled second portion in paragraph 196, is
16 the first portion.
17 A. That is correct. The second material layer
18 is divided into first portion and second
19 portion.
20 Q. Okay.
21 A. What I label in paragraph 196 is the second
22 portion. And the rest of the gate electrode

1 layer which is called the second material
2 layer, is the first portion.
3 Q. Does the first portion of the second material
4 layer of Kim extend beneath --
5 A. Hello?
6 Q. -- the first material layer that is labeled
7 122?
8 Let me -- let me repeat that
9 question. That question got broken up.
10 Sorry. Strike that.
11 Does the first portion of the second
12 material layer of Kim extend beneath the layer
13 122 of the first material layer?
14 MR. HERMAN: Objection. Form.
15 A. So I mentioned previously, the first material
16 layer includes both Kim's insulating layer
17 110 and the adjacent portion of the auxiliary
18 insulating layer 122 together constitute the
19 claimed first material layer.
20 And the annotated drawing that I
21 have in Figure 4B on page 57 which is shown
22 on the screen in paragraph 196, shows the

1 second portion which is designated such that
2 the landing pad is in the middle of the
3 second portion, which means symmetrical with
4 respect to the landing pad; that is, the
5 second portion would have equal amount of
6 space on the left and on the right of the
7 landing pad.
8 And so your question is that whether
9 the first portion include part of 122 or not,
10 since this is -- this is a magnified drawing,
11 and the first material include both 122 and
12 110, and whether the first portion -- whether
13 the second portion encroach into the region
14 110 or not is hard to say, so...
15 But what I know is that the rest of
16 the gate electrode, which is the second
17 material layer, which is not labeled, the
18 second portion in Figure 4B in paragraph 196
19 is the first portion.
20 BY MR. WATSON:
21 Q. So you labeled the landing pad in Figure 4B in
22 an orange-ish brown color. Correct?

1 A. Yes.
2 Q. The landing pad does not extend to the end of
3 the stair. Correct?
4 A. You mean it does not extend to the end of the
5 second material layer.
6 Q. Sure.
7 A. Yes.
8 Q. The landing pad does not extend to the end of
9 the second material layer. Correct?
10 A. That's what I said.
11 Q. And the landing pad does not extend to layer
12 110 either.
13 A. Well, obviously not, as shown in the photo --
14 as shown in the figure.
15 Q. Okay. The second portion of the second
16 material layer of Kim that you identify is
17 beneath the landing pad. Correct?
18 A. Yes. The -- that's correct.
19 Q. The second portion of the second material
20 layer is also beneath the auxiliary layer 122.
21 Correct?
22 A. Can you repeat the question?

1 Q. The second portion of the second material
2 layer in Kim is also beneath the auxiliary
3 layer 122.
4 A. That's correct.
5 Q. Is any portion of the first portion of the
6 second material layer beneath auxiliary layer
7 122?
8 A. I think I answered that question already,
9 that what I designated the second portion is
10 to be -- to such that the landing pad is in
11 the middle of the second portion. In other
12 words, is symmetrical with respect to the
13 landing pad. In other words, that the second
14 portion have equal amount of space on the
15 left and on the right of the landing pad.
16 So whether that space on the left
17 consumed the entire 122 or only part of 122 is
18 hard to tell because this is -- the
19 Figure 4B -- this is a zoomed-in version of
20 Figure 4B.
21 Q. So you can't tell me whether the second
22 portion of the second material layer is

1 beneath all of the auxiliary layer 122?
2 MR. HERMAN: Objection. Form.
3 A. The way the drawing is shown seems to suggest
4 that it's right -- the left end of the second
5 portion seems to be close to the border, in
6 the section between region 122 and region
7 110, but it could be a little left of the
8 intersection or a little right of the
9 intersection.
10 So to answer your question, that the
11 second portion of the second material layer
12 is probably beneath the entirety or close to
13 the entirety of 122 layer.
14 But in terms of the invalidity of
15 this claim, that minute detail is somewhat
16 unimportant because whether it encroach the
17 second portion is underneath the entire 122
18 and even go into 110 or not or only consume
19 99 percent of 122. In either case, the claim
20 limitation is satisfied by Kim.
21 BY MR. WATSON:
22 Q. So the second portion of the second material

1 layer is beneath either the entirety or close
2 to the entirety of the 122 layer. Correct?
3 A. That is correct, that the second portion is
4 underneath nearly the entirety or close to
5 the entirety of 122, highlighted in blue in
6 Figure 4B of 196, paragraph 196.
7 Q. There are portions of the second portion of
8 the second material layer that are beneath
9 layer 122 that is to the left of the landing
10 pad. Correct?
11 A. That's what we're talking about, that it's --
12 we have been talking about region 122 to the
13 left of the landing pad.
14 Q. There are also portions of the second material
15 layer that are beneath auxiliary layer 122 to
16 the right of the landing pad. Correct?
17 A. Yeah, the highlighted -- that's not
18 highlighted in blue.
19 Q. Okay. But there are portions of the second
20 material layer that are beneath auxiliary
21 layer 122 to the right of the landing pad in
22 Figure 4B of Kim.

1 A. That's what I've been telling you, that
2 there's equal space on the left and the right
3 of the landing pad.
4 Q. Okay. The first portion of the second
5 material layer in Kim does not end beneath the
6 landing pad. Correct?
7 A. As I mentioned before, as shown in the
8 figure -- annotated Figure 4B in
9 paragraph 196, the rest of the second
10 material layer that is not labeled the second
11 portion, is the first portion of the second
12 material layer.
13 As you can see, that it does not
14 extend to the landing pad.
15 Q. Now, the second portion of the second material
16 layer in Kim extends until it touches
17 auxiliary insulating layer 122. Correct?
18 A. I don't understand your question. To the
19 right?
20 Q. Let me repeat it. The second portion of the
21 second material layer in Kim extends until it
22 touches auxiliary insulating layer 122 to the

1 right.
2 A. Yes, because that's the end of the second
3 material layer to the right.
4 Q. Auxiliary layer 122 is not part of the second
5 material layer. Correct?
6 A. No, none of the auxiliary layer 122 is part
7 of the second material layer. The second
8 material layer is gate electrode. It's a
9 conductive material. The first material 122
10 is insulating material.
11 Q. Let's turn to paragraph 183 of your report.
12 Let me know when you're there.
13 A. Okay. Yes.
14 Q. You say that for limitations 1.B.2 and
15 limitation 12.B.2, [as read]: Kim, in view of
16 knowledge of a POSITA, renders these
17 limitations obvious. Correct?
18 A. Yes.
19 Q. You don't opine that Kim teaches this
20 limitation. Correct?
21 A. That's correct.
22 Q. Okay. Let's turn to paragraph 187. Let me

1 know when you're they're.
2 A. Uh-huh.
3 Q. You say that "layers 110 and 122 together
4 correspond to the claimed 'insulating layer.'"
5 Do you see that?
6 A. Yes.
7 Q. What is the "claimed 'insulating layer'" you
8 refer to here?
9 A. My apologies, I think I meant to say the
10 second material, the claim -- sorry.
11 The first material layer. Where are
12 you? 187, right?
13 Q. Correct.
14 A. Yeah, paragraph 187, yeah, together
15 correspond to the insulating layer, which is
16 the claimed first material layer.
17 Q. Got it. So in paragraph 187, you're saying
18 layers 110 and 122 together correspond to the
19 claimed first material layer; is that correct?
20 A. That's correct.
21 Q. Okay. Let's turn to paragraph 194.
22 A. Yes.

1 Q. Okay. In paragraph 194, you show Figure 6 of
2 Kim. Correct?
3 A. Yes.
4 Q. And in paragraph 194, you highlight Figure 6
5 of Kim with a yellow landing pad. Correct?
6 A. Yeah, brownish.
7 Q. Okay. And in Kim Figure 6, the bottom surface
8 of the landing page contacts the top surface
9 of the second material layer. Correct?
10 A. Can you repeat that question again?
11 Q. Yeah. In Kim Figure 6, the bottom surface of
12 the landing pad is in contact with the top
13 surface of the second material layer.
14 Correct?
15 A. Yeah, that's correct.
16 Q. Does Figure 6 show insulating layer 110?
17 A. It does show 110, but not -- you see that
18 it's a label 110 in the figure?
19 Q. I see label 110, yes.
20 A. Yeah. That shows the insulating layer 110,
21 but it does not show -- for the purpose of
22 illustration, it doesn't show the region of

1 the insulating layer surrounding the landing
2 pad.
3 Q. Insulating layer 110 in Figure 6 does not
4 contact the landing pad. Correct?
5 A. For the purpose of illustration, they do not
6 show the insulating layer 110 or 122
7 surrounding the insulating layer --
8 surrounding the landing pad.
9 Q. I'll get to figure -- layer 122 in a second.
10 My question was, the insulating layer
11 110 in Kim does not contact the landing pad.
12 Correct?
13 A. That is correct.
14 Q. As you mentioned, Figure 6 of Kim does not
15 show auxiliary insulating layer 122. Correct?
16 A. That is correct.
17 Q. And Figure 6 of Kim does not show the landing
18 pad side surfaces in contact with any layer.
19 Correct?
20 MR. HERMAN: Objection. Form.
21 A. I think the Figure 6 is drawn in such a way
22 as for illustration purposes, to show that

1 the landing pad and the relative location
2 with the second material, so therefore if
3 they show the auxiliary material, the
4 insulating material, it would not serve the
5 purpose of this illustration of Figure 6.
6 BY MR. WATSON:
7 Q. If Figure 6 showed auxiliary layer 122, that
8 would surround the landing pad. Correct?
9 A. If Figure 6 were to show the auxiliary layer
10 122, that insulating layer 122 will be
11 surrounding the landing pad.
12 Q. And the auxiliary layer 122 would be in
13 contact with each of the landing pad's side
14 surfaces. Correct?
15 MR. HERMAN: Objection. Form.
16 A. Well -- what do you mean by the "side
17 surface"?
18 BY MR. WATSON:
19 Q. Would -- where would -- all right. Where
20 would you describe the auxiliary layer 122 --
21 strike that.
22 Where would you describe -- strike

that.

Which surfaces of the landing pad would you describe as being in contact with auxiliary layer 122?

A. Well, you could -- okay. Can you repeat that question again?

Q. Which surfaces of the landing pad would you describe as being in contact with auxiliary layer 122 in Kim?

A. So first of all, the claim only recites side surfaces. It doesn't say lateral, vertical, horizontal, or internal side surface.

So the 122 -- auxiliary layer 122, if it's drawn in Figure 6, it will show that it will be in contact with the vertical side surface. Vertical means in the Z axis --

Q. Okay.

A. -- of the landing pad. There are four vertical side surfaces of the landing pad in Figure 6, so the auxiliary layer 122 would have been in contact with the four vertical side surfaces of the landing pad.

1 Q. Okay. Now, if you added auxiliary layer 122
2 to Figure 6 of Kim, it would extend from layer
3 110 to over the end of the second material
4 layer. Correct?
5 A. Yeah, you can see that in the annotated
6 cross-section on page 57 that we just looked
7 at. Page 57.
8 Q. Now, your analysis of limitations 1.B.2 and
9 12.B.2 spans from paragraphs 183 to paragraph
10 202. Correct?
11 A. Yes.
12 Q. And in those paragraphs you cite Figures 4B
13 and Figure 6 of Kim. Correct?
14 A. That's right.
15 Q. You do not cite to any other figures in Kim in
16 forming your opinions about limitations 1.B.2
17 and 12.B.2. Correct?
18 A. So my cite in Figure 6 is sufficient to --
19 together with Figure 4B is sufficient to
20 invalidate or to satisfy claim element 1.B.2
21 and 12.B.2. I could have also cite, I
22 believe it's, Figure 5 of Kim to illustrate

1 the -- in addition to Figure 6 in
2 paragraph 194, to illustrate that whether the
3 landing pad is an island shape landing pad as
4 shown in Figure 6 or a bar shape landing pad.
5 I don't remember exactly what figure
6 number it is. I believe it's Figure 5. But
7 if you can upload that -- Kim's reference, I
8 can tell you exactly.
9 Q. Do you cite in your declaration Figure 5 of
10 Kim?
11 A. Not in these paragraphs.
12 Q. So you don't cite Figure 5 of Kim in your
13 paragraphs regarding limitation 1.B.2 and
14 12.B.2. Correct?
15 A. That is correct. But I'm telling you now
16 that whether the landing pad is an island
17 shape, as shown in Figure 6, or bar shape, as
18 shown in -- I believe it's Figure 5 of Kim,
19 that both will satisfy the limitations of
20 1.B.2 and limitation of 12.B.2.
21 Q. Did you cite Figure 5 of Kim anywhere in your
22 declaration?

1 A. I just searched for it. I don't think so.
2 Q. So you're not aware of anyplace in your
3 declaration where you cited to Figure 5 of
4 Kim?
5 A. Not at this moment.
6 Q. Okay. Let's turn to paragraph 202 of your
7 declaration.
8 A. Okay.
9 Q. Let me know when you're there.
10 A. I'm here.
11 Q. You say that the second side surface must be
12 displaced in any direction parallel to the
13 substrate surface. Correct?
14 A. That's right.
15 Q. And then you say, "It does not matter which
16 direction this displacement occurs in, so long
17 as the displacement is in the plane parallel
18 to the substrate."
19 A. That's right.
20 Q. Why do you believe the direction of
21 displacement is irrelevant?
22 A. Can you upload the patent '838, please?

1 Q. Do you need the patent '838 to answer that
2 question?
3 A. Yes.
4 Q. Okay. Well, we'll --
5 A. I'd like to cite the quote in '838 patent.
6 Q. Is the quote here in the declaration or is it
7 just one you know off the top of your head?
8 A. I think -- I think it would be good if you
9 can upload '838 patent.
10 Q. I'll do that in a second. Let's move on and
11 we can come back to that question later.
12 A. Okay.
13 Q. So do you agree that the second side surface
14 is displaced in any direction parallel to the
15 substrate surface from the first side surface?
16 A. That's what I've written in 202.
17 Q. So the side surfaces can be displaced from
18 each other in any direction parallel to the
19 substrate surface; is that right?
20 A. It does not matter which direction that
21 displacement occur so long as the
22 displacement is in parallel, in the plane

1 parallel to the substrate. So, for instance,
2 in the context of Figure 4B of Kim,
3 displacement either to the right or to the
4 left of the figure qualify as a claim lateral
5 displacement.
6 Q. Since the side surfaces have to be displaced
7 in a direction parallel to the substrate
8 surface, do the side surfaces themselves also
9 have to be parallel to the substrate of the
10 surface?
11 MR. HERMAN: Objection. Form.
12 A. The side -- the side surface to be parallel
13 to the substrate? I said the displacement is
14 parallel to the substrate of the surface --
15 of the substrate surface. I did not say the
16 second side surface is parallel to the
17 substrate surface.
18 BY MR. WATSON:
19 Q. So the second surface is not parallel to the
20 substrate surface. Correct?
21 A. No. The displacement is parallel to the
22 substrate surface, not the side surface.

1 Q. Got it. So the side surfaces are not parallel
2 to the substrate surface, the displacement is.
3 Correct?
4 A. The displacement is parallel to the substrate
5 surface.
6 Q. Okay. Let's turn to paragraph 294 of your
7 declaration.
8 A. Okay.
9 Q. Are you there?
10 A. Yes.
11 Q. Okay. Ground 2 of your opinions relies on Kim
12 and Yang in view of the knowledge of a person
13 of ordinary skill in the art. Correct?
14 A. Yes.
15 Q. Let's turn to paragraph 298 of your
16 declaration.
17 A. Yes.
18 Q. Do you agree that Kim does not teach a lateral
19 distance as claimed in Claims 3 and 18 of the
20 '838 patent?
21 A. Yeah, as I mentioned, that Kim does not
22 provide a numerical example quantify --

1 quantifying the distance between the side of
2 this landing pad and the side of the
3 conductive layer below it.
4 Q. So you rely instead on the Yang reference to
5 teach the lateral distance limitation of
6 Claims 3 and 18. Correct?
7 MR. HERMAN: Objection. Form.
8 A. Well, I think a POSITA implementing Kim's
9 structure would want to use common,
10 well-known dimensions. The prior art
11 reference similar to Kim, for example, Yang,
12 which is Exhibit 1007 here, provides such
13 example and relevant dimensions. That is why
14 I cited -- referenced Yang in this ground.
15 BY MR. WATSON:
16 Q. So you used Yang to provide an example of
17 dimensions that would meet the lateral
18 distance limitation of claims 3 and 18?
19 A. I use Yang in providing such example and
20 relevant dimensions so that a POSITA
21 implementing Kim and this structure can use
22 such common, well-known dimensions.

1 Q. Turn to paragraph 297 of your expert report.
2 A. 297? Okay.
3 Q. Kim teaches landing pads that are located
4 within the bounds of the sides of a lower
5 second material layer. Correct?
6 A. That's what it says here.
7 Q. And Kim also teaches landing pads that are
8 laterally displaced from the sides of a lower
9 second material layer. Correct?
10 A. That is what is written in paragraph 297.
11 Q. Okay. Let's go to paragraph 317.
12 A. 317? Yep.
13 Q. In paragraph 317, you depict an annotated
14 version of Yang Figure 2, right?
15 A. That's right.
16 Q. And in the figure in paragraph 317, you added
17 numbers of different dimensions into the
18 figure. Correct?
19 A. Yeah, based on the dimension that they --
20 that Yang disclosed -- discloses, I concluded
21 that between the landing pad to the end of
22 the gate electrode layer is 20 to 190

1 nanometer.
2 Q. To be clear, Yang Figure 2 does not show the
3 dimensions that you have labeled on the
4 figure. Correct?
5 A. Which dimension?
6 Q. Any of the dimensions in red or blue that
7 you've annotated on Figure 2.
8 A. I think it does shows -- can you upload
9 Figure 2 so that I can refresh my memory?
10 Because I think that Yang discloses dimension
11 such that a person of ordinary skill in the
12 art would be able to deduct the dimension of
13 20 to 190 nanometer, the distance between the
14 landing pad and the end of the gate electrode
15 layer.
16 Q. I'm going to upload Yang in a second, but I
17 want to refer you to -- you have the full
18 Figure 2 from Yang unannotated below in
19 Figure 317. Correct?
20 A. 317... yes.
21 Q. Okay. And in the original Figure 2, none of
22 the numbers in red or in blue have been

1 annotated. Correct?
2 A. Right.
3 Q. Okay. You added those numbers into Figure 2
4 based on your understanding of the
5 specification of Yang. Correct?
6 A. That is correct.
7 Q. Let's go to paragraph -- well, let's keep
8 looking at this paragraph. You still with me
9 on paragraph 317?
10 A. Yes.
11 Q. According to you, Yang's landing pad in
12 Figure 2 is 220 to 240 nanometers wide in the
13 X direction. Correct?
14 A. I believe so.
15 Q. Let's turn to paragraph 311. Can you tell me
16 when you're there?
17 A. Yes.
18 Q. You calculated the width of the landing pad
19 based on disclosures in Yang. Correct?
20 A. Yes.
21 Q. Yang never expressly says the width of the
22 landing pad is 220 to 240 nanometers.

1 Correct?
2 A. Yeah, I believe that the -- as I've written
3 there, the -- given the dimensions shown in
4 paragraph 311, that a POSITA can calculate if
5 the pads are located approximately in the
6 middle of each staircase steps that the
7 Yang's will be set back from the edge of the
8 underlying conductive layer 114 by about 80
9 to 190 nanometer, and that the staircase
10 steps has a length of 400 to 600 nanometer,
11 and so therefore the contact pad width would
12 be around 220 to 240 nanometer.
13 Q. But Yang never expressly says the width of the
14 landing pad is 220 to 240 nanometers.
15 Correct?
16 A. No, but given the -- all the other numbers, a
17 person of ordinary skill in the art would
18 have sufficient amount of data to approximate
19 the contact pad width of Yang.
20 Q. To calculate the width of the landing pad in
21 Yang, you used this equation in paragraph 311
22 which says, ECDs is greater than ECDc plus 2S.

1 Correct?
2 A. That's right.
3 Q. What does "ECDs" stand for?
4 A. The size of the contact pad.
5 Q. What does "ECDc" stand for?
6 A. Let's see... so ECDs is the pad, and there's
7 two side to the -- so there's a pad right
8 here, and then there's also an opening.
9 Right? And that -- I believe that ECDc is
10 the opening of the pad and the ECDs is the
11 contact pad, and that S is the -- basically,
12 the spacing on each side of the pad.
13 Q. So ECDc stands for the width of the contact
14 openings. Correct?
15 A. Yes. That's I -- that's what I recall, yes.
16 Q. You estimate the EDC -- strike that.
17 You estimate the ECDc would be
18 193 nanometers. Correct?
19 A. That's right.
20 Q. And you base that 193 nanometers on the
21 contact openings being formed using a 193
22 nanometer ArF excimer laser stepper. Correct?

1 A. Yeah, that is what is shown in paragraph --
2 in column 10, as I've shown there, column 10,
3 lines 17 to 21 at -- the specific -- the
4 specification value S in the range of 10 to
5 20 nanometer.
6 Q. How does knowing the excimer wavelength help
7 determine the size of the contact openings
8 122?
9 A. Well, the -- each excimer laser stepper would
10 have a resolution, and, in general, the
11 smallest dimensions comfortably will be what
12 the wavelength is, so that's how we come up
13 with the 193, and then we approximate to be
14 200 nanometer.
15 Q. Does ArF wavelength dictate the size of the
16 contact openings?
17 A. In general, the wavelength -- let's see.
18 Hold on.
19 The 193 nanometer ArF laser basically
20 set the optical resolution limit in
21 photolithography and the internal constraint,
22 the minimum achievable contact hole size, and

1 a person of ordinary skill in the art would
2 understand that the 193 nanometer wavelength
3 can easily define 193 nanometer contact hole
4 opening.
5 And that's how I used the number 193
6 nanometer, and a person of ordinary skill in
7 the art would understand that that is a
8 well-acceptable number.
9 Q. Can the contact openings be made smaller than
10 the wavelength used -- strike that.
11 Can the contact's openings be smaller
12 than the wavelength of the laser used in the
13 lithography?
14 A. It could, but as you know, that -- if you
15 make it too small, that the resistance will
16 be very high.
17 And so I think in this particular
18 case, 193 is a -- a person of ordinary skill
19 in the art would understand that the opening
20 of 193 nanometer would be -- would be very --
21 very acceptable number, value.
22 Q. Why would a person of ordinary skill consider

1 193 to be the size of the contact openings in
2 comparison to, say, 100 or some smaller size?
3 A. Well, the reason is that -- as I mentioned,
4 193 nanometer sets the optical resolution
5 limit for the photolithography. You can try
6 to use all kinds of tricks of double
7 patterning, spacer base, multi -- multiple
8 patterning, but if you use a single
9 patterning of ArF opening -- ArF laser,
10 that -- and considering the resistance of the
11 contact hole, that -- of the contact, that
12 193 -- a person of ordinary skill in the art
13 considering the resolution limit will
14 understand that 193 is a good number for
15 using as the ECD under letter -- small letter
16 C to be 193 nanometer.
17 MR. WATSON: Let's pull up Yang.
18 That would be Exhibit 1007.
19 ENTERED INTO THE RECORD:
20 PREVIOUSLY MARKED EXHIBIT 1007
21 12:37 p.m.
22 PLANET DEPOS TECH: Counsel, that's

1 in the Chat and you have control of what's on
2 the screen.
3 MR. WATSON: Thank you.
4 A. Okay.
5 BY MR. WATSON:
6 Q. Exhibit 1007 is the Yang reference you
7 referred to in your declaration. Correct?
8 A. That's right.
9 Q. Let's turn to column 10, lines 17 through 22.
10 A. All right.
11 Q. Are you there?
12 A. Yes.
13 Q. The laser described in Yang is a 193 nanometer
14 ArF excimer laser stepper manufactured by
15 ASML, model 1450H. Correct?
16 A. Right.
17 Q. What is ASML?
18 A. It's a photolithography machine.
19 Q. Have you ever used an ASML 193 nanometer ArF
20 excimer laser stepper?
21 A. We have a number of laser stepper in my lab,
22 which is a shared lab in the microelectronics

1 center, and I don't recall exactly what the
2 model number is, but we do have steppers.
3 And ASML is a well-known company that provide
4 laser stepper. I don't know if it is exact
5 model number.
6 Q. Are you aware of whether the ASML 193
7 nanometer ArF excimer laser stepper can create
8 contact openings smaller than 193 nanometers?
9 A. As I mentioned, that 193 nanometer means it's
10 the optical resolution limit, and obviously
11 that by using various pattern, technique, or
12 so-called pattern tricks such as double
13 patterning or spacer base multi -- multiple
14 patterning, one can use -- one can create
15 dimension much smaller than 193 nanometer.
16 But a single patterning 193 is
17 easily achievable, and, again, you don't want
18 the contact hole to be too small because that
19 would give you a very high resistance at
20 the -- which would degrade your performance
21 of the device.
22 Q. Are you aware whether the ASML 193-nm ArF

1 excimer laser stepper can create contact
2 openings smaller than 193 nanometers using a
3 single pattern?
4 A. I don't recall exactly. It might be, but
5 like I said, that is -- for a person of
6 ordinary skill in the art, using such a
7 machine can easily fabricate 193 without a
8 lot of difficulty.
9 So 193 is a -- is a good number,
10 considering not only the resolution limit but
11 also considering the resistance of the
12 contact hole.
13 Q. So you could use the excimer laser described
14 in Yang to make contact openings larger than
15 193 and smaller than 193 nanometers. Correct?
16 MR. HERMAN: Objection. Form.
17 A. You could, but once again, the prior art
18 reference number similar to Kim, such as
19 Yang, in this case, simply provide a -- an
20 example and relevant dimensions for someone
21 who would like to implement Kim's structure.
22 BY MR. WATSON:

1 Q. Yang does not provide a fixed number for how
2 large the contact openings are. Correct?
3 MR. HERMAN: Objection. Form.
4 A. Again, that Yang might not have provide
5 certain numbers, but a person of ordinary
6 skill in the art considering the --
7 considering the tools that's used and the --
8 considering the resistance and -- as well as
9 the optical resolution limit, the 193 number
10 is a very practical number that a person of
11 ordinary skill in the art would conclude it.
12 BY MR. WATSON:
13 Q. Yang does not identify 193 nanometers as the
14 width of the contact opening. Correct?
15 MR. HERMAN: Objection. Form.
16 A. As I mentioned, that the -- and I -- and I
17 stated in the -- in my declaration that how I
18 arrive at the contact pad having a width of
19 220 to 240, and that the -- this is based on
20 the rough calculations of -- from the number
21 that's given in Yang.
22 BY MR. WATSON:

1 Q. But Yang does not disclose using the 193
2 nanometer ArF excimer laser stepper to create
3 contact openings that are 193 nanometers.
4 MR. HERMAN: Objection. Form.
5 A. Not explicitly.
6 BY MR. WATSON:
7 Q. Okay. Let's go to paragraph 306 of your
8 declaration.
9 A. 306?
10 Q. 306. So let's -- can we change to declaration
11 1003?
12 A. Yep.
13 MR. HERMAN: And also, Counsel, I
14 think it's been about another hour and a half,
15 or a little less than that, an hour and 20
16 minutes, so when we get to a convenient place.
17 MR. WATSON: Okay.
18 BY MR. WATSON:
19 Q. Are you there, Dr. Lee? Can you turn to
20 paragraph 306 of your declaration?
21 A. Okay.
22 Q. You say that [as read]: Yang's pads 120 are

1 situated to be approximately in the middle of
2 each step of the staircase structure.
3 Correct?
4 A. Yes.
5 Q. Can you identify for me the disclosure in Yang
6 you rely on to say that the pad is in the
7 middle of each step?
8 A. I didn't say that they're right in the middle
9 of each step of the staircase. I said it's
10 located approximately in the middle of each
11 step of the staircase, as shown in Figure 2.
12 Q. So you based your opinion that the pads are
13 approximately in the middle of each step based
14 on Yang Figure 2. Correct?
15 A. You see the -- even though figures in patent
16 are not drawn to scale, but it does
17 illustrate relevant -- relative space and
18 relative dimensions with respect to each
19 other.
20 So as one can see, that the pads, as
21 shown in Figure 2, are located approximately
22 in the middle of each step of the staircase

1 structure.
2 Q. Other than Figure 2, do you rely on any other
3 disclosures in Yang for your opinion that
4 Yang's pads are situated approximately in the
5 middle of each step?
6 A. I don't think explicitly they -- Yang
7 disclose that relevant -- relative position,
8 but a person of ordinary skill in the art
9 would understand that not only Figure 2
10 illustrate the pad is situated approximately
11 in each -- in the middle of each step of the
12 staircase, but in practice, you also want the
13 pad to be in the middle -- approximately in
14 the middle of each step because if you get
15 too close to one side, to the right or one --
16 on the -- too close to the -- to the left,
17 any slight misalignment will give you a
18 nonfunctional chip.
19 So, therefore, by usual practice and
20 ensure good tolerance of the -- the process
21 and such that you create, which we saw in the
22 highest yield of the manufacturing fabrication

1 process, that it is a standard process,
2 standard practice to put the pads to be
3 located approximately in the middle of each
4 step of the staircase structure.
5 So Yang does not have to explicitly
6 mention that or disclose that in these
7 specifications. It is well understood and it
8 is well common practice.
9 Q. So Yang does not expressly disclose that the
10 pad is approximately in the middle of each
11 step. Correct?
12 A. It -- Yang does not need to do that because
13 it is a common practice and it is shown in
14 Figure 2.
15 Q. Okay. So it's your opinion that it's common
16 practice to put the pad in the middle --
17 approximately in the middle of each step.
18 A. It is not only my opinion, it is a person of
19 ordinary skill in the art would have
20 understood that in order to avoid any
21 shorting or any defect in the chip, one would
22 want to put the pad approximately in the

1 middle of each step of the staircase
2 structure.
3 Q. But Yang does not expressly disclose that the
4 pad's approximately in the middle of each
5 step. Correct?
6 A. Again, Yang does not need to explicitly
7 disclose that.
8 Q. Okay.
9 MR. WATSON: Let's take a -- let's go
10 off the record. I think we can break for
11 lunch or whatever.
12 (Off the record at 12:51 p.m.)
13 (Back on the record at 1:05 p.m.)
14 BY MR. WATSON:
15 Q. Dr. Lee, did you talk to anyone over the
16 break?
17 A. No.
18 Q. And did you consult any additional materials
19 during the break?
20 A. No.
21 Q. Okay. Let's pull up paragraph 315 of your
22 declaration, Exhibit 1003. You say that

1 Yang's pads are set back by at least
2 20 nanometers. Do you see that?
3 A. Yes.
4 Q. And now in paragraph 315, you do not identify
5 any disclosure in Yang that says the pads are
6 set back 20 nanometers. Correct?
7 A. But that's the minimum layer thickness
8 according to Yang.
9 Q. In paragraph 314, you state that the space
10 between the pad edge and the end of the
11 underlying conductive material -- strike that.
12 In paragraph 314, you say, "the space
13 between the pad edge and the end of underlying
14 conductive layer still correspond to at least
15 the minimum thickness of the conductive and
16 insulating layers." Correct?
17 A. Right.
18 Q. And you cite Figure 2 of Yang in support of
19 that. Correct?
20 A. Yes.
21 Q. Are there any other disclosures in Yang that
22 support that the space between the pad edge

1 and end of the underlying conductive layer
2 corresponds to the minimum thickness of the
3 conductive and insulating layers?
4 A. You see, once again, Figure 2 illustrate --
5 it might not drawn to scale, but it
6 illustrate the relative dimensions of various
7 structure, and a person of ordinary skill in
8 the art would understand that the Yang's pad
9 would be set back by at least 20 nanometer.
10 Q. Why would Yang's pads be set back at least
11 20 nanometers based on Figure 2?
12 A. Well, the minimum -- it says that the minimum
13 thickness of -- the layer thickness is 20
14 nanometer. I believe it says that...
15 Q. Why is the minimum thickness of the conductive
16 and insulating layers equal to the setback
17 between the pad edge and the end of the
18 underlying conductive layer?
19 A. Well, that's approximately what the drawing
20 did show.
21 Q. So your opinion that the minimum thickness of
22 the conductive and insulating layers are equal

1 to the setback between the pad edge and the
2 underlying conductive layer is based on what
3 the drawing in Figure 2 shows?
4 A. So in general, that the conductive layer 114,
5 right, it says there's a range of 20 to 40
6 nanometer, and that the thickness, insulating
7 thickness, has a range of 40 to 60 nanometer.
8 Then the portion of the conductive layer
9 where the contact pad sits has a thickness of
10 70 to 90 nanometer. So if you add this all
11 up, you would have -- where was I...
12 Each step -- each of the step in
13 Yang, then, there's about 400 to 600
14 nanometer, and Yang refer that to the
15 distance D1 and D2.
16 So that's how we arrive at the
17 figures in paragraph 317.
18 Q. I'm specifically asking about the setback by
19 at least 20 nanometers that you talked about
20 in figure -- in paragraph 315. Do you see
21 that?
22 A. Yes.

1 Q. Why does the setback correspond to the
2 thickness of the conductive and insulating
3 layers?
4 A. I am -- okay. Hold on one second.
5 Q. Dr. Lee, it's been about four minutes.
6 A. Yeah.
7 Q. Can you -- do you want me to repeat that
8 question?
9 A. No, I don't. I'm just trying to review...
10 So -- sorry, I'm reviewing -- I was
11 reviewing the Yang's patent.
12 Basically, that I think a POSITA
13 would establish -- would understand that
14 Yang's minimum thickness, 20 nanometer, would
15 have established a practical and structural
16 lower bound for the pad's setback distance
17 because any smaller offset would risk etch
18 damage, misalignment, and shorting between
19 adjacent conductive level.
20 And so even in the most aggressive
21 design, Yang's pad would have setback by at
22 least 20 nanometer. You see, the setback is

1 important to allow for any tolerance for
2 misalignment which would risk shorting between
3 adjacent contact or conductive level.
4 So that's how I come up with the
5 number of 20 nanometer setback.
6 Q. So you based your opinion that the thickness
7 of the conductive layer is approximately --
8 strike that.
9 You based your opinion that the
10 thickness of the conductive and insulating
11 layers is approximately the same amount of the
12 setback based on what a person of ordinary
13 skill would have understood.
14 A. Exactly. Because in Figure 2, each
15 conductive layer is about 10s of nanometer
16 thick, and so just like any device would have
17 used etching and deposition alignment, and so
18 20 nanometer offset basically as a required
19 margin to prevent shorting or over-etch
20 penetration to the adjacent layers.
21 Q. Can you identify --
22 A. So --

1 Q. Sorry.
2 A. -- in the -- so, therefore, a person of
3 ordinary skill in the art would understand
4 that you need to prevent any electrical
5 failure caused by over-etching and
6 maintaining at least a layer of thickness
7 between the pad edge and the standard step
8 edge, which is the setback, would ensure
9 that -- you know, if there's any edge
10 variation must not expose or short the
11 neighboring conductive layer.
12 You see what I'm saying?
13 Q. Can you point to me where in your declaration
14 you issue the opinion that a person of
15 ordinary skill would have understood that the
16 thickness of the conductive and insulating
17 layer needs to match the setback because of
18 etching concerns?
19 A. Well, a person of ordinary skill in the art
20 would have understood all these constraints
21 that I just mentioned. I don't think a
22 person of ordinary skill in the art designing

1 the dimensions, relative dimension, would
2 have understood that the practical structural
3 lower bound for the pad's setback distance,
4 which is a concern related to misalignment
5 and etch back -- etching -- over-etching
6 damage and shorting between the adjacent
7 conductive layer.
8 So I don't think a person of
9 ordinary skill in the art would have
10 understood all those constraints, and, you
11 know, it's not -- I don't think it's needed
12 to put all these understanding of a POSITA in
13 my -- in my declaration.
14 And I'm testifying to you that
15 that's -- that is the -- those are the
16 concerns.
17 Q. Okay. But you would agree with me that
18 those -- you didn't list those concerns in
19 your declaration. Correct?
20 A. I don't need to, but --
21 MR. HERMAN: Objection to form.
22 A. I do not need to because a person of ordinary

1 skill in the art would understand that those
2 are the concerns, and I did not list it --
3 those concerns.
4 BY MR. WATSON:
5 Q. Besides Figure 2, is there any other
6 disclosure in Yang that you rely on to support
7 your opinion that the space between the pad
8 edge and underlying conductive layer
9 corresponds to the minimum thickness of the
10 conductive and insulating layers?
11 A. Are you saying -- are you asking the same
12 question, whether I have disclosed -- whether
13 I provide a reason why 20 nanometer is the
14 setback?
15 Q. No, no. This is a different question.
16 A. What is your question?
17 Q. Besides Figure 2 in Yang, is there any other
18 disclosure in Yang that you rely on to support
19 your opinion that the space between the pad
20 edge and underlying conductive layer
21 corresponds to the minimum thickness of the
22 conductive and insulating layers?

1 A. No. Besides the figure -- the understanding
2 of a POSITA regarding the etch damage and
3 misalignment and shorting between adjacent
4 and conductive levels would arrive at the
5 number of 20 nanometer setback.
6 Q. And that's based on Yang's Figure 2 and also
7 the understanding of a person of ordinary
8 skill in the art that's not listed in Yang.
9 A. And the minimum layer thickness contemplated
10 by Yang.
11 Q. So your opinion is based on Yang's Figure 2
12 and the understanding of a person of ordinary
13 skill in the art that there are concerns with
14 over-etching and misalignment.
15 A. And shorting between adjacent conductive
16 level.
17 Q. Okay. Your opinion that the space between the
18 pad edge and the underlying conductive layer
19 corresponds to the minimum thickness of the
20 conductive and insulating layers is based on
21 Yang Figure 2 and the understanding a person
22 of ordinary skill in the art would have that

1 there are concerns with over-etching,
2 misalignment, and shorting between adjacent
3 conductive layer. Correct?
4 A. In arriving at the 20 nanometer setback, yes.
5 Q. Okay. Let's go look at your declaration, in
6 particular -- you can look at the entire
7 Ground 2 for this question. Okay?
8 A. Okay.
9 Q. In your declaration, you do not discuss how
10 Yang forms its pads. Correct?
11 MR. HERMAN: Objection. Form.
12 A. What do you mean, I explain or not how Yang
13 prevent -- so --
14 BY MR. WATSON:
15 Q. Maybe I can clarify the question.
16 A. Let me -- going back to the -- your earlier
17 question about whether I discuss about the
18 concern of over-etching and misalignment, I
19 do -- I do under -- I did discuss that in
20 paragraph 302 [sic]. I said, "Both Kim and
21 Yang aim to prevent electrical failure caused
22 by over-etching during the manufacturing of

1 3D memory devices.
2 [As read]: Kim teaches the
3 protrusions pad offset from the edge of the
4 lower conductive layer to improve
5 reliability, while Yang provide specific pad
6 dimensions to achieve the same goal by
7 mitigating over-etching.
8 "Yang's" staircase step --
9 "stair-step structure with pads embedded
10 within each step closely resemble[s] Kim's
11 structure, making Yang's teaching directly
12 applicable."
13 So you're not correct that I did not
14 mention the risk of over-etching and shorting
15 between adjacent conductive level.
16 Q. So my question -- let me clarify my previous
17 question.
18 A. Hold on. I'm answering your previous
19 question whether I have discussed the concern
20 about the over-etching and shorting.
21 Q. Okay. Okay. Let me ask you my next question,
22 then, if that's okay.

1 A. Sure.
2 Q. Okay. You do not describe in your declaration
3 the manufacturing steps in creating the pad in
4 Yang.
5 A. The -- as far as I can tell, and if I recall
6 correctly, that Yang's manufacturing are
7 pretty standard method, and I don't think it
8 is necessary to spend -- repeating all those
9 manufacturing process because it is fairly
10 standard that a POSITA would understand, and
11 I don't think it is necessary to repeat all
12 that in my declaration because one can read
13 it when reviewing the declarations and that
14 my declaration is very clear about how I
15 arrive at those numbers.
16 Q. My question is simply, in your declaration,
17 you don't describe the manufacturing steps in
18 creating the pad in Yang.
19 A. I don't need to because it's pretty standard
20 process.
21 Q. Did you describe the manufacturing steps in
22 creating the pad in Yang in your declaration?

1 A. Well, I sort of alluded to that, saying that
2 both Kim and Yang aim to prevent electrical
3 shorting, electrical failure caused by
4 over-etching during manufacturing of 3D
5 memory devices, and the important thing is
6 that I disclosed the relevant important
7 numbers to arrive at the -- at the 20 to
8 190 nanometer narrow displacement number.
9 And I think that's sufficient to the
10 readers to understand how those numbers come
11 about.
12 Q. Okay. But you didn't describe the
13 manufacturing steps in creating the pad in
14 Yang in your declaration. Correct?
15 A. Again, the process that Yang use are pretty
16 standard, and otherwise I would have to write
17 another 30 page of my declaration just
18 describing each of the every single prior
19 art, how they manufacture and how they etch,
20 how they use photolithography to define a
21 pattern, how they clean the wafers. You
22 know, that's totally unnecessary.

1 Q. But, again, my question isn't whether you
2 could have or whether you didn't. My question
3 is simply this: You did not describe the
4 manufacturing steps in creating the pad in
5 Yang in your declaration. Correct?
6 A. I do not need to and I didn't.
7 Q. Okay. Let's go to paragraph 337 of your
8 declaration.
9 A. 337. Okay. Ground 3?
10 Q. Uh-huh.
11 A. Okay.
12 Q. Ground 3 relies on the Lee reference in view
13 of knowledge of a person of ordinary skill in
14 the art. Correct?
15 A. Right.
16 Q. You do not list any other references in
17 Ground 3. Correct?
18 A. Yes, that's correct. The Ground 3 is based
19 on the reference of Lee.
20 Q. So Ground 3 is a single prior art reference
21 obviousness ground. Correct?
22 A. Right.

1 Q. Yeah. Let's go to paragraph 349 of your
2 declaration.
3 A. Hold on one second...
4 Okay.
5 Q. Okay. This paragraph discusses limitations
6 1.A and 12.A. correct?
7 A. Yes.
8 Q. And if you look at paragraph 349, it's your
9 opinion that this limitation is taught by Lee.
10 Correct?
11 A. That's correct.
12 Q. Let's go to paragraph 354 of your declaration.
13 Let me know when you're there.
14 A. 3 what?
15 Q. 54.
16 A. Okay.
17 Q. In paragraph 354, you cite and annotate Lee
18 Figure 7B. Correct?
19 A. Wait. Hold on one second. Let me go there.
20 I apologize.
21 354. Okay.
22 Q. You identify the first material layer in Lee

1 as insulating layer 22. Correct?
2 A. That's right.
3 Q. And the first material layer in Lee extends to
4 the end of the stair to the left. Correct?
5 A. The first material, which is the insulating
6 layer 22 annotated in blue, is shown in
7 Figure 7B in paragraph 354, and it is
8 extended to the end of each staircase steps.
9 Q. So the first material layer in Lee extends to
10 the end of each staircase step. Correct?
11 A. That's correct.
12 Q. The first material layer in Lee does not stop
13 at the landing pad. Correct?
14 A. No. The first material layer go over the
15 landing pad near the end.
16 Q. Now, you label the first portion of the second
17 material layer with brackets in red in
18 paragraph 354. Correct?
19 A. That's right.
20 Q. And the first portion of the second material
21 layer is not disposed under the entire first
22 material layer in Lee. Correct?

1 A. Say that again? The first portion of the
2 second material layer is not the entire
3 second material layer, is that what you said?
4 Q. The first portion of the second material layer
5 is not disposed under the entire first
6 material layer in Lee.
7 MR. HERMAN: Objection. Form.
8 A. I think your -- can you repeat that question?
9 It's kind of weird, that the -- the first
10 portion is not under the entire first
11 material layer.
12 BY MR. WATSON:
13 Q. The first portion of the second material layer
14 is not under the entire first material layer.
15 Correct?
16 A. That's correct. In your earlier question you
17 said "disposed over," but it's actually
18 under.
19 Q. Okay. So the first portion of the second
20 material layer you identified only extends
21 under the portion of the first material layer
22 that is not above the landing pad. Correct?

1 A. That is -- that is correct, that -- what
2 happened is that -- sorry.
3 Q. Let's go to paragraph 355 of your declaration.
4 A. Okay.
5 Q. It is your opinion that Lee teaches a landing
6 pad -- strike that.
7 It's your opinion that Lee teaches
8 the claimed landing pad. Correct?
9 A. That's what I've written in 355.
10 Q. So you don't rely on obviousness to show that
11 Lee invalidates the landing pad limitation.
12 Correct?
13 MR. HERMAN: Objection. Form.
14 A. I use the term "teach," which means the
15 reference expressly disclosed the claim
16 element. In this case, the landing pad.
17 BY MR. WATSON:
18 Q. Okay. Let's go to paragraph 360 of your
19 report.
20 A. Okay.
21 Q. In paragraph 360, you again show an annotated
22 version of Lee Figure 7B. Correct?

1 A. Right.
2 Q. And you label the landing pad in the
3 yellow-brownish color?
4 A. Right.
5 Q. And you label the second portion of the second
6 material layer again with red brackets.
7 Correct?
8 A. That's right.
9 Q. And the second portion you labeled extends
10 from the end of the first portion of the
11 second material layer to the end of the stair
12 step.
13 A. That's right.
14 Q. So the second portion of the second material
15 layer is not just beneath the landing pad.
16 Correct?
17 MR. HERMAN: Objection. Form.
18 A. I'm not sure what you -- what you mean by
19 that.
20 BY MR. WATSON:
21 Q. The second portion of the second material
22 layer is beneath both the landing pad and

1 portions of insulating layer 22. Correct?
2 A. And the conducting plug and the insulating
3 layer above it, 24.
4 Q. So you'd agree with me that the second portion
5 of the second material layer in Lee is beneath
6 both the landing pad, portions of the
7 insulating layer, the conducting plug, and the
8 insulating layer above it. Correct?
9 A. That's what I told you.
10 Q. Yeah. Okay. The second portion of the second
11 material layer in Lee is not -- strike that.
12 Let's go to -- let's pull out --
13 let's pull up Exhibit 1006.
14 A. Are you gonna share that in --
15 Q. Yeah, we're pulling it up real quick.
16 ENTERED INTO THE RECORD:
17 PREVIOUSLY MARKED EXHIBIT 1006
18 1:44 p.m.
19 BY MR. WATSON:
20 Q. Dr. Lee, Exhibit 1006 is the reference you
21 referred to as Lee in your declaration.
22 A. That's right.

1 Q. Let's turn to Figure 1A.
2 A. Okay.
3 Q. Do you see in Figure 1A where the pad is
4 labeled?
5 A. Yes.
6 Q. And in Figure 1A of Lee, the first conductive
7 label -- layer is labeled as 11?
8 A. Yes.
9 Q. And the insulating layer is labeled as 12.
10 Correct?
11 A. Yes.
12 Q. Let's go to paragraph 23 --
13 A. Wait, wait, hold on one second.
14 Yeah, you're right. Yeah.
15 Q. Let's go to paragraph 23 of Lee.
16 Are you at paragraph 23?
17 A. Yes.
18 Q. Okay. Can you take a second to review it, and
19 I'll have a couple of questions about this
20 paragraph.
21 A. Hold on one second, please. Wait a minute.
22 Sorry.

1 The paragraph 23, okay, which is
2 referring to Figure 1A. Right?
3 Q. Correct.
4 A. That the pad structure include a first layer
5 and the first...
6 Okay.
7 Q. So in Lee Figure 1A, the pad portions PAD are
8 the portion of the first conductive layer 11
9 that are exposed along the stepped end of the
10 pad structure PS. Correct?
11 A. That's what it says there.
12 Q. So pad portions PAD are all of the conductive
13 material that's not covered by the step above
14 it. Correct?
15 A. Pad structure PS. PS is a contact. Right?
16 According to Figure 1A. The pad portion may
17 be greater thickness than the unexposed
18 portion of the first conductive layer.
19 So what is your question again?
20 Q. The pad portions PAD are all of the conductive
21 material that is not covered by the step above
22 it.

1 A. Pad portion PAD, P-A-D, capital P, capital A,
2 capital D, is a portion of the conductive
3 layer that is not covered by the conductive
4 layer above it, is that what you're saying?
5 Q. Correct.
6 A. Yeah, because this is a staircase structure.
7 Q. So let me repeat that question now that we've
8 kind of established it.
9 So the pad portions PAD are all of
10 the conductive material that is not covered by
11 the step above it. Correct?
12 A. That is not covered by the conductive layer
13 above it.
14 Q. So let me repeat it, and I just want to make
15 sure I get the right answer here, or that --
16 A. Yeah, I'm trying to understand.
17 Q. The pad portions PAD are all of the conductive
18 material that is not covered by the conductive
19 material above it.
20 A. Right.
21 Q. Okay.
22 A. And hence the staircase structure.

1 Q. Okay. Let's turn to paragraph 365 of your
2 declaration. Pull up your declaration again.
3 Okay. 365.
4 Paragraph 365 is about limitation
5 1.B.2/12.B.2. Correct?
6 A. Yeah.
7 Q. And it's your opinion that limitation 1.B.2
8 and 12.B.2 is obvious in view of Lee.
9 Correct?
10 A. Yep.
11 Q. You do not opine that Lee teaches limitation
12 1.B.2/12.B.2. Correct?
13 A. No. As I stated in paragraph 365, a POSITA
14 would have considered this limitation obvious
15 in view of Lee.
16 Q. Let's turn to paragraph -- paragraph 366. Do
17 you see that here?
18 A. Yes.
19 Q. Now, in the bottom -- in paragraph 366, you
20 include an annotated version of Figure 7B of
21 Lee. Correct?
22 A. 7B, yes.

1 Q. You didn't alter the figure itself for
2 paragraph 366. Correct?
3 A. I did not alter it. I just magnify it.
4 Q. Does Lee Figure 7B show the claimed lateral
5 displacement discussed in limitation 1.B.2 and
6 12.B.2?
7 A. Can you repeat that question again? I'm
8 sorry.
9 Q. Does Lee Figure 7B show the claimed lateral
10 displacement discussed in limitation 1.B.2 and
11 12.B.2 of the '838 patent?
12 A. No, it does not, but as I show later on, that
13 Figure 7B, together with the barrier layer
14 structure, it does show the lateral
15 displacement as --
16 Q. Well, let's -- let's go there. I'll go there
17 for you.
18 A. Okay. Go ahead.
19 Q. Okay. Let's go to paragraph 393 --
20 A. Okay.
21 Q. -- of your declaration. Are you there?
22 A. Yes.

1 Q. Now, in paragraph 393 of your declaration, you
2 cite and depict a modified version of Lee
3 Figure 7B. Correct?
4 A. That's right.
5 Q. And the modified version of Lee Figure 7B in
6 paragraph 393 of your declaration is not an
7 actual figure in Lee. Correct?
8 A. No. We modified it based on the teaching of
9 Lee.
10 Q. And this figure in paragraph 393 applies a
11 barrier layer 28 to Lee Figure 7B. Correct?
12 A. That is correct.
13 Q. And by adding barrier layer 28 to Figure 7B,
14 the resulting landing pad becomes thinner at
15 the end of the stair. Correct?
16 MR. HERMAN: Objection. Form.
17 A. Can you repeat that question again?
18 BY MR. WATSON:
19 Q. Sure. As shown in this modified version of
20 Lee Figure 7B found in paragraph 393 of your
21 declaration, adding barrier layer 28 results
22 in the landing pad becoming thinner at the end

1 of the stair.
2 A. The landing pad is the same -- same thickness
3 throughout. I don't understand what you mean
4 by "landing pad become thinner."
5 Q. Sure. So let's look at paragraph 365 real
6 quick.
7 A. Okay.
8 Q. Okay. So in paragraph 365, you show the
9 unaltered version of Lee Figure 7B. Correct?
10 A. That is correct.
11 Q. And in paragraph 393 of your declaration, you
12 show a modified version of Lee Figure 7B where
13 barrier layer 28 is added. Correct?
14 A. Yep.
15 Q. Is the wordline in your modified Figure 7B
16 thinner than the wordline in Lee Figure 7B?
17 MR. HERMAN: Objection. Form.
18 A. Wordline's the same thickness, to begin with.
19 Region 25 is the same thickness.
20 BY MR. WATSON:
21 Q. And in the modified 7B you have in
22 paragraph 393, the landing pad's not being

1 held in place by the barrier layer 28.
2 Correct?
3 A. What do you mean by that, "held in place"?
4 MR. HERMAN: Objection. Form.
5 BY MR. WATSON:
6 Q. The barrier layer in -- your modified
7 Figure 7B in paragraph 393 shows the barrier
8 layer is beneath the landing pad. Correct?
9 A. Beneath part of the landing pad. Well, you
10 have to think about it. Figure 7B is
11 basically the same as Figure 8B and taught by
12 Lee, and it's just that the Figure 8B does
13 not show the landing pad at the end. But,
14 here, we do.
15 So the figure -- the barrier layer is
16 taught by Lee, and we simply implement the
17 barrier layer as taught by Lee.
18 Q. And so in your modified version of Lee
19 Figure 7B in paragraph 393 of your report --
20 or your declaration, the barrier layer is
21 underneath the landing pad. Correct?
22 A. Underneath the -- part of the landing pad,

1 yes.
2 Q. Now let's go to paragraph 381 of your expert
3 declaration.
4 A. Okay. 381. Yep.
5 Q. Here, you cite the word "first material layer
6 21." Do you see that?
7 A. Yep.
8 Q. Would you consider the first material layer 21
9 in Lee a sacrificial layer?
10 A. Wait, hold on. 381? Yeah, it is -- the
11 layer 21 includes a sacrificial layer.
12 Q. So layer 21 in Lee is considered a sacrificial
13 layer. Correct?
14 A. Because layer 21 eventually will be etched
15 off and replaced it with conductive material.
16 Q. I don't think you answered the question. I
17 think it was just a yes-or-no question. So
18 let me try that again.
19 Layer 21 in Lee is a sacrificial
20 layer. Correct?
21 A. That's right.
22 Q. And Lee describes forming the barrier layers

1 28 by oxidizing this sacrificial layer 21.
2 Correct?
3 A. Where did I write... yeah.
4 Q. Paragraph 381 of your declaration.
5 A. Yeah.
6 Q. I'll give you a second.
7 A. Yep.
8 Q. Okay.
9 A. Before an implant -- impurity implant
10 process, side walls of the first material
11 layer 21 exposed at respective steps may be
12 oxidized to thereby form a plurality of the
13 barrier layer.
14 Q. So Lee describes forming the barrier layers 28
15 by oxidizing the sacrificial layer 21.
16 Correct?
17 A. To form the barrier layer, yes, by oxidizing.
18 Q. Lee describes forming the barrier layer 28 by
19 oxidizing the sacrificial layer 21. Correct?
20 A. Right.
21 Q. Okay. Let's turn to paragraph 436 of your
22 declaration.

1 A. 436.
2 Q. Uh-huh.
3 A. Okay. This is Ground 4 now.
4 Q. We'll go there in a second but I want to
5 finish discussion of Lee before I move on.
6 A. 436.
7 Q. 436. Are you there?
8 A. Wait, that -- 436 is Ground 4, isn't it, not
9 Ground 3?
10 Q. I just have a simple question for you about
11 Lee, if that's okay.
12 A. Okay. I thought we were focusing on Ground 3
13 at this point.
14 Q. Lee does not provide an example of the
15 thickness of barrier layer 28. Correct?
16 A. That's right.
17 Q. All right. Let's pull up Lee Exhibit 1006
18 real quick. Let's turn to paragraph 49 of
19 Lee.
20 Let me know when you're there.
21 A. Yes.
22 Q. I'm going to start with the first sentence.

1 I'll give you a second to read that and then
2 we'll talk about it.
3 Have you read paragraph 49 of Lee?
4 A. Yeah, kind of.
5 Q. Let me ask you some questions about it and
6 then if you need to refer to it further, you
7 can. Sound good?
8 A. Sure.
9 Q. Okay.
10 A. Let me... okay. Hold on one second.
11 Figure 5A. Okay.
12 Q. The barrier layers 27 and 28 of Lee are formed
13 "to ensure an etch margin when the ends of the
14 recessed regions RC are extended." Correct?
15 A. That's what he says there.
16 Q. And I'll refer you to the last sentence of
17 paragraph 49 for this next question, if you're
18 there. Are you there, Dr. Lee?
19 A. The last sentence?
20 Q. The barrier layers 27 and 28 of Lee ensure a
21 sufficient distance between the stacked and
22 conductive layers to prevent any

1 deterioration; is that correct?
2 A. That's what he says there.
3 Q. Okay.
4 MR. WATSON: We've been going about
5 an hour and I'm at a good stopping place. I
6 know we wanted to -- if it's okay, let's go
7 off the record and talk about the rest.
8 (Off the record at 2:08 p.m.)
9 (Back on the record at 2:26 p.m.)
10 BY MR. WATSON:
11 Q. Dr. Lee, during the break -- did you talk to
12 anybody during the break?
13 A. No.
14 Q. Let's turn to paragraph 431 of your
15 declaration. Let me know when you're there.
16 A. Yep.
17 Q. Okay. Ground 4 relies on Lee and Haller in
18 view of knowledge of a person of ordinary
19 skill in the art. Correct?
20 A. That is correct.
21 Q. And let's turn to paragraph --
22 A. Oh, hold on one second.

1 Q. -- 446. Oh, sorry.
2 Are you okay, Dr. Lee?
3 A. Not yet. Hold on. I'm having some
4 computer -- it's not scrolling too well. One
5 second, please.
6 Q. Do you want to just go off the record? Why
7 don't we go off the record real quick while
8 you resolve that.
9 (Off the record at 2:27 p.m.)
10 (Back on the record at 2:28 p.m.)
11 BY MR. WATSON:
12 Q. Dr. Lee, can you please turn to paragraph 446
13 of your declaration?
14 A. Yes.
15 Q. Dr. Lee, it's your opinion that Lee, in view
16 of Haller's example spacer and etch stop
17 dimension, render this limitation obvious.
18 Correct?
19 A. Yes.
20 Q. And that limitation is the limitation found in
21 Claims 3 and 18?
22 A. Yes.

1 Q. Okay.
2 MR. WATSON: Let's pull up
3 Exhibit 1008.
4 ENTERED INTO THE RECORD:
5 PREVIOUSLY MARKED EXHIBIT 1008
6 2:29 p.m.
7 BY MR. WATSON:
8 Q. Dr. Lee, Exhibit 1008 is the Haller reference
9 you refer to in Ground 4.
10 A. Yes.
11 Q. Let me go back to your declaration,
12 paragraph 445. Let me know when you're there.
13 A. Yes.
14 Q. The spacer 502 in Haller is formed by
15 depositing insulative dielectric material into
16 a recess that is 30 nanometers in length.
17 Correct?
18 A. Right.
19 Q. So spacer 502 is formed by depositing
20 dielectric material into the recess.
21 A. That's right.
22 Q. Let's go then to Haller, paragraph -- column

1 4, lines 40 through 44.
2 A. Wait, hold on one second.
3 Hold on one second. Sorry. 144?
4 Q. Paragraph -- line -- column 4, lines 40
5 through 44.
6 Are you on the screen?
7 A. It's on the screen. Column 4? Okay.
8 Q. And let's go to lines 37 through 40.
9 Dr. Lee, how is the recess in Haller
10 formed?
11 A. Well, in -- let's see.
12 Well, in Figure 3, the staircase
13 structure 200, right, and -- is recessing the
14 semiconductor layer 214 of the wordline 202,
15 204, 206, and 208 basically by isotropic etch,
16 such as wet etch, the semiconductor material
17 comprising layer 214. So the recess is formed
18 by wet etching, basically undercut the --
19 undercut the layer 216.
20 Q. Let's turn to Figure 3 of Haller.
21 A. Okay.
22 Q. Are you there?

1 A. Yes.
2 Q. So to form the recess for the spacer, Haller
3 etches under the oxide.
4 A. Under 216, yes, the passivation limit of the
5 oxide.
6 Q. So in Haller, the size of the recess is based
7 on the amount of the etch. Correct?
8 A. That's right.
9 Q. So the bigger the etch is, the bigger the
10 spacer is.
11 A. Bigger the recess.
12 Q. All right. The bigger the etch is, the bigger
13 the recess is. Right?
14 A. Right.
15 MR. HERMAN: Objection. Form.
16 A. The spacer is not formed yet.
17 BY MR. WATSON:
18 Q. Okay. So in Haller, the size of the recess
19 depends on how big you etch. Correct?
20 MR. HERMAN: Objection. Form.
21 A. The etch back process is a very
22 well-controlled process.

1 BY MR. WATSON:
2 Q. Would you agree then that --
3 A. Wait. Hold on one second.
4 Yeah, it's a wet etch, and it's
5 well-controlled and undercut the oxide layer.
6 Q. Would you understand that Haller has control
7 over the amount of etching that takes place?
8 A. Of course.
9 Q. Okay. Now let's turn to Haller column 4,
10 line 50.
11 Are you there?
12 A. Yes.
13 Q. Spacer 502 is created by depositing insulative
14 dielectric material 402 into the recess.
15 Correct?
16 A. Wait, where are you reading?
17 Q. Paragraph -- column 4, lines -- it's the
18 paragraph starting at line 50 through 58.
19 I'll give you a second to read it.
20 A. Wait, where do you read 502?
21 Q. I'm going to ask you a question about it.
22 A. No, but you said spacer 502 at -- I didn't

1 say anything about 502, at least not in the
2 column 4, line 50.
3 Q. Okay, well, let me -- let me repeat the
4 question then. Okay?
5 The spacer in Haller is created by
6 depositing insulative dielectric material 402
7 into the recess.
8 A. Yeah.
9 Q. Okay. And the insulative dielectric material
10 402 can be a nitride. Correct?
11 A. Yes.
12 Q. So Haller creates the spacer by coating a
13 nitride to fill the etched space. Correct?
14 A. That's right.
15 Q. Let's go to Haller column 5, starting at
16 line 40. Let me know when you're there.
17 A. Okay.
18 Q. Haller describes a silicide layer 802.
19 Correct?
20 A. What line are you?
21 Q. Starting at line 40.
22 A. Silicide layer 802. Okay.

1 Q. So Haller decides -- strike that.
2 Haller describes a silicide layer
3 802. Correct?
4 A. That's right.
5 Q. And "The silicide layer 802 [sic] and the
6 spacer 502 may form an etch stop for the
7 wordline." Correct?
8 A. That's right.
9 Q. Now let's turn to Haller column 6, lines 59 --
10 59 through 63. Let me know when you've had a
11 chance to read that.
12 A. Okay. Go ahead.
13 Q. Okay. The purpose of spacer 502 is to
14 "prevent the wordline contact structure 902
15 from leaking over the end 906 of the
16 wordline 920, formed by the spacer 502, to the
17 adjacent wordline 922." Correct?
18 A. I'm sorry, where are you reading? I'm sorry.
19 Can you highlight that?
20 Q. I'm not reading but I'm trying to paraphrase
21 it to make sure I understand it correctly.
22 Starting line 59 of column --

1 A. What column?
2 Q. 6.
3 A. Column 6.
4 Q. Line 59.
5 A. 59.
6 Q. Let me know when you're there.
7 A. [As read]: Further, the proposed etch stop
8 provide desired stopping power due to
9 employment of silicide, compared to
10 conventional structure (polysilicon based
11 etch stops)."
12 Q. Are you ready for my question?
13 A. Yeah.
14 Q. The purpose of spacer 502 is to prevent the
15 wordline contact structure 902 from leaking
16 over the end 906 of the wordline 920 formed by
17 the spacer 502 to the adjacent wordline 922.
18 Correct?
19 A. The spacer 502 of the etch stop 902, right,
20 may prevent the wordline contact structure
21 902 from leaking over the end 906 of the
22 wordline 920, formed by a spacer -- by the

1 spacer 520 [sic], to the adjacent wordline
2 922.
3 Okay. That's what he says there.
4 Q. All right. So the purpose of spacer 502 is to
5 prevent the wordline contact structure 902
6 from leaking over the end 906 of wordline 920
7 formed by the spacer 502 to the adjacent
8 wordline 922. Correct?
9 A. So it's to prevent shorting.
10 Q. Okay. So would it be correct to say that
11 Haller's spacer keeps the silicide layer from
12 expanding on to the adjacent wordline?
13 A. Yeah, you can say that because the wordline
14 contact structure 902 basically is a silicide
15 802 and the spacer 502 is a dielectric layer,
16 so -- nitride layer, right, and...
17 Q. Okay. Well, let's move on to the next ground
18 in your declaration. Let's turn to
19 paragraph 458.
20 A. Next ground, okay. Ground 5.
21 Q. Uh-huh. Ground 5 relies on Lee and Park in
22 view of knowledge of a person of ordinary

1 skill in the art. Correct?
2 A. Yes.
3 Q. Let's turn to paragraph 460.
4 A. 460. Okay.
5 Q. Lee depicts a pad having straight sides.
6 Correct?
7 A. That's what he says there.
8 Q. So Lee does not teach the claimed curved side
9 surface. Correct?
10 A. Not expressly.
11 Q. Okay. Let's turn to paragraph 472 of your
12 declaration.
13 A. 472?
14 Q. Uh-huh.
15 A. Let me get there.
16 Okay. Hold on. Okay. I'm there.
17 Q. You claim that to achieve a rounded contact
18 pad in Lee, oxidant would be introduced into
19 the openings. Correct?
20 A. Right.
21 Q. And let's go to paragraph 474 of your
22 declaration.

1 A. Okay.
2 Q. Where in Lee Figure 5B are the openings where
3 oxidant would be introduced to form the curved
4 side surfaces?
5 A. Well, it's between the layers 22.
6 Q. Is it that part where you labeled "oxidant" in
7 paragraph 474?
8 A. Yes. It's basically through the opening
9 of -- in-between the oxide layer.
10 Q. So the openings where the oxidant would be
11 introduced are in layer 22. Correct?
12 A. That's right.
13 Q. Now, Lee doesn't describe there being any pure
14 silicon in layer 22. Correct?
15 A. No.
16 Q. Instead, layer 22 is a solid oxide layer.
17 Correct?
18 A. Well, layer 22, in general, is deposited by a
19 CVD, chemical vapor deposition, of silicon
20 dioxide, whether it's saline and oxygen or
21 TEOS, capital T, capital E, capital O,
22 capital S, with ozone typically produce what

1 is called a non-stoichiometric silicon oxide
2 with the formula SiOx, where X is not equal
3 to two; it's less than two, greater than one.
4 The reason why it is a
5 non-stoichiometric silicon oxide is the -- due
6 to the temperature of the deposition,
7 typically around 300 to 700 degrees C, and the
8 precursor chemistry that's used. Those are
9 the reason that limit for oxidation. What
10 that means is that you would have some
11 silicon-hydrogen bond, or silicon-OH bond, or
12 silicon-silicon bond. In other words, that it
13 is not a fully oxidized silicon oxide, SiO2.
14 And so when we do a thermal oxidation
15 by introducing oxidant that drive the oxygen
16 diffusion into the CVD oxide filling the
17 oxygen vacancy and oxidize same residual
18 silicon-silicon bond and silicon-OH bond.
19 As a result, due to the
20 configurations, due to the convex and concave
21 corners -- and I describe that in my
22 declarations -- that because of this -- the

1 different oxidation rate at the corners versus
2 the planar surface, causing both corners to --
3 convex and concave corners to be round off.
4 And so the figure is not -- the
5 annotated drawing in paragraph 474, I did not
6 intend to imply that the corner would be eaten
7 away by the oxidation process. I merely tried
8 to show that, due to the oxidation, that the
9 shape of the corner would be curve, more like
10 an S shape, and the oxidation -- because
11 oxidation is an additive process.
12 The wording in the paragraphs are
13 surrounding that -- the Figures [sic] 473 to
14 474, the wording is accurate. And so even
15 though you say that the silicon -- there's no
16 silicon source, typically that you would still
17 have oxidation because of the nature of the
18 CVD deposition of silicon dioxide.
19 Q. So is it your opinion that layer 22 is not
20 made of silicon dioxide in Lee Figure 5B?
21 A. As I mentioned before, that as deposit
22 silicon material, silicon oxide material

1 using chemical vapor deposition, which is
2 what is used in these depositions, would
3 typically produce non-stoichiometric silicon
4 oxide. It is still silicon oxide, but it's
5 silicon SiOx, where X is less than two and
6 greater than one.
7 It is a well-known fact,
8 well-documented in literature and is a common
9 thing that a POSITA would have known and
10 understood.
11 Q. So it's your opinion, then, that Lee layer 22
12 is made up of solid silicon monoxide and solid
13 silicon dioxide; is that fair?
14 A. Okay, so -- sorry, I did not say that. I did
15 not say that it's made up of silicon dioxide
16 and silicon monoxide. I'm saying that the
17 composition of the layer 22 is not a fully
18 oxidized SiO2. It is actually SiOx, where X
19 is less than two, meaning that there are some
20 oxygen vacancies.
21 So when you drive the oxidant into
22 the open area in-between layers 22, that

1 oxygen would be fused there and filling those
2 oxygen vacancies and forming, basically,
3 oxidize the non-stoichiometric regions and
4 make it to become more stoichiometric and
5 also densify it.
6 Q. So layer 22 in Lee, Figure 5B, is not silicon
7 dioxide. Correct?
8 A. It did not -- when it deposits CVD oxide it's
9 not a fully oxidized silicon dioxide, it's a
10 non-stoichiometric silicon oxide layer.
11 Q. Okay. Okay.
12 MR. WATSON: Let's pull up
13 Exhibit 1001.
14 ENTERED INTO THE RECORD:
15 PREVIOUSLY MARKED EXHIBIT 1001
16 2:53 p.m.
17 A. Okay.
18 BY MR. WATSON:
19 Q. Dr. Lee, Exhibit 1001 --
20 A. Hold on, let me download.
21 Q. Sorry.
22 A. Go ahead.

1 Q. Exhibit 1001 is the '838 patent you opine on.
2 Correct?
3 A. Yes.
4 Q. Can you go down to the section that says,
5 Related U.S. Application Data on the cover?
6 A. Okay.
7 Q. Related -- which column, left or right?
8 A. In the first column, furthest right on the
9 cover -- furthest left. Excuse me.
10 Q. Okay. The '838 patent is a continuation of
11 Application Number 16/885,858, filed on
12 May 28, 2020, now U.S. Patent Number
13 11,145,666. Correct?
14 A. Yes, that's what it says there.
15 Q. For purposes of this deposition, will you
16 understand that I'll refer to the patent
17 11,145,666 as the '666 patent?
18 A. Sure.
19 Q. Okay. What is your understanding of what it
20 means that the '838 patent is a continuation
21 of the '666 patent?
22 A. I'm not a lawyer, so perhaps might be best if

1 you can explain it to me.
2 Q. Have you ever reviewed the '666 patent?
3 A. The '666 patent, I believe -- yeah, I believe
4 that is the -- one of the IPR that we did; is
5 that right?
6 Q. Correct.
7 A. Yeah. In fact, you deposed me last -- a few
8 weeks back.
9 Q. So you've offered opinions on the '666 patent.
10 Correct?
11 A. That's correct.
12 Q. Are you aware of any differences between the
13 specification of the '666 patent and the '838
14 patent?
15 A. I think they're very similar. I don't
16 recall -- I have not compared it directly.
17 Q. Okay. Are you aware of any differences
18 between the drawings in the '666 patent and
19 the '838 patent?
20 A. I don't recall.
21 Q. But sitting here today, you can't think of any
22 differences between the specification and

1 drawings of the '838 patent and the '666
2 patent. Correct?
3 A. I cannot recall exactly whether this --
4 they're the same or not.
5 Q. Okay.
6 A. I believe the drawing are the same, but I'm
7 not hundred percent. I'm pretty sure they're
8 the same.
9 Q. Let's turn back to your declaration, paragraph
10 65.
11 A. Hold on, let me go there. 465?
12 Q. No, just paragraph 65.
13 A. Sorry.
14 Okay.
15 Q. Would you agree that the '838 patent relates
16 to a staircase structure for a 3D memory
17 device?
18 A. Yes. And generally related to a staircase
19 structure for memory device, for example a 3D
20 memory device.
21 Q. Let's go to paragraph 72 of your declaration.
22 A. Okay.

1 Q. In paragraph 72, there's a picture of Figure 8
2 of the '838 patent. Correct?
3 A. Yes.
4 Q. And in the '838 patent, the figures are drawn
5 to show the cross-sectional view in the XZ
6 plane. Correct?
7 A. Yes.
8 Q. And in Figure 8, layer 502 is the insulating
9 layer. Correct?
10 A. Yes.
11 Q. And in Figure 8, the landing pad is labeled
12 820.
13 A. 820. Yes.
14 Q. Now, in Figure 8, the landing pad is not
15 located in the middle of each stair step.
16 Correct?
17 A. The landing pad is located at the end of the
18 steps -- staircase.
19 Q. It's not located in the middle of each step.
20 Correct?
21 A. "In the middle," you mean like -- no, it is
22 not. You're -- on the leftmost location.

1 Right?
2 Q. Yeah, so -- sorry.
3 The landing pad is located at the
4 leftmost portion of the step. Correct?
5 A. Right.
6 Q. Where does the landing pad contact the
7 insulating layer in Figure 8?
8 A. What do you mean by "contact"?
9 Q. Where does the landing pad touch the
10 insulating layer?
11 A. Well, it's in the -- in the section between
12 820 and 502.
13 Q. So there's an interface between 820 and 502.
14 Correct?
15 A. That is correct.
16 MR. HERMAN: Objection. Form.
17 THE WITNESS: Sorry. Sorry, Patrick.
18 A. There's intersection between 502 and 820.
19 BY MR. WATSON:
20 Q. And that intersection between layer 502 and
21 820 occurs along the Z-axis. Correct?
22 MR. HERMAN: Objection. Form.

A. What do you mean by that?
BY MR. WATSON:
Q. Well, there's a surface of the landing pad and a surface of the insulating layer that contact each other. Correct?
A. Right.
Q. On what plane is the surface of the intersection of the landing pad and the insulating layer in Figure 8?
A. Intersection is in the X -- in the YZ plane.
Q. Does the intersection between the landing pad and the insulating layer include a curve in Figure 8?
MR. HERMAN: Objection. Form.
A. You know, Figure 8 is a black-and-white picture with a very poor resolution. So first of all, the intersection between 502 and 820 is a straight line, right, vertical, perpendicular to the XY plane. And between that intersection to the flat portion of the 820, it appears to be a straight line, to me, instead of a curve.

1 So a person of ordinary skill in the
2 art looking at this figure would not have
3 concluded there's a -- there's a curve --
4 curved side. At least it's not conclusive.
5 It appears to be, basically, a straight angle,
6 and then a vertical line.
7 A person of ordinary skill in the art
8 would not conclude that this is a curved side
9 surface.
10 BY MR. WATSON:
11 Q. So you'd agree with me that the intersection
12 between 502 and 820 is vertical and
13 perpendicular to the XY plane. Correct?
14 A. That is correct.
15 Q. Okay. And it's your opinion then that
16 Figure 8 does not show a curved side surface
17 of the landing pad. Correct?
18 A. I don't think so. Once again, that is poor
19 resolution and each steps are drawn very
20 differently, in some ways, it appears to me.
21 It seems to me that it's more of a straight
22 line angle rather than a curved side surface.

1 Q. Would it be fair to characterize your opinion
2 as it's unclear whether the intersection
3 between the 820 and 502 is curved or not?
4 A. I would say that is leaning more toward a
5 straight line angle rather than a curved side
6 surface.
7 Q. Are you certain there's no curved side surface
8 between landing pad 820 and insulating layer
9 502?
10 MR. HERMAN: Objection. Form.
11 BY MR. WATSON:
12 Q. In Figure 8?
13 A. I'm expanding this, and you can see that
14 there's a lot of dots and is quite -- at
15 least to me, that it is not definitive. Even
16 if Figure 8 does shows a curved side surface
17 in the Z direction, it is just an embodiment,
18 just an example. The claim does not say --
19 the specification of '838 does not use the
20 word "curved" whatsoever.
21 So without the specification
22 supporting this, I think a POSITA look at

1 Figure 8 with such a poor resolution and
2 that -- would not have concluded that
3 definitively that's a curved surface.
4 Q. Now, in Figure 8 of the '838 patent, layer 840
5 is a conductive layer. Correct?
6 A. That's correct.
7 Q. And there's a portion of layer 840 that's
8 beneath insulating layer 502. Right?
9 A. That is correct.
10 Q. And there is a portion of layer 840 that's
11 beneath landing pad 820. Correct?
12 A. That is correct.
13 Q. And the portion of layer 840 that's beneath
14 insulating layer 502 does not overlap with the
15 portion of layer 840 beneath the landing pad.
16 Correct?
17 MR. HERMAN: Objection. Form.
18 A. Well, there's clear intersections between the
19 502 and 820, so the layer 840, which is the
20 gate electrode layer, underneath the 502, is
21 one portion, generally called the first
22 portion, and then the layer -- the region of

1 840 beneath the 820 is another portion which
2 is called the second portion.
3 BY MR. WATSON:
4 Q. So in Figure 8, the first portion of layer 840
5 is beneath layer 502. Correct?
6 A. So, yeah, there are -- the boundary between
7 the first portion and the second portion in
8 this case is at the intersection between the
9 landing pad and the insulating layer first
10 meet as -- in Lee as well as in this '838
11 patent.
12 So the first portion is located
13 below the insulator layer -- insulating layer
14 502, and the second portion of the second
15 material layer is beneath the landing pad
16 820. But notice that it is also beneath the
17 interlayer dielectric 820, and the first
18 portion also has not only the first material
19 layer, but also, above that, you have many
20 layers of the gate electrode layer above --
21 in the top as well as the inter [sic]
22 dielectric layer 825.

1 Q. Let me break that last -- all the stuff you
2 just told me down, if that's okay, into little
3 smaller questions.
4 A. Sure.
5 Q. Is that okay?
6 A. Sure.
7 Q. So the first portion of layer 804 is located
8 below insulating layer 502. Correct?
9 A. Well, I think that's an incomplete sentence.
10 I will say that the first portion of 804 is
11 underneath the insulating layer 502, but it's
12 also underneath other electrode layer above
13 the specific first portion, and also
14 underneath 820.
15 So it's not only underneath one
16 layer of -- a single layer of 502. You see
17 what I'm saying?
18 Q. Why -- so let me -- let me -- let me -- let's
19 focus on the top gate electrode layer here --
20 A. Okay.
21 Q. -- in Figure 8. Okay? So let me see if I can
22 zoom in a bit. Let me see if I can... all

1 right.
2 Can you see the top -- we'll call it
3 the top stair, as you will, of -- in Figure 8.
4 A. Okay.
5 Q. Okay. So your opinion is that the first and
6 second portion of layer 804 are divided by the
7 division of the insulating layer and landing
8 pad above them. Correct?
9 A. At the intersection.
10 Q. Fair.
11 So your opinion is that the first and
12 second portion of layer 804 are divided by the
13 intersection of the insulating layer and
14 landing pad above them.
15 A. That's right.
16 Q. Okay. Now, in Figure 8, layer 825 is the
17 dielectric layer. Correct?
18 A. That's correct.
19 Q. Okay. And the landing pads 820 have a side
20 surface that's in contact with the dielectric
21 layer as well. Correct?
22 A. As a side surface, you mean touching 825?

1 Q. Yes.
2 A. Which side surface, the top side surface?
3 The left side --
4 Q. The side-side surface. There's a side-side
5 surface that touches layer 825.
6 A. On the --
7 MR. HERMAN: Objection. Form.
8 A. -- left --
9 THE WITNESS: Sorry, Patrick.
10 A. On the leftmost at the end of the --
11 BY MR. WATSON:
12 Q. So the landing pads 820 in Figure 8 have a
13 side surface on the left in contact with
14 dielectric layer 825. Correct?
15 A. That is correct.
16 Q. And the landing pads -- strike that.
17 And the conductive layer 804 --
18 conductive layer 840 has a side surface on the
19 left in contact with the dielectric layer.
20 Correct?
21 A. At the end of the staircase, yes.
22 Q. Okay. Would you consider the side surface of

1 the landing pads that is in contact with layer
2 825 to be laterally displaced from the side
3 surface between conductive layer 840 and 825?
4 MR. HERMAN: Objection. Form.
5 A. You mean that there's a gap undercut the
6 landing pad? Is that what you mean?
7 BY MR. WATSON:
8 Q. Sure.
9 A. Yeah. So you're right that there will be a
10 lateral displayed [sic].
11 Q. And would you agree with me that Figure 8
12 shows the claimed lateral displacement from
13 the claims in the '838 patent?
14 A. Which claim are you talking about?
15 Q. Claim 1 and 12, Claims 1 and 12.
16 A. Can you show me the paragraph that I'm...
17 Q. I can show you the claim language if you want.
18 A. Okay.
19 Q. Let's see...
20 So this is limitation I think in your
21 declaration you identify as 1.B.2 and 12.B.2.
22 Do you see them, "a landing pad disposed

1 over"? Do you see this paragraph?
2 A. 1. -- 1. what?
3 Q. I believe it's 1.B.2.
4 A. Oh, yeah.
5 Q. Actually, let's go to Figure -- let's go to
6 your declaration, paragraph 197. Let me know
7 when you're there.
8 A. I'm there.
9 Q. Okay. So you state that in Figure 8 of the
10 '838 patent, the depicted landing pad
11 overhangs an underlying conductive layer.
12 A. That's right.
13 Q. So in Figure 8, does that depict the claimed
14 lateral displacement discussed in Claim
15 Element 1.B.2, 12.B.2 from the '838 patent
16 claims?
17 A. One second...
18 Yeah, except this is undercut rather
19 than overhang.
20 Q. But whether it's an undercut or an overhang
21 has no effect, in your opinion, on whether it
22 satisfies the Claim Limitation 1.B.2/12.B.2 of

1 the '838 patent.
2 A. Right. As I describe in my declaration for
3 Kim, it is overhang which satisfy the claim
4 limitations of 1.B.2 and, what is it, 12.B.2,
5 which is an overhang, whereas, for Lee, it is
6 undercut and also satisfies the lateral
7 displaced claim element.
8 Q. So you agree that Figure 8 of the '838 patent
9 shows the limitations described in 1.B.2 and
10 12.B.2. Correct?
11 MR. HERMAN: Objection. Form.
12 A. In that respect, the undercut is the lateral
13 displaced portion, lateral displaced between
14 the -- from the side surface of the second
15 portion of the second material to the first
16 side surface which is in contact with the
17 first material layer and the second side
18 surface, so yeah.
19 BY MR. WATSON:
20 Q. So, yes, Figure 8 of the '838 patent shows the
21 limitations described in 1.B.2 and 12.B.2.
22 Correct?

1 MR. HERMAN: Objection to form.
2 A. Yeah, it is -- I'm not forming any opinion on
3 Figure 8 whether it satisfy the claim
4 limitation. I'm looking at the prior art of
5 Kim and Lee. And so I did not perform
6 analysis '838 whether it satisfied all the
7 claim limitations. But it seems like there
8 is an undercut, and so one would have to do
9 an analysis in detail to show whether that
10 satisfy all the limitations.
11 BY MR. WATSON:
12 Q. Would you agree that the side surface of the
13 landing pads in contact with layer 825 are
14 laterally displaced from the side surface
15 between conductive layer 840 and 825?
16 MR. HERMAN: Objection. Form.
17 A. What you're saying is that the undercut
18 region is the lateral displaced region.
19 BY MR. WATSON:
20 Q. Let's pull up -- let's go back to
21 Exhibit 1001, the '838 patent, Figure 5. Let
22 me know when you're there.

1 A. I'm there.
2 Q. Figure 5 illustrates the staircase structure
3 after removal of a portion of the insulating
4 layer. Correct?
5 A. Right.
6 Q. And let's go to paragraph -- column 8, lines
7 41 through 44. Let me know when you're there.
8 A. Column 8, line what?
9 Q. 41 through 44.
10 A. 41 through 44. Okay.
11 Q. "In Figure 5, each SC layer of staircase
12 structure 500 exposes a portion of a top
13 surface of sacrificial layer 204 in spacer 410
14 of each SC layer." Correct?
15 A. That's what it says there.
16 Q. So there's a portion of sacrificial layer 204
17 that is exposed in Figure 5. Correct?
18 A. That is what it says there.
19 Q. And that exposed portion is a portion of a top
20 surface of sacrificial layer 204. Correct?
21 A. That expose the top portion of the -- a
22 portion of the top surface of the sacrificial

1 layer.
2 Q. So the exposed portion is a portion of a top
3 surface of the sacrificial layer 204.
4 Correct?
5 A. Yes.
6 Is it possible to hold on one second
7 real quick?
8 MR. WATSON: Yeah, let's take a
9 quick -- we can take a quick break. That's
10 fine.
11 THE WITNESS: Thank you.
12 MR. WATSON: Let's go off the record.
13 (Off the record at 3:25 p.m.)
14 (Back on the record at 3:29 p.m.)
15 BY MR. WATSON:
16 Q. Dr. Lee, did you talk to anybody during the
17 break?
18 A. Nope.
19 Q. Okay. All right.
20 Let's pull up Figure 5 of the '838
21 patent, which is in Exhibit 1001.
22 A. Okay.

1 Q. So in Figure 5, layer 502 is the insulating
2 layer. Correct?
3 A. Yes.
4 Q. And as you just read, there's a top surface
5 portion of sacrificial layer 204 that's
6 exposed. Correct?
7 A. That's right.
8 Q. Can you identify in Figure 5 where the exposed
9 top surface portion of sacrificial layer 204
10 is?
11 A. Well, it's between the step of the -- if you
12 look at the top steps or second-to-the-top
13 step, the exposed region of 204 is between
14 the 502 on the top of it and 410 on the left
15 of it.
16 Q. So in Figure 5, there remains a portion of
17 sacrificial layer 204 that remains underneath
18 insulating layer 502. Correct?
19 A. That's right.
20 Q. And in Figure 5, there's a portion of
21 sacrificial layer 204 that's exposed.
22 A. That's right.

1 Q. Okay. Let's turn to paragraph -- column 8,
2 line 46. Let me know when you're there.
3 A. Okay. I'm here.
4 Q. Excuse me. I'm not there. Column 8. Yeah,
5 column 8, line 46. Are you there?
6 A. You're talking about Figure 6 now.
7 Q. Correct.
8 A. Okay.
9 Q. So Figure 6 in the '838 patent illustrates a
10 cross-sectional view of a staircase structure
11 with a dielectric layer disposed thereon.
12 Correct?
13 A. Yes.
14 Q. And the dielectric layer 620 covers a top
15 surface of the staircase structure. Correct?
16 A. Yes.
17 Q. And the dielectric layer 620 also covers a
18 portion of a side of staircase structure 500.
19 A. That's right.
20 Q. So the top surface of the staircase structure
21 is different from the side of staircase
22 structure 500. Correct?

1 MR. HERMAN: Objection. Form.
2 A. I don't understand what you're talking about.
3 What do you mean by that?
4 BY MR. WATSON:
5 Q. So the patent describes here a top surface of
6 the staircase structure. Correct?
7 A. Yes.
8 Q. And it separately describes a portion of a
9 side of staircase structure 500. Correct?
10 A. Yes.
11 Q. Does the patent here describe the top surface
12 as being the same as the side surface of the
13 staircase structure?
14 MR. HERMAN: Objection. Form.
15 A. I don't understand. How can you compare the
16 top surface and the side surface?
17 First of all, the orientations are
18 different. Second of all, the side surface
19 of the material is on a different structure,
20 410 rather than 206, for example. And I
21 don't know what you mean by "different."
22 BY MR. WATSON:

1 Q. You know what? Let's move on. We'll move on
2 to Figure 7.
3 A. Okay.
4 Q. Turn to column 9, line 13.
5 A. Okay.
6 Q. Let me know when you're there.
7 A. I'm there.
8 Q. Figure 7 illustrates a cross-section view of a
9 staircase structure 700 with landing pad 720.
10 Correct?
11 A. Okay, that's what it says.
12 Q. And the landing pad is formed on the portions
13 of sacrificial layer 204 that were previously
14 exposed. Correct?
15 A. That's what it says.
16 Q. And the portions of sacrificial layer 204 that
17 were exposed remain in the staircase
18 structure. Correct?
19 A. It still -- yeah, it still remain there, yep.
20 Q. So the landing pads can't be formed over the
21 portions of the sacrificial layer that
22 remained unexposed. Correct?

1 A. Right. It's only formed on the exposed
2 region.
3 Q. Let's turn to column 7, line 1. Let me know
4 when you're there.
5 A. Yep.
6 Q. Figures 2A and 2B in the '838 patent
7 illustrate cross-sectional views of staircase
8 structures 200A and 200B. Correct?
9 A. Okay, that's what it says.
10 Q. Now let's turn to lines 11 through 15 of
11 column 7. Let me know when you're there.
12 A. Okay. Yeah.
13 Q. "A portion of a topmost SC layer of staircase
14 structure 200A is exposed." Correct?
15 A. Yep.
16 Q. "Another portion of the topmost SC layer is
17 covered by hard mask layer 206." Correct?
18 A. That's what is written there.
19 Q. Let's turn -- let's actually look at Figure 2A
20 now. Let me know when you're there.
21 A. I'm there.
22 Q. So the portion of a topmost SC layer of

1 staircase structure 200A that is exposed is
2 the portion of layer 202 under the letter A in
3 Figure 2A. Correct?
4 A. Yes. That's the top, at the very top
5 surface.
6 Q. The portion of the topmost SC layer that is
7 covered by hard mask layer 206 is the portion
8 of the stair beneath layer 206. Correct?
9 A. Okay. Yes.
10 Q. There is no overlap between the exposed
11 portion layer of 202 and the portion covered
12 by hard mask layer 206. Correct?
13 MR. HERMAN: Objection. Form.
14 A. There's no overlap. You mean there's a
15 distinct [ph] region, exposed region, and the
16 region covered by 206.
17 BY MR. WATSON:
18 Q. Correct.
19 A. Yeah, of course.
20 Q. Let's go turn to the claims of the '838
21 patent. Let's look at Claim 1. Let me know
22 when you're there.

A. I'm there.
Q. So if you'll go to Claim 1, lines -- column 13, lines 51 through 52. Do you see that --
A. Okay.
Q. -- where it says "wherein the landing pad"?
A. Yep.
Q. So Claim 1 claims a landing pad comprising a first side surface and a second side surface. Correct?
A. Okay.
Q. Now turn to Claim 2.
A. Okay.
Q. Claim 2 claims a dielectric layer in contact with a bottom surface of the landing pad. Correct?
A. Okay.
Q. So the claims of the '838 patent describe the landing pad as having both side surfaces and a bottom surface. Correct?
MR. HERMAN: Objection. Form.
A. Well, the claim is that bottom surface of the landing pad in Claim 2, and Claim 1 says that

1 the landing pad comprised -- comprises a
2 first side surface and a second side surface.
3 That's right.
4 BY MR. WATSON:
5 Q. So Claim 2 requires the landing pad have a
6 first side surface and a second side surface
7 and a bottom surface. Correct?
8 MR. HERMAN: Objection. Form.
9 Outside the scope of direct.
10 A. So Claim 2 says that "the dielectric layer in
11 contact with a bottom surface of the landing
12 pad, the second side surface of the landing
13 pad, and the side surface of the second
14 portion of the second material layer."
15 BY MR. WATSON:
16 Q. And you understand that Claim 2 includes the
17 limitations of Claim 1. Right?
18 MR. HERMAN: Objection. Form. Also
19 outside the scope of direct.
20 A. Claim 2 is a dependent claim, dependent on
21 Claim 1.
22 BY MR. WATSON:

1 Q. So in Claim 2, the landing pad has both side
2 surfaces and a bottom surface. Correct?
3 MR. HERMAN: Objection. Form. Also
4 outside the scope of direct.
5 A. Okay. That's what it says in Claim 2, yeah.
6 BY MR. WATSON:
7 Q. Now let's turn to column 5, lines 46 through
8 50. Are you there?
9 A. Okay.
10 Q. In the '838 patent, "a staircase structure
11 refers to a set of surfaces that include at
12 least two horizontal surfaces (e.g., along an
13 X-Y plane) and at least two vertical surfaces
14 (e.g., along a Z-axis)." Correct?
15 A. Well, you -- line...
16 Q. 47 -- I guess, 47, column 5 --
17 A. "A staircase structure refers to a set of
18 surfaces that include at least two horizontal
19 surfaces" along X-Y plane "and at least two
20 vertical surfaces" along Z plane [sic]. Is
21 that what you're talking about?
22 Q. Correct.

1 A. Okay.
2 Q. Is a bottom surface a horizontal surface?
3 MR. HERMAN: Objection. Form.
4 A. Did I -- have I considered this in my
5 declaration of what bottom surface is?
6 Because I don't think -- I don't think that
7 I -- because Claim 2 is not part of my
8 analysis. Unless I'm incorrect.
9 BY MR. WATSON:
10 Q. Did you consider whether the bottom -- a
11 bottom surface is a horizontal surface?
12 MR. HERMAN: Object to form.
13 THE WITNESS: Okay, can you -- I need
14 to pick up this phone call. Can you hold --
15 MR. WATSON: Sure, we can go on
16 break.
17 THE WITNESS: Okay.
18 MR. WATSON: Let's go off the record.
19 (Off the record at 3:43 p.m.)
20 (Back on the record at 3:46 p.m.)
21 BY MR. WATSON:
22 Q. Dr. Lee, let's turn to column 5, line 55

1 through 58 of the '838 patent.
2 A. Okay. Column 5?
3 Q. Yes.
4 A. Okay.
5 Q. In the '838 patent, "A horizontal direction
6 can refer to a direction (e.g., the X-axis or
7 the Y-axis) parallel with a top surface of the
8 substrate." Correct?
9 A. That's what it says there.
10 Q. Okay. So horizontal surfaces run along the XY
11 plane in the '838 patent. Correct?
12 A. That's what it says there. But on the other
13 hand, if you go to column 4 -- let's see,
14 column 4, line 20, it says that on line 17,
15 "The spatially relative terms are intended to
16 encompass different orientations of the
17 device in use or operation in addition to the
18 orientation depicted in the figures. The
19 apparatus can be otherwise oriented (rotated
20 90 degrees or at other orientations) and the
21 spatially relative descriptors used herein
22 can likewise be" interpret -- "interpreted

1 accordingly."
2 So in other words, that when they say
3 "horizontal," you could also rotate it by 90
4 degree or any other orientation and could mean
5 other than parallel to the lateral surface of
6 the substrate.
7 Q. Let's turn to column 5, lines 59 through 61.
8 Are you with me?
9 A. Yes.
10 Q. The '838 patent says, "A vertical direction
11 can refer to a direction (e.g., the Z-axis)
12 perpendicular to the top surface of the
13 [substrate]." Correct?
14 A. Once again, that's what it says there, with
15 the caveat that I was just mentioning in
16 column 4 that one can rotate 90 degree or at
17 any other rotation -- orientations.
18 So the patent seems to -- the patent
19 suggests that you could rotate certain
20 direction by 90 degrees, and so when they say
21 it's perpendicular to the top of the surface,
22 you can also rotate it. Now it's become

1 parallel to the top of the surface.
2 So we have to take into account what
3 is written in column 4, is what I'm saying.
4 Q. So let's go to that portion of column 4 that
5 you cited.
6 A. Right.
7 Q. You say, "The apparatus can be otherwise
8 oriented (rotated 90 degrees or at other
9 orientations) and the spatially relative
10 descriptors used herein can likewise be
11 interpreted accordingly."
12 Right? You see that?
13 A. Yep. That's what it -- that's what I show.
14 Q. So is it your opinion that that means that the
15 orientation is only spatially relative to each
16 other?
17 A. What that means is that "different
18 orientations" is a relative term. And so, in
19 other words, for example, when they say top,
20 bottom, above, below, are used only
21 relative -- are used only to describe
22 relative arrangement of the features and not

1 literally direction of those features in
2 space. You know what I'm saying?
3 When -- so the patent is saying that
4 the word describing spatially relative
5 relationships are relative, not absolute.
6 Q. Got it.
7 A. So --
8 Q. When the patent says, in column 5, that [as
9 read]: The horizontal direction refers to a
10 direction parallel with the top surface of the
11 substrate, it's meaning that relative to the
12 substrate, the top surface, the horizontal
13 direction is parallel to it.
14 MR. HERMAN: Objection. Form.
15 A. What -- you're reading column 5, line 6?
16 BY MR. WATSON:
17 Q. Column 5, line 55 through 59.
18 A. 55 to 50 -- to 59?
19 Q. Uh-huh.
20 A. "A horizontal direction can refer to a
21 direction (for example, the X-axis or the
22 Y-axis) parallel to the top surface of the

1 substrate (for example, the substrate that
2 provide the fabrication platform of the
3 structure over it.)"
4 Okay, that's what it says there. Is
5 there a --
6 Q. So the directions are relative to the
7 components within the invention. Correct? Is
8 that what you're trying to say?
9 MR. HERMAN: Objection. Form.
10 A. Okay, so -- so is your question saying that
11 what is the meaning of this in light of what
12 is written in column 4 where they talk about
13 spatial relative term is -- the orientation
14 is relative? Is that what your question is?
15 BY MR. WATSON:
16 Q. Yes. The '838 patent talks in terms of
17 spatial relativity, not absolute relativity.
18 Correct?
19 A. In this -- in this case, the horizontal and
20 vertical, right, quote, horizontal, quote,
21 vertical, are defined relative to the
22 substrate.

1 So the passage that we read in
2 column 4 regarding different orientations
3 does not change these definitions. In other
4 words, if the device is rotating or flipped
5 in the drawing, it still doesn't change
6 because when you talk about horizontal and
7 vertical are relative to the substrate.
8 Q. So the '838 patent talks about the terms
9 "horizontal" and "relative" in terms of their
10 spatial relativity to the surface of the
11 substrate. Correct?
12 A. Right. So even if you rotate the device and
13 flip the device -- or flip the joint, turn it
14 upside-down, and because it's relative, they
15 define -- horizontal and vertical are defined
16 relative to the substrate. So that relative
17 orientation doesn't change, even consider the
18 clause about different orientation in column
19 4.
20 Q. Okay.
21 A. Does that answer your question, sir?
22 Q. Close enough.

1 Let's go to paragraph 231 of your
2 declaration.
3 A. Okay.
4 Q. In paragraph 231 you refer to a reference
5 called Yun. Correct?
6 A. Yes.
7 Q. Now, none of your grounds list Yun as a
8 reference. Correct?
9 A. I beg your pardon?
10 Q. None of your grounds identify Yun as a
11 reference. Correct?
12 A. What do you mean by that, "as a reference"?
13 Q. You list five -- you list five grounds of
14 invalidity in your declaration. Correct?
15 A. Yes.
16 Q. None of those grounds list Yun as being part
17 of them.
18 A. Yeah, that's right. None of the five grounds
19 are based on -- yeah.
20 Q. Okay. Let's go to paragraph 235 of your
21 declaration.
22 A. Right.

1 Q. Are you there?
2 A. Yep.
3 Q. You point to a purported curved side surface
4 in Figure 5A. Correct?
5 A. Right. Yes.
6 Q. Would you agree with me that the side of pads
7 122 closest to the interlayer insulating layer
8 102 is not rounded?
9 A. The one on the left of 152.
10 Q. Correct.
11 A. Yes, that is a straight line.
12 Q. Okay. So the side of the pads 120 that are
13 closest to interlayer insulating layers 102
14 are not curved. Correct?
15 MR. HERMAN: Objection. Form.
16 A. The point is, we're talking about the rounded
17 surface shown on the right side of the
18 contact pad, not the left side.
19 BY MR. WATSON:
20 Q. My question was, the side of the pads 120
21 closest to the insulating layers 102 are not
22 curved. Right?

1 A. That's my point, is that on the left side of
2 the landing pad -- of the contact pad is not
3 rounded, is not curved, but on the right side
4 shows a rounded surface, the right side of
5 the contact pad.
6 Q. Let's pull up Exhibit 1021.
7 A. 10... okay.
8 ENTERED INTO THE RECORD:
9 PREVIOUSLY MARKED EXHIBIT 1021
10 4:04 p.m.
11 A. Hold on, let me download it.
12 Okay.
13 BY MR. WATSON:
14 Q. Exhibit 1021 is the Yun reference you referred
15 to. Correct?
16 A. Yes.
17 Q. Take a look at the figures in Yun real quick.
18 I'll give you a second to look at them.
19 A. Okay.
20 Q. Every figure in Yun, the inner side of pad 120
21 does not contact the insulating layer 102.
22 Correct?

1 A. What figure are you referring to?
2 Q. Any of the figures.
3 A. So you're saying that the left side of the
4 landing pad?
5 Q. Correct. In all the figures in Yun -- well,
6 strike that.
7 Yun does not include a figure where
8 the left side of the pad contacts the
9 insulating layer.
10 A. Well, it does contact 127, which I believe is
11 the insulating layer.
12 Q. All right. Let me change that -- let me
13 change that. Fair point.
14 Yun does not include a figure where
15 the left side of the patent contacts
16 insulating layer 102.
17 A. Sorry, I need to review this.
18 So if you look at Figure 6M.
19 Q. Yeah. Okay.
20 A. So 123 -- 123A are the -- basically the
21 contact pad, right? 123B is also a contact
22 pad, and so on and so forth. But there's no

1 102 here.
2 Q. Okay. So Yun does not include a figure where
3 the left side of the contact pad contacts
4 insulating layer 102.
5 A. No. Where is the label 102?
6 Q. I'm not saying every figure has label 102.
7 I'm saying, is there a figure in Yun where the
8 insulating layer 102 is in contact with the
9 contact pad?
10 A. So your question is that, is the left side of
11 the contact pad touching insulating layer
12 102? Is that what your question is?
13 Q. Correct. Is the left side of the contact pad
14 touching insulating layer 102.
15 A. According to this figure, it doesn't appear
16 to be.
17 Q. In any figure in Yun, is the left side of the
18 contact pad touching insulating layer 102?
19 A. Well, it depends on what you mean by the
20 insulating layer or the first material layer.
21 Just like Kim, where the insulating layer
22 have both the 110 and 122, I suppose that one

1 can consider that because they both are made
2 of the same material -- I don't know.
3 I did not consider these questions,
4 hypothetical questions, and one could consider
5 that 102 is in conjunction with 127, you know.
6 So I have not analyzed this particular
7 hypothetical question, so I'm not sure if I
8 can provide you an answer to that because
9 that's not what I consider in my expert -- in
10 my declarations.
11 Q. You don't know, sitting here, whether any
12 embodiment in Yun discloses the left side of
13 contact pad touching insulating layer 102.
14 A. I have not considered that in my declaration.
15 Q. Okay. That's fine.
16 MR. WATSON: I think that's my
17 questions.
18 Patrick, I don't know if you have any
19 questions?
20 MR. HERMAN: I do not. I do not have
21 any redirect.
22 MR. WATSON: Thank you, Dr. Lee.

1 THE WITNESS: Thank you, Tom.
2 Thank you, Patrick.
3 (Proceedings concluded at 4:13 p.m.)
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1 REPORTER'S CERTIFICATE

2

3

4

5 I hereby certify that the witness in the
foregoing deposition, JACK LEE, Ph.D., was by me
6 duly sworn to testify to the truth, the whole
truth, and nothing but the truth, in the
7 within-entitled cause; that said deposition was
taken at the time and place herein named; and that
8 the deposition is a true record of the witness's
testimony as reported by me, a duly certified
9 stenographer and a disinterested person, and was
simultaneously transcribed from steno to English
10 via Case Catalyst software under my personal
guidance.
11 I further certify that the adverse party,
MICRON TECHNOLOGY, INC., was represented by counsel
12 at the deposition.
I further certify that the deposition of
13 JACK LEE, Ph.D., occurred virtually, on
Thursday, October 30, from 10:00 a.m. to 4:13 p.m.
14 Eastern Time.

15 I further certify that I am not interested
in the outcome of the said action, nor connected
16 with nor related to any of the parties in said
action, nor to their respective counsel.
17 In WITNESS HEREOF, I have hereunto set my
hand this November 6, 2025.
18

19

20 Alison C. Webster

21 ALISON C. WEBSTER, CSR NO. 6266

22

1 ACKNOWLEDGMENT OF DEPONENT
2
3
4 I, JACK LEE, Ph.D., do hereby
5 acknowledge that I have read and examined the
6 foregoing testimony and the same is a true,
7 correct, and complete transcription of the
8 testimony given by me and any corrections
9 appear on the attached errata sheet signed by
10 me.
11
12
13
14
15
16 _____
17 (SIGNATURE)
18
19
20
21 _____
22 (DATE)

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