

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICRON TECHNOLOGY, INC.,
Petitioner,

v.

YANGTZE MEMORY TECHNOLOGIES COMPANY, LTD.,
Patent Owner

IPR2025-00228
Patent 11,101,276 B2

Record of Oral Hearing
Held: April 27, 2026

BEFORE: JO-ANNE M. KOKOSKI, KIMBERLY McGRAW, and
MICHAEL T. CYGAN, Administrative Patent Judges.

IPR2025-00228,
Patent 11,101,276 B2

APPEARANCES:

ON BEHALF OF THE PETITIONER:

JASON LANG, ESQ.
JOHANNES HSU, ESQ.
Orrick, Herrington & Sutcliffe, LLP
200 W 6th Street
Austin, TX 78701
(512) 582-6950
jlang@orrick.com
johanneshsu@orrick.com

ON BEHALF OF THE PATENT OWNER:

ADAM GREENFIELD, ESQ.
JACOB VANNETTE, ESQ.
INGE OSMAN, ESQ.
Latham & Watkins
330 N Wabash Ave.
Chicago, IL 60611
(312) 876-7700
adam.greenfield@lw.com
jake.vannette@lw.com
inge.osman@lw.com

The above-entitled matter came on for hearing on April 27, 2026,
commencing at 12:59 p.m., via video teleconference.

P R O C E E D I N G S

- - - - -

JUDGE CYGAN: Please be seated. Good afternoon. This is Judge Cygan. Judges McGraw and Kokoski are with us by video. We'll now hear argument in case IPR2025-00228, concerning US Patent Number 11,101,276, between Petitioner, Micron Technology and Patent Owner, Yangtze Memory Technologies. Counsel for the parties, starting with Petitioner, please introduce yourself.

MR. LANG: Jason Lang. I'll be arguing half of it and my colleague, Johannes Hsu, will be arguing, as well, and we have a representative from Micron, Jan Bissey with us. And Your Honor, there's one procedural issue we were hoping that we could address before the hearing began, as well.

JUDGE CYGAN: Okay.

MR. GREENFIELD: Good afternoon, Your Honors. Adam Greenfield from Latham & Watkins on behalf of the Patent Owner, and with me today is Jacob Vannette and Inge Osman, both also from Latham & Watkins.

JUDGE CYGAN: Okay, thank you. Welcome to the Board. For our hearing order, each party is provided with 60 minutes of oral argument. Parties need not use the entirety of that time. Petitioner will argue first. You may reserve time for rebuttal. Patent Owner will respond to Petitioner's argument and may reserve time for surrebuttal. We have the demonstratives from each party, and please remember to identify the number of the demonstrative slide you are referencing as you present your argument, which

1 is particularly helpful for our participants on video. Petitioner, did you want
2 to discuss the procedural issue?

3 MR. LANG: Yes, Your Honor. I believe it was on March 13, if
4 memory serves me right. We had a hearing on the IPR covering the '711
5 patent. That's related to this patent and there is a common issue here today
6 with that proceeding, and we were wanting to inquire whether that hearing
7 transcript should be made of record in this proceeding.

8 JUDGE CYGAN: If you would like to either reference the
9 transcript in your remarks, you can do that. If you would like to ask that the
10 transcript in its entirety be entered, also in the record of this proceeding, you
11 can make a request for that, too. Which one would you prefer?

12 MR. LANG: We'd just for simplicity to have the whole transcript
13 be made of record, Your Honor.

14 JUDGE CYGAN: Okay. Patent Owner?

15 MR. GREENFIELD: Thank you, Your Honor. We don't think it's
16 necessary to enter the whole transcript into the record. There is one
17 common issue, but we expect that'll be covered sufficiently today.
18 Obviously, it's before the same panel, so you're aware of the hearing. It's
19 nothing we're concerned about, but we just don't think it'd be appropriate or
20 necessary to enter the entire transcript into this proceeding.

21 JUDGE CYGAN: Okay. We'll take that under advisement and
22 we'll let you know the outcome of that. Petitioner, you have 60 minutes.
23 How much do you want to reserve for rebuttal?

24 MR. LANG: We'll aim to reserve 13 minutes.

25 JUDGE CYGAN: Okay. I'll let you know when I'm ready for you

1 to begin. Just give me one second. Okay. Petitioner, you may begin when
2 ready.

3 MR. LANG: Good afternoon, Your Honors. Thank you. I'll jump
4 to Slide 8. So, I'll be covering the first two grounds -- Kim and Kim plus
5 Fang. My colleague will pick up Grounds 3 and 4. Turning to Slide 10, I
6 just want to start with a little context here, and we're going to discuss a little
7 bit about what an etch-stop does. This was described in the petition in the
8 background section. For example, with respect to Fang and Exhibit 1013.

9 And the important aspect of an etch-stop is that it can have, as
10 described here with respect to Fang, a selectivity with respect to the
11 dielectric material above -- the blue there. And Fang says that the etch-stop
12 material is resistant to etch chemistries used in the formation of context.
13 And what that means is when you etch through the blue dielectric filling
14 material on top, it hits that etch-stop and, as the name implies, it stops. I'll
15 show some of Dr. Campbell's testimony on this point, as consistent with
16 both, Fang and Exhibit 1013.

17 At that point, because of the selectivity, you have to change the
18 etch chemistry in order to etch the etch-stop. Fang continues that the etch-
19 stop is also selectively etchable relevant to other specific materials. And
20 both Fang, in Exhibit 1013, describe this -- Kim has the same disclosure
21 -- that what you're doing is you change the etch chemistry, you etch through
22 the etch stop, but then the selectivity is such that then it will stop, for
23 example, when you hit the conductive layer, because of course, you don't
24 want to burn through the conductive layer if you don't want punch-through.

25 Skipping ahead to Slide 12, the '276 patent simply requires a first

1 or a first and second etch stop layer. They refer to one as a barrier layer.
2 What got the claims allowed, however, was simply that one of the etch-stop
3 layers is a high-k material. It's not even disputed anymore that the fact that
4 you had an etch-stop as a high-k material was widely known in the art. They
5 don't dispute that Kim discloses it. They don't dispute that Fang discloses it.
6 Indeed, Chen discloses it, as well. So, again, the alleged point of novelty
7 here was well-known in the prior art.

8 Skipping ahead to the first issue on Claim 1 is an issue that we had
9 in the '711 patent proceeding and I'll summarize the argument here, but the
10 briefing came in the same way. Turning to Slide 14, Kim, with respect to
11 Figures 5 through 14, talks about building the stack, and Kim says when
12 you're building the stack, you can have the insulating layers on top or
13 instead, you can have the sacrificial layers on top, which then become the
14 conductive layers, and that's what the claims require -- the conductive layers
15 on top, sacrificial layers on top, and Kim discloses layer reversal.

16 Once more, when you get to Figures 17 through 22, which is the
17 embodiment upon which we rely, it says, we will not repeat -- may not
18 repeat overlapping descriptions. The description of building the staircase
19 was in 5 through 14, Figures 17 pick-up and they use the same reference
20 numerals for that stack.

21 Turning to Slide 15, this puts it into context, Your Honors. Five
22 through 14 when building the stack, we get to 17 through 22. It simply
23 picks up from that description and it omits the overlapping description of the
24 staircase, and then it picks up and describes forming the etch-stops. So, in
25 our view that Kim certainly discloses this all by itself, renders it obvious all

1 by itself. If that were not enough, it is, the petition also demonstrates this
2 was just a predictable variation. There's one of two ways to build the
3 staircase, such that you have these landing pads for the staircase, vertical
4 connections, which you see going down onto the word lines. And indeed,
5 we cited multiple references disclosing this, so you have one of two options
6 to create this structure for the contacts.

7 Now, turning to Patent Owner's argument, I'll just jump to Slide
8 18. They say that there must be some benefit to this, but as the law clearly
9 provides, Intel/PACT case, if there are two known mechanisms to do
10 something, whether you want to call it to address an issue, whether you want
11 to call it a problem, that's semantics. It's two structures that serve a purpose
12 to do something and both are suitable options. That provides the motivation.
13 This was described in the petition. It was described in the reply here on
14 Slide 18. In short, when you take that 2D stack and you flip it into a 3D
15 stack, now you have a much denser memory, but the problem is, is that you
16 have to make connections to those word lines. Hint, the staircase. And you
17 have those landing pads that come down, that couple the vertical connect to
18 the gates.

19 There's one of two ways to do that. You can have the conductors
20 on top, you can have the dielectric layers on top. Both providing the landing
21 pads, both of them provide those connections to the word lines that then are
22 coupled to the memory cells.

23 And I'll just summarize the law briefly. I just went over the
24 Intel/PACT case. This is dead on that case where you had two ways to
25 maintain cache coherency and either was a suitable option. KSR is also on

1 point. I have the wrong quote there. I should have had focus, as the petition
2 did -- does on it's a predictable variation. There's one of two ways to do this.
3 Both were well-known. We cited the Boston Scientific case merely for the
4 proposition that yeah, when you have these disclosures like in Kim, saying
5 I'm not going to repeat overlapping definitions and they're right next to each
6 other, it doesn't require a legal (INDISCERNIBLE).

7 Turning to Slide 20, all of Patent Owner's law basically stands for
8 the proposition that it can't just be that the two things were known. That's
9 not the case here. Both of these were known for what? For building a
10 staircase. Why? Because you have to have landing pads for the vertical
11 interconnects. So, all of patent's law is off-point in that there was never one
12 of two options to do a very specific purpose to provide these landing pads in
13 this instance.

14 Turning briefly just to the next couple of slides. The whole
15 reasonable expectation of success argument falls apart because it just
16 contradicts the record. All of these references treat these one of two
17 predictable variations to provide the landing pads the same. Simply, you can
18 do either/or. Kim just simply says, oh, the dielectric can be on top, the
19 conductive layers can be on top.

20 Turning to Slide 22, indeed, Chen lays them out side by side. You
21 can form the staircase. It doesn't put all the distinction on how you do that.
22 You can lay the etch-stop. It doesn't draw a distinction on how you do that
23 with either layer or reversal -- either layer or order. Then you put down the
24 interconnects. It doesn't draw a distinction on how you do that in either
25 layer or order.

1 And indeed, Slide 23, Park, Yu, are exactly the same. You simply
2 reverse the order. Now, turning to Slide 24, Patent Owner raises kind of a
3 few specific arguments. The first argument, they say, well, it would be
4 problematic in Kim because some of the insulating layers are thicker than
5 the others. And then when you do the layer reversal, then you end up with
6 conductive layers that are thicker than the others, and that's allegedly a
7 problem. That is flatly rejected by Kim because Kim discloses layer reversal
8 with these thinner layers -- thinner and thicker layers.

9 There's no dispute that Kim discloses layer reversal in Figures 5
10 through 14, and there's no dispute when you look at 12B, you see thinner
11 and thicker layers. If that were not enough, Kim even says that this feature
12 is optional. This is Slide 25. Some of the inside layers may be thicker than
13 others. Maybe. The thickness, it may be variously modified. So, Kim has
14 no issue with layer reversal in light of this alleged issue. And then it's
15 optional, in any event.

16 Turning to Slide 26, Patent Owner raises the argument, well, the
17 conductive contact would be a different length. Again, none of the
18 references -- this is made up from Dr. Campbell -- none of the references say
19 that that's an issue -- Kim, Yu, Clark.

20 Turning to Slide 27, indeed, what Dr. Campbell did testify was that
21 -- oh, I'm sorry -- one other argument they made is that, well maybe you
22 don't even need an etch-stop, if you have layer reversal. Again, that makes
23 little sense. The point of etch-stop is to stop an etch, and Dr. Campbell, of
24 course, testifies, yeah, that's what the etch-stop does. You don't want to
25 blow through and go through the conductive layer punch-through. So, this

1 problem exists in each context. Indeed, it would make little sense for Park
2 to show the etch-stop in either ordering, as other references do, if you didn't
3 need an etch-stop. So, again, there's no evidence to the contrary that all the
4 sudden, an etch-stop stops performing its function, based on layer order.

5 Turning to Slide 28, Patent Owner, again, makes this missing
6 limitation argument when Kim itself discloses it and the layer and order is
7 just replete as a suitable option in the prior art. So, there is no missing
8 limitation. Now, turning to the second issue. I'm just going to start by
9 saying, Patent Owner had raised a construction in the Patent Owner response
10 that candidly, we didn't fully understand. That construction has changed
11 now in the surreply. I think I might know what they might be arguing, and
12 I'll get to that in a minute, but as a threshold matter, it doesn't matter because
13 what you're trying to interject into the claim, which is a second etching step
14 where you change the etch chemistry, Kim discloses that. And I want to go
15 over that first and then get to the construction issue because I believe it will
16 provide some context.

17 So, what the petition showed was that yes, you form contacts, and
18 so what does that mean? It goes through the etch-stop first and then after
19 going through the etch-stop, it's going to go through the conductive layer.
20 So, of course, you're exposing the etch-stop and then going into the
21 conductive layer as the two limitations require. But there's more and this is
22 important.

23 On Slide 31, the etch-stop may be formed of a material having etch
24 selectivity with respect to the interlayer dielect 130. That's shown, Your
25 Honors, in light blue. That's the dielectric, and what that means is -- that's

1 why I focused on Fang in Exhibit 1013 to start. What that means is that etch
2 chemistry -- the etch-stop is resistant to that etch chemistry. And you'll see
3 Dr. Campbell's testimony on point -- it's consistent with Fang, Exhibit 1013
4 in Kim, because what that means is that when that etch hits that etch-stop,
5 it's resistant to that chemistry and the etch stops. You actually have to
6 change the etch chemistry to go through the etch-stop. And I'll get to Dr.
7 Campbell's testimony on that in a second.

8 Turning to Slide 33, this idea that somehow the etch-stop isn't
9 exposed, it's just rejected by the figure, but it's also -- Dr. Campbell agrees,
10 yeah, that's the point of an etch-stop. The Patent Owner makes this
11 argument that Kim is for a different purpose, but even their own expert says,
12 yes, it's the etch-stop. It slows down the etching here. And what did he
13 notably say? On Slide 34, the question, in order to penetrate the etch-stop,
14 the etch chemistry must be changed from the chemistry that's used to etch
15 the upper insulating layer. Exactly so. Again, Kim discloses that etch-stop
16 is resistant because of the selectivity to the etch chemistry that's going
17 through the blue.

18 So, Dr. Campbell, there's no dispute here. All the experts agree.
19 What that means, what Kim is saying, is that you have to change the etch
20 chemistry. And thus, you etch the holes, you expose the etch-stop, the etch-
21 stop stops the etch, and then next, you have to change that chemistry and
22 keep going through. That's explained in the petition, Dr. Banerjee explains
23 that, and Dr. Campbell agrees.

24 Turning to Slide 35, again, they make this argument that Kim's
25 etch-stop is just for planarization. Their own expert doesn't agree with that.

1 “Etch-stop 126B will serve as an etch-stop?” “Yes.” Dr. Campbell -- yes.
2 So, this idea that somehow, it's called etch-stop, it's not an etch-stop and
3 their expert doesn't even agree.

4 All right. I want to jump to their construction on Slide 37 to start
5 with. In the surreply, they say the etch-stop layer remains whole, unetched.
6 But in the Patent Owner response you see at the bottom, they say, well the
7 exposure step cannot penetrate through the etch-stop layer. So, still sitting
8 here today, I don't exactly know what they're saying, but reading between
9 the lines, I think this is what they're saying, and you can look at their slides.
10 They highlight -- they have column six and there's a part that they don't
11 focus on -- six, one through five. They show a side column 10, and they cut
12 off what's underneath, towards the bottom of column 10 and are outlined
13 through 47.

14 The patent teaches, just as we saw in Fang, Exhibit 1013 in Kim,
15 that you etch to the etch-stop, you change the etch chemistry, and then do a
16 different etch with reverse selectivity etch, it's called. So, I think what
17 they're trying to read into the claims is not that there are just two different
18 limitations. We agree they're two different limitations. That's what the
19 patent says, but when you have two different limitations -- a single method
20 step that has two parts can meet that limitation, or a single structure that has
21 two parts of the structure can meet one limitation, and I thought that was the
22 issue.

23 But what they're actually saying is no, the claim requires that you
24 stop and then -- especially in the surreply -- that you -- it's even unetched,
25 and then you change the etch chemistry as described, as column six, line 31,

1 and you change the etch chemistry, and then you do a completely separate
2 etch with a different chemistry. Number one, Kim discloses that is
3 consistent with Dr. Campbell's testimony. That's what you'd have to do, but
4 we'd also say, Your Honor, that construction, as the institution decision
5 points out, is legally erroneous because the specification describes reverse
6 selectivity etching, but the claims do not.

7 And the case law was clear, that shows that the Patentee knew how
8 to claim it, but expressly chose not to require a change in etching chemistry,
9 not to require stopping, but again, Kim discloses it, Dr. Campbell -- and I'm
10 going back to Slide 34 to show again where Dr. Campbell says, this is how it
11 works. Yeah, to penetrate, the etch chemistry needs to be changed. That's
12 what they're reading into the claim. It's legally erroneous, but it doesn't
13 matter because Kim discloses exactly the same.

14 Just the other odd point on their construction, and surreply now,
15 they're focused on this notion of forming all openings. You have to do all
16 openings at the same time. The claim doesn't say that, and indeed, it's just
17 black letter law that you can't read in all openings to the claims when you're
18 just talking about a plurality of steps, for example. That doesn't say all
19 steps. It says plurality of steps. So, it's another reason that the construction
20 is legally erroneous.

21 Now, in the interest of time, I might just focus here on Claim 4, but
22 really, the arguments they make against 4, 5, and 7 are the same, and 4 is
23 illustrative. The petition demonstrates that Kim not only discloses that the
24 -- and this is just like Fang, if you remember. Not only does it disclose that
25 etch-stop can be selected to the dielectric above it, so they can stop on the

1 etch-stop, then you change the etch chemistry.

2 And then what does Kim disclose? Selectivity with respect to the
3 stack structure. They actually say in their slides that we don't cite Kim at all
4 for Claim 4. That's just patently false. It's right there in the petition. We
5 have the citation there. We cite 186. And as Dr. Banerjee explains, what
6 that means is that now, I'm going to change etch chemistry, go through the
7 etch stop, but it's selected to the stack structure, which includes a conductive
8 layer, and it's going to stop and not go through the conductive layer. Why
9 do you want that? You're trying to prevent punch-through through the
10 conductive layer.

11 So, Dr. Banerjee cited that and then he did much more. He
12 explained that look, you have three different options here. It's a different
13 material, so the etch rates aren't going to be the same. It would make no
14 sense to etch through the etch-stop after you change the chemistry slowly,
15 but then burn right through the conductive layer because you're trying to
16 stop on the conductive layer, you don't want to burn through it. So, there's
17 only one or three options that make sense, but he did much more. He
18 actually provided a specific example of fluorine -- two examples of fluorine
19 gas that do exactly this, as cited in Exhibit 1023. So, undoubtedly, he did
20 cite -- or we did cite Chen, and Dr. Banerjee cited additional evidence and
21 we did, as well.

22 So, Patent Owner responds by saying, it's improper for us to rely
23 on a POSITA's knowledge and background reference. That's just not the
24 law. The law is, of course you can have reasoned analysis and evidentiary
25 support. That's precisely what the petition advances. Again, a citation to

1 Kim. Exemplary type of etch with the fluorine gases, and further, the
2 reasoning of why this is only one of three finite options, and the only option
3 of the three that make sense.

4 Indeed, Dr. Campbell's testimony is consistent with this. The
5 whole point of punch-through is you do not want to burn through that
6 conductive layer. So, when Kim is saying that you can set the resistivity
7 with respect to the stack structure, which includes the conductive layer,
8 you're doing it, as Dr. Campbell says, so you don't burn and damage that
9 conductive layer -- burn through and damage that conductive layer.

10 Turning to Slide 5. The arguments are similar here. This claim
11 requires a select -- that you etch through the etch-stop faster, and then the
12 high-k dielectric layer. It's really the same reasoning. Again, Kim discloses
13 that this etch-stop can be selective towards the stack structure. Again, the
14 high-k layer is part of the structure, and so again, you have these kind of
15 three options. The only one that makes sense is to -- once you change the
16 chemistry, now I'm going to go through the etch-stop and I want to stop.

17 And Dr. Campbell -- I have a slide on this later, I believe. He
18 actually referred to this as proceeding a lock step. You see that's in both,
19 Fang in Exhibit 1013 in our background section, that you change -- you etch
20 down, it stops. You change the chemistry. You etch down, it stopped. You
21 changed the chemistry. You etch down and you stop, you change the
22 chemistry. But Dr. Campbell said that's proceeding a lock step. That's what
23 the references describe, that's what Kim describes. And indeed, here again,
24 Dr. Banerjee explained it and cited Exhibit 1024, providing a very specific
25 example on how you stop that etch on the high-k aluminum oxide.

1 And again, turning to Slide 44, Dr. Campbell's testimony is
2 consistent with this. He, himself, stated that you can use this high-k layer as
3 the etch-stop, consistent with Kim's selectivity disclosure, and again, his
4 testimony that I'll get to about proceeding a lock step. This is exactly what
5 you're doing. You're proceeding a lock step through each layer.

6 Turning to 45 and 46. Again, they make the same attack that we're
7 not relying anything on Kim. It's just false again. Kim discloses two
8 different times planarizing the top surface. Dr. Banerjee explained why you
9 do that. It's been known for many decades that you have to have planar
10 surfaces for layers of semiconductors when you put meta-layers on top.
11 What is on the top? The word lines. The upper metal layer. Dr. Banerjee
12 cited at 1021 that consistent with Kim's disclosure, every layer has to be
13 planar, consistent with the Figure 2, consistent with the planarization
14 disclosures.

15 Does Kim expressly say that that top surface that we show
16 planarized right there, does he describe the planarization stuff there? No,
17 Kim does not. That's why we advanced the obviousness theory. That's why
18 we pointed to the various planarization steps that Kim discloses and that's
19 why we cited to Exhibit 1021 that it would be understood and certainly
20 obvious that you would planarize that top surface, in order to have a better
21 metal layer connection.

22 So with that, turning to Ground 2, Ground 2 combines Kim with
23 Fang. And turning to Slide 48 briefly, there's no dispute that both, Kim and
24 Fang, focus on preventing damage. And indeed, there's no dispute that Fang
25 is more focused on preventing punch-through and using the etch-stop to

1 prevent punch-through, and he kind of details how that can be done.

2 Therefore, a POSITA, with looking at Kim, having an etch stop,
3 would naturally want to look at Fang and say, can I optimize this, but there's
4 more because Chen teaches that another benefit of an etch stop is it can
5 increase -- you can increase the tunnelling length. And in short what that
6 means, as you see at the bottom of the Chen, paragraph 4, is it better
7 effectively, electrically isolates the conductive layers from one another. So,
8 you're just basically, again, adding some insulation, but a particularly good
9 type of insulation. What it can do is prevent this electrical crosstalk.

10 Fang discloses a high-k hafnium oxide etch-stop material. And it
11 is undisputed that a high-k dielectric material increases tunneling length. So
12 now you know looking at Kim, I can increase tunnel length, I can get these
13 good punch-through benefits.

14 And indeed, looking at Fang and Kim, turning to Slide 50, the
15 same thing, reading memory. Staircase structure. Etch-stop on top.
16 Vertical interconnect. Turning to Slide 51, both Fang and Kim, as I went
17 over, see that that etch-stop is selected with respect to what's above it, so it's
18 acting as an etch-stop. So, okay, again, similarities. Fang discloses an etch-
19 stop layer, Kim discloses one or two etch-stop layers. There's an issue on
20 silicon nitrate I'll get to, but all these similarities, a POSITA would combine
21 then. Indeed, the only potential difference that could've been identified, a
22 meaningful difference, was that the height of the two staircases are different.
23 So, Dr. Banerjee went through and explained how you would take that
24 height of Fang and scale it for Kim. Never been disputed that he calculated
25 this incorrectly or that this doesn't apply.

1 So, turning to Slide 53, in the interest of time, I'll just summarize
2 the first argument. They argue that, well, Kim and Fang have different
3 problems. That's legally irrelevant because obviousness is not through the
4 viewpoint of Kim. The inventor of a prior art reference is through a
5 POSITA. We cite the law on that. Number two, it contradicts the record
6 because even Dr. Campbell admitted, yes, Kim's etch-stop stops the etch,
7 slows down the etch. Okay.

8 Turning to Slide -- and I'll just briefly go onto Slide -- they say,
9 Fang is only related to carbon-doped silicon nitride. I don't even understand
10 the argument because Fang says by way of example only, carbon-doped
11 silicon nitride, but then Fang also says, oh, but it could be hafnium oxide.
12 Indeed, in their slides -- Patent Owner slides -- they say that we're relying on
13 carbon-doped silicon nitride. No, we're not. The combination combines
14 Fang's hafnium oxide and replaces the silicon nitride etch-stop layer, the top
15 layer of Kim.

16 So, the idea that Fang only relates to CDSN or somehow we're
17 relying on CDSN, it doesn't accurately reflect the ground in the petition.
18 And again, this was discussed in the last proceeding. The only evidence on
19 record -- the only evidence on record -- is carbon-doped silicon nitride and
20 silicon nitride have the same etch rate -- the same dry etch rate, which is
21 what's used here. And this, by the way, was in our petition. One of the
22 claims that refers to dry etch, but -- so again, even if it was CDSN only, and
23 it's not, it's irrelevant because the etch rate is the same.

24 Let me skip forward to -- now, this is an important point I want to
25 start with. Patent Owner says, well, if you look under the etch-stop, Kim

1 and Fang are a little bit different, and therefore, you maybe went and
2 motivated or expect success. Here is what Dr. Campbell said -- Patent
3 Owner's expert. Turning to Slide 60. His answer, a properly designed etch-
4 stop -- or question, I'm sorry -- properly designed etch-stop should not be
5 penetrated during the etch of the upper insulating layer. Yes. Remember his
6 testimony about changing the etch chemistry? It stops it. Okay. Next
7 question. If you're etching the top-most layer and you're not penetrating
8 through that layer, the next layer down isn't an etch-stop. Oh, I'm sorry, this
9 is all his answer. He says, I can't say it's not an etch-stop or it is an etch-
10 stop. It's irrelevant at the moment. Their own expert says what's under the
11 etch-stop is irrelevant at the moment. Why? Because as he also explained,
12 you etch and the etch-stop stops it. You have to change the chemistry. So,
13 for that etch, if you're looking at an etch-stop layer, what's underneath it, and
14 your own expert's word is "irrelevant", so this idea that the structural
15 differences underneath are somehow relevant is 100 percent contradicted by
16 their own expert.

17 And this is the testimony I was going to get to on the bottom
18 bullet. Again, the whole point is that the etch-stop stops material or the etch,
19 you have to change the etch chemistry, and this is what Dr. Campbell says.
20 We cite this in our reply paper -- his testimony at 94, 14 through 22. It's
21 again, this notion of you go to the etch stop and it stops, you change the
22 chemistry, so now only when you stop and change the chemistry does
23 anything underneath it matter, then you etch down, again you stop, change
24 the chemistry, etch down, and that's what Dr. Campbell was testifying, what
25 he calls proceeding in lock step.

1 Just to jump forward on 63. They make an argument against the
2 tunneling that perhaps Kim already addresses that problem, but what they
3 ignore is Chen actually is doing the exact combination we have argued. On
4 the left there, in the left-most figure of Chen, Chen presents a silicon oxide
5 and a silicon nitride etch-stop, just like Kim. Then he moves to the right and
6 he says, I want more tunneling, a greater tunneling length. So, he replaces
7 the silicon nitride with a high-k etch-stop. That's exactly what the
8 combination is. Replacing the top silicon nitride with the high-k for a higher
9 tunneling length while it reduces the leakage capacitive coupling.

10 And lastly, quickly, they make this argument, well, Kim and Fang
11 don't provide guidance on how to use hafnium oxide. That's an admission in
12 itself that this was well-known to a POSITA, that yeah, you can use this, you
13 can use this. And just like the layering order, you can do this order, you can
14 do this order. These were routine to a POSITA. Indeed, their own expert
15 says that look, any time you're doing these things -- even if you read the '711
16 patent, he says. Even if you read the '711 patent, you're going to have to do
17 some experimentation to make it work. That's natural tweaking of a
18 POSITA. So, with that, I'll turn it over to my colleague, unless you have any
19 questions.

20 MR. HSU: Good afternoon, Your Honors. I will discuss Grounds
21 3 and 4. Each ground has an etch-stop on Han's staircase, and prior art
22 shows each additional etch-stop to be -- to provide a benefit. And Patent
23 Owner's position is, no, that it doesn't provide a benefit.

24 Turning now to Ground 3 -- Han in view of Fang. Slide 68. This
25 combination simply applies Fang's teaching about etch-stop on Han's

1 staircase. Patent Owner does not dispute that Han and Fang together
2 disclose all limitations of Claim 1. Now, Fang teaches that punch-through
3 must be prevented, but using multiple masks to do so, encouraged extra
4 complexity and costs. And Dr. Campbell conceded in his deposition that
5 Han's stage etching uses multiple masks. And so, a POSITA would have
6 been motivated to apply Fang's solution.

7 Moving on to Slide 69. Fang's etch-stop layer provides punch-
8 through prevention while eliminating the use of multiple masks. Slide 71.
9 Patent Owner makes two sets of arguments. Both cannot -- neither can stand
10 up against the record. Slide 72. Patent Owner first argues that Han's high-k
11 dielectric layer protects against punch-through and therefore, makes the
12 etch-stop unnecessary. But that is directly contradicted by the record. Both
13 Kim and Park use both etch-stop layer and high-k dielectric. And that shows
14 an etch-stop is useful, even when a high-k dielectric is present.

15 Now, Patent Owner will quote -- take a quote from Dr. Banerjee in
16 his declaration at paragraph 110 out of context. There, Dr. Banerjee was
17 discussing using a high-k dielectric as a back-up to the etch-stop. Not to
18 replace it as Patent Owner would suggest.

19 Slide 73. Now, again, Patent Owner argued that Han uses a stage
20 etching process, which would render the etch-stop unnecessary, but again,
21 Dr. Campbell admitted that this process uses multiple masks and that's
22 exactly the complex process and cost that Fang sets out to
23 (INDISCERNIBLE).

24 Slide 74. Also, as this figure shows, Han's stage etching process
25 divided contact holes into two stages. As you can see in the figure, each

1 stage still has a range of depths in terms of the contact holes, and therefore,
2 punch-through is still a concern. That's why Patent Owner can only say this
3 stage etching approach mitigates the problem. It doesn't solve the problem.

4 Now, also note that Patent Owner's two arguments taken together
5 are actually self-contradictory. If the high-k dielectric indeed prevents
6 punch-through, why then would Han incur the extra complexity and costs of
7 stage etching? Now, I'm going to move on to Claim 4, Slide 78. Here, I
8 want to simply highlight, Patent Owner's main argument basically recycles
9 from Ground 1, but in the petition, we actually made a specific argument
10 based on Fang, and in fact, Fang's disclosure that you would switch the etch
11 chemistry, and Dr. Banerjee identified a specific etchant that would render
12 Claim 4 obvious. Patent Owner never disputed that.

13 Now, moving on to Ground 4. Applying a barrier layer based on
14 the teaching of Chen. Now, my colleague, Mr. Lang, covered Chen's
15 disclosure, as well. Basically, Chen teaches that there's a problem with the
16 electron tunneling, which causes short-circuiting, and short circuit, as an
17 engineer would know, is a catastrophic fear there to be avoided.

18 So, Chen teaches basically increasing the tunneling length with
19 reduced likelihood of short circuits. Specifically, Chen discloses that at a
20 higher tunneling length, "different conductive layers can be more effectively
21 electrically isolated from one another." More effectively describes a
22 likelihood, and that's the thrust of Chen's disclosure. Chen is focusing on
23 increasing the tunneling length through different configurations, and
24 thereby, decreasing the likelihood of short circuits. The greater the
25 tunneling length, the less likely the short circuits.

1 Let me explain using Slide 87. Figure 8B shows the tunneling
2 length of a single high-k dielectric etch-stop. Figure 8D shows also a single
3 high-k dielectric -- well, excuse me -- a high-k dielectric layer, plus a silicon
4 oxide barrier layer. Although as Chen discusses in paragraph 48 and 49, the
5 configuration of 8B is sufficient to meet a preferred tunneling length, but
6 Chen did not stop there as if that is good enough. Instead, Chen has a barrier
7 layer to further increase the tunneling length.

8 As shown here in paragraph 53, Chen discloses that the Figure 8D
9 configuration can "further provide a relatively large tunneling length so that
10 the occurrence of short circuit between different conductive layers is less."
11 Again, further, relatively large, less. All languages of likelihood based on
12 the function -- as a function of tunneling length. So, and there's no dispute
13 that adding a barrier layer can increase a tunneling length. So, Chen's
14 teaching would have motivated a POSITA to do the same, exactly as Chen
15 shows between these two figures to add a barrier layer.

16 Patent Owner makes three arguments, all fair. First, Patent Owner,
17 again, argues that the etch-stop is unnecessary and the barrier layer just
18 makes the redundancy worse, but as we saw in Ground 3, etch-stop is not
19 unnecessary. Slide 89. And Patent Owner argues that Han's high-k
20 dielectric around the gate conductor provides enough tunneling length, but
21 again, that is contrary to Chen's whole thrust of changing, tweaking the
22 configuration to increase the tunneling length. So, Patent Owner's argument
23 contradicts Chen's expressed teaching.

24 Slide 90. Patent Owner also argues that, well, Kim has actually
25 multiple -- or excuse me -- Han has multiple dielectric layers, but that

1 argument has two problems. First, the petition identified a single high-k
2 dielectric for the combination non-multiple layers. And second, other
3 disclosures also -- for example, Park provides for multiple high-k dielectric
4 layers, as well. Now, and also, Patent Owner has a slide that notes -- that
5 has a similar showing of these figures, plus the AC that's missing, but Patent
6 Owner knows that. These figures show a constant thickness between the
7 barrier layer and the etch-stop combined. But that actually supports
8 Petitioner's position because what it shows is, even if you have to maintain
9 the total thickness, more layers is better. So, that is consistent with applying
10 Chen's teaching and adding a barrier layer.

11 Lastly, I'll briefly discuss Dr. Campbell's testimony. Slide 93. Dr.
12 Campbell's testimony has two major issues. One is virtually unsupported by
13 any evidence, and second, worse, his conclusory testimony was contradicted
14 by the record. On this slide, there are three examples, and there's another
15 example where he argues that the high-k and etch-stop for Han can be the
16 same -- for Kim can be the same material when, in fact, the prior art itself
17 disclosed that they are made of different materials. And these contradictory
18 testimonies should not be given weight. And unless there are questions, I'll
19 hand over the time to Patent Owner.

20 JUDGE CYGAN: Thank you. Okay. Petitioner, you will have
21 your full 13 minutes, if needed, for rebuttal.

22 MR. GREENFIELD: Bear with me one moment to connect the
23 computer.

24 JUDGE CYGAN: And when you're ready, let me know how much
25 time you'd like for -- to reserve for surrebuttal.

1 MR. GREENFIELD: Thank you, Your Honor. May I please
2 reserve five minutes for the surrebuttal?

3 JUDGE CYGAN: Okay. You can proceed when ready.

4 MR. GREENFIELD: Good afternoon, Your Honors. Adam
5 Greenfield for Patent Owner. Petitioner has not shown obviousness under
6 any of its four grounds, primarily because its arguments depend on hindsight
7 and a lack of motivation to combine. For Ground 1, Petitioner relies on a
8 Kim embodiment, Figures 17A through 22B that has its gate stack on
9 bottom rather than on top as claimed.

10 So, Petitioner improperly and belatedly relies on other
11 embodiments and other prior art. Ground 2 fails because Petitioner brings in
12 a secondary reference, Fang, that's also gate stack on bottom and has other
13 structural differences. Ground 3 fails because there would've been no
14 motivation to combine. Petitioner relies on a different primary reference
15 -- Han -- which we heard about earlier, which already protects against the
16 issues Petitioner argues would motivate a POSITA to combine it with Fang.
17 Ground 4 fails for similar reasons. Adding Chen exacerbates the
18 redundancies of the first two references, so I'll jump to Slide 10 to start.

19 So, turning to Ground 1, there's three reasons Ground 1 fails and
20 I'll address them in order. The first two reasons affect all claims and the last
21 reason affects certain dependent claims. Petitioner has not shown that the
22 claimed gate stack on top arrangement within this larger structure would've
23 been obvious. The petition unequivocally relies on only one embodiment in
24 Kim -- the Figure 17A through 22B embodiment.

25 Slide 12 here shows an expert from page 31 of the petition, which

1 does two things. First, states that Grounds 1 and 2 rely on Kim's Figure 17A
2 through 22B embodiment, and second, recognizes that Kim discloses other
3 embodiments. For example, the Figures 5A through 14B embodiment. The
4 institution decision on page 8 is consistent with that. It says, "Petitioner
5 points to Kim's description of two embodiments. One in which the
6 sacrificial layer is the top surface, and one which the dielectric layer is the
7 top surface." Petitioner relies on one sentence at the end of Kim, paragraph
8 90, about which there was significant discussion the last time I was before
9 the panel, and I plan to go through that in detail and appreciate the
10 opportunity to answer questions and do so.

11 So, Kim paragraph 90 does not describe the Figure 17A through
12 22B embodiment, but rather what Petitioner referred to here on page 31 as
13 other embodiments. The Figure 5A through 14B embodiment. So, we agree
14 with Petitioner -- the parties agree Kim treats Figures 5A through 14B as one
15 embodiment together, and Figures 17A through 22B as a different
16 embodiment. The parties agree with that.

17 And now, Kim first walks through the Figure 5 through 14
18 embodiment. It starts at -- I should say, paragraph 14 and 17 of Kim, I
19 guess, further clarify this in describing the different embodiments. And it
20 first walks through the 5 through 14 embodiment and it describes various
21 options as in some embodiments and other embodiments, almost every
22 paragraph in the discussion of this Figure 5A through 14B embodiment talks
23 about that. In some embodiments, this feature and in some embodiments,
24 this other feature. That most naturally refers to variations of the Figure 5A
25 through 14B embodiment.

1 Starting at paragraph 183, Kim shifts and it shifts to the 17A
2 through 22B embodiment, and it does the same thing. The paragraphs that
3 follow qualify various descriptions as being in some embodiments, which
4 again, is most naturally interpreted as variations on the Figure 17A through
5 22B embodiment. A contrary conclusion that whenever any paragraph says,
6 in some embodiments or other embodiments that it applies in all
7 embodiments, really blurs what Petitioner and Patent Owner agree are two
8 different embodiments. 5A through 14B and 17A through 22B. It cannot be
9 that everything in one embodiment applies to the other embodiment. So,
10 now the only Kim embodiment that Petitioner relies on, shown here in Slide
11 13, Figure 17A through 22B has the gate stack on bottom. And so, what do
12 they do in the next slide? They modify that figure and reverse the order, but
13 they provide no motivation to do so.

14 And shown here on Slide 15 is an excerpt of a recent Federal
15 Circuit case, Micron v. Netlist. In that case, two months ago, the Federal
16 Circuit faulted Micron for the same thing -- failing to provide a motivation
17 to combine, two different embodiments from the same prior art. At issue in
18 that case was whether a POSITA would've included Figure 2's chip select
19 signals and Figure 4's memory module. That's less important, but the quote
20 from the Federal Circuit is significant. Micron argued that there was a
21 motivation to do so because Figure 4's memory module is "just another
22 design for the Figure 2 embodiment, so it would've been obvious to combine
23 them." And the Federal Circuit said that's insufficient, and that's similar to
24 the argument Micron is making here. These are both 3D structures. You
25 have gate stack and dielectric layers. They're the same thing, you can

1 reverse the order. And that's just not sufficient, just like it wasn't two
2 months ago in the Netlist case.

3 We cite on this slide, as well, the in re Stepan case, which
4 concluded there must be a motivation to make a combination when
5 combining multiple embodiments from a single prior art reference.
6 Petitioner argues -- going to Slide 16 -- Petitioner argues that switching the
7 gate stack in the sole Kim embodiment in which it relies was "suitable"
8 because different gate stack orders are disclosed in other Kim embodiments,
9 which we talked about, and other prior art. For example, Chen. But the fact
10 that an alternative order existed is insufficient. The law requires a
11 motivation to combine.

12 Shown here on Slide 16 is an excerpt of the Adidas v. Nike case.
13 It's the same case that was cited for this proposition in the Micron/Netlist
14 case, as well. You need a motivation to combine. Petitioner did not make
15 that showing here. In fact, its expert, going to Slide 17, agreed. He has
16 identified no reason to switch the gate stack order. It really comes down to a
17 design choice. Going to Slide 18, we have an excerpt of the Intel case and
18 the Commscope case. Petitioner relies extensively on Intel, but in the Intel
19 case shown here, the prior art addressed the same problem and there was no
20 way to address that problem. That's not the case here. They haven't
21 identified sort of the same problem being addressed by the different
22 embodiments or the other prior art that they try to bring. This situation is
23 much more like Commscope. Now, turning to Slide 19, Petitioners --

24 JUDGE CYGAN: So, Counsel, if Kim is stating that either one of
25 these orders is appropriate, why shouldn't we interpret that as saying it's

1 appropriate to solve the problems that Kim is being purposed to solve?

2 MR. GREENFIELD: Well, Kim only says that either order is
3 acceptable for the first embodiment. It doesn't say for all embodiments and
4 it doesn't tie that layer order to any specific problem. Shown here on --

5 JUDGE CYGAN: So, let me --

6 MR. GREENFIELD: Yeah.

7 JUDGE CYGAN: -- break that into two questions. If we were
8 only talking about the first -- Figures 5 to 14, let's say, does that language
9 that says you could use either order -- is that addressing the same problem?

10 MR. GREENFIELD: The same problem as what, Your Honor? I
11 understand that --

12 JUDGE CYGAN: So, is Kim's use of a gate stack on bottom and a
13 gate stack on top in the first set of embodiments, are those for the same
14 purpose or are they for different purposes?

15 MR. GREENFIELD: In that embodiment, those layers serve the
16 same purpose. The gate stack and the dielectric layer are both serving the
17 same purpose regardless of what order they're in, and for that one
18 embodiment, Kim is just saying, you can have the alternative order.

19 JUDGE CYGAN: Okay. Is there any dispute in your mind that if
20 we were only relying on that first set of embodiments, that there would be a
21 different purpose for gate stack on top versus gate stack on bottom?

22 MR. GREENFIELD: I'm not sure I quite understand the question.
23 There is no purpose to the order, I guess, identified in Kim. Kim doesn't
24 say, if you want to achieve purpose A, you can put the gate stack and the
25 dielectric in this order, if you want to address something else, or even like

1 the same problem, you can switch the order and it would be insufficient. It
2 just has sort of an off-hand comment that, oh, in this embodiment, you could
3 switch the order. Whether you'd want to, why you'd want to is all silent
4 from Kim, and it's noticeably absent that language from the description of
5 the second embodiment -- the 17 through 22 embodiment, but we don't
6 dispute that in the first embodiment, you could switch the order.

7 JUDGE CYGAN: But would a person of ordinary skill in the art,
8 in your opinion, read that section and say, oh, there's a reason -- there's a
9 teaching in this first set of embodiments that someone would understand that
10 both of these different ways of ordering your gate stack are meant to solve
11 the same problem that Kim, in general, is solving. They're for the same
12 purpose. They're to arrive at the same sort of improved semi-conductor
13 manufacturing process.

14 MR. GREENFIELD: No, Your Honor. These are complicated
15 structures with many different layers and other features, and nothing about
16 that language in Kim ties these like specific layers to solving a certain
17 problem. I mean, I think a dielectric and a gate stack, those two layers
18 appear in many 3D NAND structures, sort of independent of whatever
19 problem Kim is trying to solve.

20 JUDGE CYGAN: So, what problem is Kim trying to solve?

21 MR. GREENFIELD: Petitioner hasn't identified that. The
22 supposed problem that they rely on is shown here in Slide 19 where they
23 say, 3D staircases in either layering order provide isolated gate stacks,
24 meaning a demand for higher density memories. That's about as general and
25 generic as you can get and unsupported, and we'd say, I mean, that same

1 statement could be made as to all 3D memory devices. But we'd say this
2 statement is really a concession that proves the opposite. They say either
3 layer -- either layer order -- provides isolated gate stacks to meet this
4 demand. That's the opposite of a motivation to combine. What this says is a
5 person of ordinary skill in the art would have no motivation to combine
6 -- motivation to switch the order -- because either order is sufficient, for the
7 problem that they have identified.

8 JUDGE CYGAN: So, let's assume that that represents Kim's
9 reason for its disclosed invention. So, if we were, for example, to take a
10 look at paragraph 4 of Kim, Kim discusses improvements to process
11 technologies to mass produce -- as you're saying, a very general sort of -- we
12 want to have more dense memory.

13 MR. GREENFIELD: Yes, sir.

14 JUDGE CYGAN: Why is it wrong to -- why would it be wrong to
15 read both of the gate stacks on top and the gate stacks on bottom as Kim's
16 statement of how to achieve that goal and how to solve the problems in the
17 past?

18 MR. GREENFIELD: It's really taking out of context one sentence
19 from one paragraph from a lengthy disclosure. There's many features, many
20 layers in Kim that combine to be a complicated structure that Kim would
21 say would solve this problem to provide an improved memory structure. It's
22 insufficient, I'd say, contrary to law to say that every single feature, every
23 single variation described in the patent can be combined necessarily with
24 every other embodiment of the patent simply because overall, the prior art is
25 seeking to improve memory structures. I think that would really erode the

1 tests and the sort of motivation to combine requirements, and the specificity
2 that you see in all these different Federal Circuit cases, like our Netlist case
3 and so on.

4 JUDGE CYGAN: But limiting this to the discussion with the first
5 set of embodiments, and that one sentence which says -- I don't remember if
6 it's a sentence or paragraph, but the one discussion in the 5 through 14 which
7 just says --

8 MR. GREENFIELD: Paragraph 9.

9 JUDGE CYGAN: -- you could do it top, you could do it on the
10 bottom. I'm trying to understand why that isn't -- why both of those things
11 aren't meant to solve the same problems that Kim has identified in the prior
12 art.

13 MR. GREENFIELD: Because Kim does not tie that layer order to
14 an improved memory structure. The fact that you have a dielectric layer, the
15 fact that you have gate stack, that -- no one disputes it was in the prior art.
16 Kim's advance is in, we're going to have improved memory structures by
17 having gate stack and dielectric layers, oh and it's improved if you do it in
18 either order. That's not the Kim invention. That's sort of table stakes of
19 having these structures. You have a dielectric and a gate stack. That's --

20 JUDGE CYGAN: So, if I'm understanding you correctly, the test
21 that you'd have us apply for this sort of Intel situation is that wherever there's
22 a discussion of alternatives, each one of those alternatives has to be
23 somehow explicitly linked to a problem. It's not enough to have one general
24 problem and then at some point in the disclosure, you have a Markush group
25 which says that you could use, for example, chemicals A through D. If

1 you're using chemicals A through D, you need to say, chemical A solves this
2 problem, chemical B solves the same problem, chemical C solves a different
3 problem, and that's how we would know which ones of those we could
4 combine. Is that where you're going with this?

5 MR. GREENFIELD: Respectfully, I don't -- I'm hesitating
6 because I don't quite understand the analogy from that to this situation, but
7 let me try to explain and field any --

8 JUDGE CYGAN: Um-hum.

9 MR. GREENFIELD: -- obviously follow-up questions, which is
10 we agree that that language at the end of paragraph 90 is sufficient in
11 describing the first embodiment -- the 5 through 14 embodiment, that you
12 could have it in either order as the Kim reference goes through and describes
13 many different variations for that embodiment. And we agree that's
14 sufficient for ways in which you would change that embodiment. And if
15 you were to like apply that first embodiment and try to combine it with a
16 secondary reference, like you wouldn't have to do more. It wouldn't be tied
17 to the problem because those variations are expressly described in the
18 reference.

19 The problem -- not the problem -- the sort of leap that Petitioner is
20 making here, that I think calls for this specificity that Your Honor is asking
21 me about is they're saying, well, the alternative layer is not described for the
22 second embodiment. Kim does not say for that second embodiment that you
23 could have the gate stack on top as claimed. That's not in there. So, they
24 need to get it from somewhere else, and so they turn to a different
25 embodiment. And so now, you have two different embodiments and a prior

1 art reference, and you need a motivation to combine. That's the
2 Micron/Netlist case from two months ago and many others.

3 And one way to show that motivation to combine would be to tie
4 them to a specific problem to Your Honor's question. Not saying that's the
5 only way, but that is sort of, I guess, the most common way to do it. If they
6 were in a world where they weren't combining different embodiments from
7 the same prior art, then they wouldn't need that motivation to combine and
8 we wouldn't have this problem -- this specificity problem that you're asking
9 about.

10 JUDGE CYGAN: Within Figures 5 through 15 or 5 through 14,
11 there are a number of different embodiments within that, correct? It's not
12 one monolithic embodiment that's described by Figures 5 through 14?

13 MR. GREENFIELD: Well, the short answer, it's correct. The long
14 answer, I'd say is I think the way Petitioner and Patent Owner have set it up
15 and agree there are really two embodiments, and there are many variations
16 on those embodiments. I agree with you that Kim says -- I mean, it starts
17 almost every paragraph -- in some embodiments, this, in other embodiments,
18 that. And so, I would agree with you, that would suggest that Figure 5A
19 through 14B can be many embodiments, but the way both Patent Owner and
20 Petitioner have, I think tee'ed it up is that it's really two embodiments that
21 can have a number of variations.

22 JUDGE CYGAN: I'm not sure it's quite that simple because as
23 Petitioners pointed out, there's language in Kim, such as in paragraph 23 that
24 says the use of similar or identical reference numbers in the drawings is
25 intended to indicate the presence of a similar or identical element or feature.

1 And you certainly had that discussion in your briefing about, well, there is
2 differences. Look at the -- for example, the etch-stop layer. That's the
3 difference that we're talking about with this.

4 MR. GREENFIELD: Right.

5 JUDGE CYGAN: But when we're looking at the idea of different
6 embodiments, I want to get to the idea of if there was no question that this
7 paragraph 90 was a general description, which applied to you all of the sub-
8 embodiments of -- let's say 5 through 14. So, a person of ordinary skill
9 could say, well, there's a special sub-embodiment for Figure 7, but it's still
10 covered by this discussion in paragraph 90 because it's generally the same
11 embodiment.

12 If that is the case and that is solving essentially the same issue
13 because all of those things are directed towards the same problem, where do
14 we draw the line when we have language such as paragraph 23, which says,
15 anywhere you see these sort of same reference numbers we're commuting
16 the same structure, and how do we sort of draw a line with the Intel case,
17 which says, well now, even though it's very similar, now we've crossed into
18 new region where we need a specific statement of what problem A is and
19 how it's addressed here, and why it's the same problem down here when we
20 wouldn't have needed that for the Figures 5 through 14?

21 MR. GREENFIELD: Yes, Your Honor. Let me take that in
22 pieces. 5A through 14B is one embodiment that has variations or I
23 understand where Kim says, in other embodiments, sometimes, but it's not
24 that, like Figure 5 is one embodiment, Figure 6 is one embodiment, Figure 7
25 is one embodiment. It is a process of building the structure, so that's why we

1 group 5 through 14, and turning to the language of paragraph 23, which I've
2 got Slide 22 on the screen now, which goes to the similar point, which is
3 where certain features or layers denoted with the same numeral, that would
4 apply to other embodiments. That common language that appears in patents.
5 That is not the situation we have here. What I understand that language to
6 apply -- an example I would apply is, okay, you have embodiment A, it has
7 etch-stop layer 125, and then you go to embodiment B, and it's referring to
8 element 125. But it omits calling it specifically an etch-stop layer.

9 Well, you would know in that case that element from embodiment
10 B, element 125, is also an etch-stop layer without that language being
11 repeated because it's a common structure across embodiments, it's using the
12 same numeral, and so forth, or to the example of -- I think you asked me -- I
13 don't know if it was today or previously, about materials. Like if it said
14 layer 125 -- etch-stop layer 125 in embodiment A could be made of this list
15 of materials. You go to embodiment B and it talks about etch-stop layer
16 125, but it doesn't specify all the materials it could be. We would agree, that
17 sort of is an admission where it's sort of overlapping discussion and it would
18 apply across embodiments. This is different. This is -- you have two
19 different layers -- the gate stack and the dielectric. For the first embodiment,
20 it says it can be in these two different orders. The second embodiment, it
21 says it's in this specific order -- the wrong order. The gate stack is on
22 bottom.

23 It omits the very change that they're trying to make. I mean, the
24 conclusion from that is that an embodiment -- in the second embodiment,
25 you can't reverse the orders. Otherwise, it would've said, it's not just

1 omitting what it calls the layer. It's really omitting the key sentence saying,
2 oh, and in this embodiment, you can reverse the layer. It really should be
3 the opposite inference, that that language doesn't apply. It's not the case that
4 any time variations of embodiment one are described, they necessarily apply
5 to all other embodiments. It would really -- I mean, I don't know how you
6 can reconcile that with the Micron case, with the Commscope case, the
7 Adidas case, and so forth. In those cases, you would not need a motivation
8 to combine multiple embodiments from the same reference.

9 JUDGE CYGAN: So, I guess following that logic, if there was a
10 discussion in Figure 5, which is the first steps of building the semi-
11 conductor structure, if there was a discussion about Figure 5 that said, you
12 can make the semi-conductor substrate out of these three materials, and it
13 was semi-conductor substrate, let's say 100. And then later on, in the Figure
14 17 through 22 discussion, they just reference -- they may not even discuss
15 semi-conductor material 100 at all, but they may have the same figures,
16 which show 100. Do I understand you to say that we can't -- that the
17 inference should be we are not using the same materials for the semi-
18 conductor substrate in that because it's a different set of embodiments and
19 you should not carry them over?

20 MR. GREENFIELD: No. If I understand right, the example you
21 gave is -- that is sort of omitting repetition. Embodiment one, layer 100, can
22 be these materials. You go to the next embodiment. You've got layer 100,
23 and it just doesn't specify, here are the materials that layer 100 would be.
24 Then sort of this type of broad language that appears in this patent and
25 others, you'd say you could apply. That would be a reasonable inference

1 because you have just omitted that sort of duplicative description. But what
2 we have here is different -- or just taking that example, if in the first
3 embodiment, you say layer 100 can be made of these four materials, and
4 then in the second embodiment, you've got layer 100, and for this
5 embodiment, it says it can be made of these two materials, well, it's omitting
6 the other two materials.

7 The inference there would be that it can't be made of those two
8 materials, unless there's some specific reason or you go through the
9 motivation to combination and it solves the problems or so forth, but you
10 wouldn't say, oh, because in the first embodiment, it lists four materials, in
11 the second embodiment, it only lists two of those, necessarily it also includes
12 the two missing materials. I would not say that.

13 JUDGE CYGAN: But to the extent that the second embodiment
14 builds upon the first one and is silent on any changes that have been made to
15 it -- so, the first, we have one build-up of embodiments where in
16 embodiment one, we're building up a staircase structure, and there's a lot of
17 discussion about the staircase structure. In the second embodiment, there's
18 really -- there would be no discussion of the staircase structure, but there'd
19 be discussion of what happens on top of the staircase structure. What's the
20 presumption that you want us to apply to the description that's discussed
21 earlier in the staircase structure? That it should be all repeated later, that the
22 only thing that needs to be repeated are things which are more limiting than
23 before?

24 MR. GREENFIELD: What should be repeated is -- I guess I
25 would say is where there are differences. I mean, it's similar to what's here

1 on Slide 22, sort of where there are differences. It is not the case -- I think
2 Petitioner's Counsel said, oh it like -- second embodiment simply follows
3 from the first embodiment, and sort of -- I think implicit in your question is,
4 you've got these steps leading up to it and then you just kind of -- the second
5 embodiment picks up where the first one left off.

6 Kim doesn't start talking about the second embodiment until, I
7 think, paragraph 183. There's a lot of daylight between paragraph 90 and
8 183. It's not like Kim went through paragraph 190 and that's where the
9 second embodiment picks up. That's not the case at all, and I don't think
10 that's a fair interpretation of it. I think where the first embodiment describes
11 a specific order -- and it says it can be an alternative order -- and where the
12 second embodiment describes only one order.

13 It's not that it's not describing any order. It's describing only one of
14 those orders. I think that's the end of the showing. I don't think there's -- it
15 gets into presumption or not presumption. I think it's -- they then need to
16 show motivation to combine, and if not, and if the rule were, anything that's
17 in one embodiment, as long as you have sort of the general typical language,
18 well this could be applied in any embodiment -- if that were sufficient, the
19 motivation to combine test would be significantly eroded.

20 JUDGE CYGAN: In the first set of figures for Kim --

21 MR. GREENFIELD: Um-hum.

22 JUDGE CYGAN: -- in the first embodiment --

23 MR. GREENFIELD: Um-hum.

24 JUDGE CYGAN: -- do they mainly focus on the gate stack on
25 bottom in their figures?

1 MR. GREENFIELD: Well, the figures show gate stack on bottom.

2 JUDGE CYGAN: All right. So, it's consistent with all the figures
3 that it's gate stack on bottom, correct?

4 MR. GREENFIELD: Kim's figures always show gate stack on
5 bottom.

6 JUDGE CYGAN: Right.

7 MR. GREENFIELD: Correct.

8 JUDGE CYGAN: So, is it actually fair to say that by only
9 mentioning gate stack on bottom in the second set of figures, there's been
10 some limiting when the first set of figures also only discuss gate stack on
11 bottom?

12 MR. GREENFIELD: I'm sorry. Can you repeat that one question?
13 I want to make sure I answer --

14 JUDGE CYGAN: Sure.

15 MR. GREENFIELD: -- the question.

16 JUDGE CYGAN: So, I think your contention has been, if you
17 start off with two things being mentioned and you drop down to a different
18 embodiment, only one thing is mentioned, the presumption should be that
19 the second thing doesn't apply.

20 MR. GREENFIELD: Oh, yes.

21 JUDGE CYGAN: In this particular fact situation, what we have is,
22 we have one thing which was mentioned all throughout, which was the gate
23 stack on bottom, but then we also have this sentence which says you can use
24 another order to it, which is kind of hanging off by itself in that first
25 embodiment, but is it really fair to characterize the first one as having two

1 and then the second one being limited to one, where they both describe all
2 the figures in terms of gate stack on bottom?

3 MR. GREENFIELD: Yeah, it's absolutely fair. I mean, the
4 language from the petition, first of all, which defines the proceedings
5 acknowledges there are two different embodiments. So, that is the starting
6 point. For the first embodiment, it is true that figures show the gate stack on
7 bottom. They're putting all their weight on this one sentence in paragraph 90
8 that says you could have a different order. I mean, it doesn't even say that as
9 expressly, but for these purposes.

10 And so, to kind of, I guess now trivialize that as sort of hanging out
11 on its own and for that reason, should apply to the second, I guess, I think
12 turns the petition's arguments on its head. What they're saying is that
13 sentence from paragraph 90 is like the end all, be all of their combination,
14 and they're putting all their weight on that as hugely significant, and meets
15 the demand for improved memory structures and saves the world, and so it
16 kind of has to be one or the other. It's either very important and therefore,
17 it's a difference, and so it doesn't necessarily apply to the second
18 embodiment, or it's not that important. To me, it's -- I think to take the idea
19 that because it's a trivial part of Figure 1, therefore it applies, would really
20 turn it on its -- the Petitioner's argument on its head.

21 JUDGE CYGAN: Okay. Thank you, Counsel.

22 MR. GREENFIELD: Just briefly a few more points on this
23 Ground 1. Boston Scientific -- Petitioner acknowledged they're the ones that
24 brought -- that cited Boston Scientific, and today, they're trivializing it. That
25 case stands for really the proposition of combining different embodiments, and

1 so I suppose they're walking away from that. But that's just not a test that
2 they've met.

3 Going to Slide 25. So, also staying with Ground 1, the exposing
4 and etching steps, shown here on Slide 26 is the relevant portions of Claim
5 1. There's two distinct steps here. First, forming a plurality of openings in
6 the insulating layer, exposing portions of the etch-stop layer. Second step,
7 etching the exposed portions of the etch-stop layer, and the plurality of
8 openings, and exposing at least a portion of the conductive layer of each
9 step. Those are two distinct steps. It refers to opening -- plurality of
10 openings, multiple openings, and each step.

11 Our only point is that those are two steps. The exposing has to be
12 done before the etching by pure antecedent basis. I understand Petitioner
13 agrees that it's two steps. Going to Slide 30, that's in the reply where they
14 agree it's two steps. It is true then because it talks about portions -- or
15 openings plural, and each step that it's not sufficient to just do one step. I
16 think there was a suggestion, well, Kim necessarily etches down, and by
17 etching down, you necessarily expose and then etch. You do have to do it
18 across more than one openings, and that's sort of essential to the '276 patent
19 by allowing -- creating these openings simultaneous. And there's no
20 disclosure in Kim of this all -- we have what they rely on in -- shown here on
21 Slide 31, we have what Petitioner relies on, and it just kind of starts from
22 -- talks about forming holes and forming openings, but it doesn't describe
23 doing it in any way that's as detailed as the '276 patent.

24 Very briefly, there's a third reason Ground 1 fails as to specific
25 dependent Claims 4, 5, and 11. I do want to just touch on Claim 4 briefly,

1 which is Slide 34. Petitioner's Slide 39 today said that they cited Kim for
2 Claim 4. I went back and looked. I do not see them relying on Kim. Their
3 Slide 39 cited petition 40. That's not part of the Claim 4 discussion, and it
4 cites petition, page 50 to 51. That's where the Claim 4 discussions starts.
5 And from the Claim 4 discussion on, on page 50 to 51 of the petition, I don't
6 see a cite to Kim. If I'm overlooking it, my apologies, but I just think that's
7 inaccurate. I didn't see it.

8 Going to page 39. The point there for those dependent claims, they
9 fail because they haven't identified actual support in the Kim reference for
10 the disclosure and they're relying on general knowledge, but they certainly
11 don't satisfy the test for general knowledge of being unusually simple and so
12 forth.

13 Jumping to Slide 39, I'll turn to Ground 2 -- the Kim and Fang
14 combination. So, Ground 2 adds Fang to challenge one specific element of
15 Claim 1 -- element 1B shown here on Slide 40, as well as dependent Claims
16 3, 6, 7, and 8, all of which deal with etch-stop characteristics and contact
17 hole etching for word lines. For this ground, Petitioner relies on Kim for all
18 other elements that are shown here on Slide 40, and to be clear, the Board
19 doesn't need to reach this ground if it agrees with Patent Owner on Claim 1
20 under Ground 1. In any event, Petitioners failed to show that Kim and Fang
21 render obvious these dependent claims.

22 Fang is all about carbon-doped silicon nitride. It really is. It's the
23 title, it's the abstract. I heard Petitioner up here saying they're not relying on
24 the carbon-doped silicon nitride embodiment. That I suppose is an
25 abandonment or disavow that we'll accept. They certainly did in their reply

1 -- I think it's page 51 -- they're relying on the CDSN embodiment, but I take
2 their position now to be they're only relying on the hafnium oxide
3 embodiment of Fang.

4 The problem is that Fang -- let me jump to Slide 45. Fang says
5 that in its embodiment, hafnium oxide can be a substitute for the carbon-
6 doped silicon nitride, and that's really the extent of it. And so now, if
7 Petitioner is abandoning the CDSN embodiment and relying on only
8 hafnium oxide, it's really many steps removed. They're trying to bring in an
9 alternative to Fang's CDSN to be an alternative to Kim, and that's just not
10 supported. Just because hafnium oxide can sub in for CDSN doesn't mean it
11 could sub in for the silicon nitride of Kim. There's many differences
12 between Kim and Fang. I've got it here on Slide 44.

13 JUDGE CYGAN: Counsel, can you go back to that slide?

14 MR. GREENFIELD: Yep.

15 JUDGE CYGAN: Isn't the argument there that Fang discloses the
16 etch-stop layer may be silicon nitride or Fang's hafnium oxide? Isn't it just a
17 direct substitution? I'm not understanding your double --

18 MR. GREENFIELD: Yeah.

19 JUDGE CYGAN: -- substitution on it.

20 MR. GREENFIELD: Fang says instead of CDSN, you could use
21 hafnium oxide for Fang, but what they haven't gone through and I think laid
22 out is --

23 JUDGE CYGAN: Sorry. Fang says you can use hafnium oxide as
24 an etch-stop layer, correct?

25 MR. GREENFIELD: Right.

1 JUDGE CYGAN: Okay.

2 MR. GREENFIELD: Right, right. If you read the petition and the
3 reply, you would see pretty significant reliance on CDSN and I would say,
4 secondarily, they say, oh, well you can also bring in hafnium oxide. I think
5 this is a significant pivot with them abandoning the CDSN embodiment of
6 Fang.

7 JUDGE CYGAN: Counsel, are you saying that the petition is
8 relying upon CDSN and then the petition goes from CDSN to hafnium
9 oxide?

10 MR. GREENFIELD: I would say the -- when I read the bulk of
11 the petition and the reply, and consistent with the last proceeding that was
12 related, they've relied significantly on CDSN, and then they say, oh, and in
13 addition -- I guess as like an alternative or secondary argument -- they're
14 saying you could rely on the hafnium oxide of Fang. And today, I was
15 surprised to hear them say expressly, they are not relying on the CDSN
16 embodiment of Fang. Only the hafnium oxide embodiment. That's the point
17 I wanted to make, Your Honor.

18 And sort of their motivation to bring in Fang is -- talks about
19 tunneling, but there are no tunneling problems identified in Kim, and so Kim
20 doesn't mention any tunneling problems. Kim's structure and design already
21 protect against tunneling, and specifically, the concerns that the Petitioner
22 has identified in Chen.

23 Going to Slide 47. So, as I understand their reliance on Chen,
24 Chen shows that sort of as you go from single layer silicon nitride to adding
25 a high-k dielectric, tunneling is less of a problem. As you add in a double

1 layer, moving across from left to right to see, tunneling is less than a
2 problem. It's even less of a problem when you get to Figure D. And so,
3 Kim employs both of these features that are in Figure D, shown here on
4 Slide 44. It's got a high-k dielectric layer surrounding the conductive layer
5 or the gate stack, and two etch-stop layers. So, the idea that you would need
6 to bring in a second reference of Fang to guard against tunneling really isn't
7 supported by Petitioner's own evidence. Kim doesn't talk about a tunneling
8 problem, and under Chen, sufficiently would protect against it. So, there
9 would be no motivation to add another reference purely for tunneling
10 protection.

11 So, now I'll turn to Ground 3, which is where Petitioner switches to
12 a different primary reference -- the Han reference. Ground 3 challenges only
13 Claims 1 through 15, not Claims 16 through 18. And moving to Slide 49.
14 Han is missing at least four important limitations of Claim 1, as shown here.
15 An etch-stop layer covering the staircase structure, an insulating layer on top
16 of this etch-stop layer, performing a plurality of opening step and the etching
17 the exposed portions step. The petition relies on Fang to supply these
18 missing limitations, but fails to provide a motivation to combine.

19 So, Han discloses a gate stack with multiple high-k dielectric
20 layers surrounding the conductive layer. In particular, what's shown here on
21 Slide 50, BK is the blocking layer and TIL is the tunnel insulating layer.
22 And the high-k dielectric layers protect against punch-through. It's sort of a
23 repetition of the argument you just heard. They rely a lot on sort of punch-
24 through and tunneling protection, and Han sort of has these layers that
25 already protect against it. And so, a person of ordinary skill in the art would

1 not be motivated to bring in Fang to further protect against tunneling or
2 punch-through. That's adequately done here by Han.

3 Han also protects against punch-through with staged etching,
4 performing contact hole openings at different times. For example, doing the
5 upper holes first and then doing the lower holes, and that mitigates against
6 punch-through because you sort of stop etching the upper holes by the time
7 you start the lower holes. So, Fang's etch-stop layer is redundant. We have
8 here the South-Tek case where sort of redundancy counts against a
9 motivation to combine.

10 And I want to turn now to Ground 4 on Slide 55. So, Petitioner for
11 Ground 4 brings in a third reference, the Chen reference, which we talked
12 about, and this is directed to dependent Claims 17 and 18, and they fail for
13 the same redundancy reason. You see on Slide 56 here, Claims 17 and 18
14 add the barrier layer, and Petitioner's argument for bringing in Chen to add a
15 layer is that it would protect against over-etching, punch-through, and
16 tunneling concerns.

17 But adding Fang's, yet another layer, would add complexity,
18 another step in the manufacturing process, really to -- in Petitioner's word
19 -- to protect again sort of problems that are already solved by Han, and at a
20 minimum, the Han and Fang before you would get here. There's no reason
21 to add another layer to protect against punch-through or tunneling, especially
22 remember, one of the dielectric layers in Han is specifically the tunnel
23 insulating layer, TIL. So, there'd be no motivation to add both things
24 -- etch-stop layer and what Chen calls a stop layer.

25 On Slide 58, we go through some of the same analysis with the

1 different figures of Chen, and we're already well into D that shows adequate
2 protection. And with that, Your Honors, if there's no further questions, I'll
3 save the rest of my time for surrebuttal.

4 JUDGE CYGAN: Thank you. You have an additional 10 minutes
5 remaining, which leaves you 15 minutes for surrebuttal. Petitioner, you
6 have 13 minutes for your rebuttal, and you may begin when ready.

7 MR. LANG: I think that's the first time I've hit how much I was
8 trying to save. I'm having a technical problem here. All right. Sorry about
9 that, Your Honors. I'm ready. Now, Patent Owner did not spend too much
10 time on this change in construction that it has, but what I was pointing out
11 was that if you actually look at the specification there at the bottom where
12 they have highlighted, it says the etch-stop is exposed on each level of the
13 staircase structure by a selective etching process, and then it says, and then
14 removed by reverse selective etching.

15 That is what I think they were trying to read into the claim where
16 you stop and you change the etch chemistry, which Kim itself discloses. But
17 I will just note that the problem they have is that while the specification talks
18 about reverse selectivity etching, it's nowhere to be found in the claims. So,
19 the Patentee knew how to say stop, change the etch chemistry, do reverse
20 selectivity etching. It's not there.

21 Your Honors, this is a selective quote from the petition. They say
22 that this is all that we rely on. Continuing on 32, we go to the discussion
23 about the descriptions applying and talking about the closely related
24 embodiment. On 33, we go through Chen, we go through Yu. We cite,
25 indeed, Intel/PACT. So, this idea that this petition relies on this solely is

1 just incorrect.

2 Counsel, again, isolated this sentence from the petition. This
3 portion of the -- or the reply -- I'm sorry. This portion of the reply indeed
4 cites to Banerjee, paragraph 14. Just like the petition, what's described is
5 that when you go from 2D to 3D, you end up with this stack, you have to
6 provide this staircase with these isolated gate stacks, and in order to have
7 these landing pads where the vertical connects. And so, Your Honor, you
8 asked what is Kim addressing with the staircase and the ordering, that
9 description appears in Figures 4 through 8 and paragraph 90, where he's
10 building the staircase. That is what we're talking about. That's what
11 Banerjee explains in the opening and in the reply that you have to have these
12 landing pads for the vertical interconnect. That's what Kim discloses.
13 Indeed, when Kim gets to Figure 17 through 22, he doesn't refer back to
14 building the staircase. It assumes that a staircase is there, staircases are
15 shown. And so, indeed, the admission from Patent's Counsel, I think, is
16 telling and dispositive that Kim, in fact, expressly discloses this, putting
17 Intel/PACT aside.

18 The sub-stated analogy, I think, was good. He said, okay, if you
19 say substrate 100 has three materials, does that apply when you show a
20 substrate again. Counsel said yes. That is what Kim does. He builds the
21 staircase. He says the staircase can have any order. Labels 111 through 118
22 is the insulating layers. When he gets to Figure 17, it just shows the
23 staircase. He doesn't describe building it again. So, it's just like the analogy
24 where the substrate can be one of three things, and then you show the
25 substrate again. They build the staircase, they show the staircase again.

1 And that brings us to their Slide 22, Your Honors. And they, in
2 fact, underlined itself, except where the embodiments differ. Underneath
3 that etch-stop on Figure 17 through 22, it's just a staircase. You can just
4 look at the figures of how they build the stack in these early figures, and
5 then 17 picks up and literally shows that staircase that was built, so the
6 substrate analogy applies. The staircase is the same. It can be any order.
7 What 17 and 22 describe differently is the new elements which go on top of
8 the staircase.

9 Your Honor, I went back and looked at the papers. I think the
10 confusion on where the citation to Kim, paragraph 186 is, and the reason our
11 slides cited 40, 50, and 51 is Claim 4 refers to, of course, the etch-stop layer.
12 That, in the petition, is first explained when the -- I mean, it refers to the
13 etch-stop. So, a etch-stop is first referred to -- I believe it's in element 1B,
14 but it's on page 40 of our petition, and when the etch-stop is first introduced,
15 the petition describes the material of it. And so, our slides cited back to 50
16 and 40 because 50 introduces Claim 4, which refers back to the etch-stop,
17 and we first address that in Claim 1. So, Counsel is right. The expressed
18 citation doesn't appear in Claim 4, but it does appear when the etch-stop is
19 introduced as a etch-stop.

20 What the Petitioner relies on in this Ground 2 is replacing the Kim
21 -- Kim has a silicon nitride top etch-stop, and the bottom is silicon oxide.
22 What the petition explains in detail is that it would be obvious to replace
23 Kim's top silicon nitride etch-stop with Fang's hafnium oxide. And so, I'm
24 not sure I quite understand, but if Counsel is saying that we're somehow not
25 relying on CDSN, no the ground adds the hafnium oxide. To the extent that

1 that appears in a paragraph that also discuss CDSN, I mean, it's neither here
2 nor there because again, the ground advances the hafnium oxide. More
3 importantly, we've always argued that Fang is not limited to CDSN. It just
4 makes little sense to say that Fang is limited to CDSN when Fang says that's,
5 for example, only, and then indeed, provides another expressed example and
6 hafnium oxide.

7 What's undisputed about Chen is important. And what Patent
8 Owner does not dispute is what they labeled there on C and D. Chen has a
9 silicon oxide and a silicon nitride dual etch-stop layers. Silicon oxide is on
10 bottom, the silicon nitride is on top. And that is precisely what Kim
11 discloses -- silicon oxide, silicon nitride. And Chen says, that's not good
12 enough. I want to sub out that silicon nitride with a high-k layer because I
13 even want greater tunneling length. Undisputed. And that's exactly what the
14 ground advances for this great -- this tunneling benefit. Your Honor, I'm
15 going to switch computers real quick.

16 MR. HSU: Quickly, Patent Owner's arguments with regard to
17 Grounds 3 and 4 focus on this idea that there's some alleged redundancy, but
18 there is none, as we explained. And I'll zero in on one of the statements that
19 Patent Owner made. Patent Owner focuses on this idea, oh, Han discloses
20 multiple high-k dielectric layers. Again, that is not what the petition relied
21 on. The petition identified either the tunneling insulating layer, TIL, or the
22 blocking layer, BK. Not multiple layers. Han, in fact, discloses a single
23 layer high-k dielectric around the gate.

24 This is Figure 26B. The embodiment that Patent Owner was
25 referring to are other variations that the petition did not rely on. Now, even

1 if that were true, it still doesn't matter because Exhibit 1088 -- this is also
2 cited in our reply -- this is the Park reference, Park also shows a variant with
3 multiple high-k dielectric around the gate. And Park undisputably has a
4 high-k, plus the etch-stop layer. And with that, unless there are questions,
5 I'll hand over the time to the Patent Owner.

6 JUDGE CYGAN: Thank you, Petitioner. Patent Owner, you have
7 13 minutes and you may begin whenever ready.

8 MR. GREENFIELD: Okay. May I proceed, Your Honor?

9 JUDGE CYGAN: Yes.

10 MR. GREENFIELD: Very briefly, where Patent Owner left off, in
11 talking about the different layers of Han that it's relying on. This is not
12 related to what I have on the screen right now. This is separately -- they
13 talked about only relying on some features of Han and not other
14 embodiments of Han. In reply, Petitioner argued it didn't rely on Han's multi
15 high-k dielectric embodiments. That's at page 21 of the reply, but the
16 petition stated that Figures 1 through 11 and 14 through 31, which obviously
17 include figure 26D, are all applicable to the method forming the device
18 shown in Figure 20. That's at petition, page 74.

19 So, somehow, they're trying to disclaim kind of relying on the
20 multi dielectric layer embodiment. It doesn't really fit what's in the petition.
21 But more to the point, and I think the central issue that I covered in my
22 opening I want to address is this sort of gate stack layer. And when
23 Petitioner was up here, they pointed to page 31 of the petition where they
24 said, Grounds 1 and 2 rely on Kim's Figure 17A through 22B embodiment,
25 comprising an etch-stop layer and a barrier layer. Kim discloses other

1 embodiments for example, Figures 5A through 14B, suggesting that we have
2 taken this out of context, that this is sort of trivial, and that the petition goes
3 on to talk about sort of the relationship between these embodiments. I think
4 it's just, I guess, dawned on me and kind of hit me, I think, where there's
5 been a lot of discussion about, does the sentence in paragraph 90 apply to the
6 Figure 17A through 22B embodiment. That's been a lot of the discussion
7 today and understandably so.

8 If you go back to the petition, they don't say that. I mean, they
9 could've said in crystal clear words that this 17A through 22 embodiment
10 can have the gate stack on top versus on bottom, pointing to paragraph 90,
11 and just laid it out like we've discussed. They don't do that. They expressly
12 in the petition, at paragraph 31, or page 31, draw a distinction between these
13 two different embodiments. And they go on, on paragraph 20 -- or page 32
14 -- to talk about, well, a POSITA would've understood descriptions of one
15 embodiment applied to other embodiments. These are closely related
16 embodiments.

17 This is all sounding in the Boston Scientific case law of combining
18 two embodiments from one prior art reference for which you indisputably
19 need a motivation to combine. That's the world that the petition defined.
20 Two embodiments that they're combining. The discussion we've had since
21 about, well, does paragraph 90 and that sentence really apply to the second
22 embodiment, so they're not combining embodiments, just does not fit the
23 petition. It does not fit the petition.

24 So, we think we're right the way that we've phrased it, but I'd
25 encourage the Board to just go back to the petition, to what the arguments

1 they were really putting forward there in the ground, and that's combining
2 two different embodiments from Kim, and they have not provided a
3 motivation to combine to do so with reasonable expectation of success.
4 Unless there are any questions, I'll respectfully ask the Board to reject all
5 four grounds. Thank you.

6 JUDGE CYGAN: Thank you, Counsel. I'd like to thank Counsels
7 for both parties for their attendance and their presentation, again this
8 afternoon. We'd also like to thank the parties for their preparedness and the
9 good command of record again -- we've said it before, but we'll say it again
10 -- for the afternoon session. And again, for the demonstrative exhibits and
11 for the discussion today. A final written decision will be issued in due
12 course and the hearing is now adjourned.

13 (Whereupon the above-entitled matter went off the record at 2:59
14 p.m.)

IPR2025-00228,
Patent 11,101,276 B2

PETITIONER:

Jeremy Jason Lang
K. Herman
Johannes Hsu
ORRICK, HERRINGTON & SUTCLIFFE LLP
jlang@orrick.com
p52ptabdocket@orrick.com
ptabdocketj1h1@orrick.com

PATENT OWNER:

Inge A. Osman
Charles H. Sanders
Richard A. Lowry
B. Thomas Watson
Alex Grabowski
Adam Greenfield
Jacob Vannette
LATHAM & WATKINS
inge.osman@lw.com
charles.sanders@lw.com
richard.lowry@lw.com
thomas.watson@lw.com
alex.grabowski@lw.com
adam.greenfield@lw.com
jake.vannette@lw.com