

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CIRRUS LOGIC, INC.
OMNIVISION TECHNOLOGIES, INC. and
TEXAS INSTRUMENTS INC.,
Petitioner

v.

GREENTHREAD, LLC,
Patent Owner.

IPR2024-00017 (Patent 10,734,195 B2)
IPR2024-00018 (Patent 9,190,502 B2)
IPR2024-00021 (Patent 11,121,222 B2)

Record of Oral Hearing
Held: January 31, 2025

Before GRACE KARAFFA OBERMANN, JON B. TORNQUIST,
JEFFREY W. ABRAHAM, and MONICA S. ULLAGADDI, *Administrative
Patent Judges.*

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IPR2024-00018 (Patent 9,190,502 B2)
IPR2024-00021 (Patent 11,121,222 B2)

APPEARANCES:

ON BEHALF OF THE PETITIONER:

SCOTT C. WEIDENFELLER , ESQUIRE
ANUPAM SHARMA, ESQUIRE
RAJESH PAUL, ESQUIRE
Covington & Burling LLP
One CityCenter
850 Tenth Street, NW
Washington, DC 20001-4956
(202) 662-6000

DAVID BLUESTONE, ESQUIRE
Benesch Friedlander Coplan & Aronoff LLP
71 South Wacker Drive
Suite 1600
Chicago, Illinois 60606
(312) 212-4949

ON BEHALF OF THE PATENT OWNER:

ALAN L. WHITEHURST, ESQUIRE
NICHOLAS MATICH, ESQUIRE
ARVIND JAIRAM, ESQUIRE
McKool Smith P.C.
1717 K Street, NW
Suite 1000
Washington, DC 20006
(202) 370-8300

The above-entitled matter came on for hearing on Friday January 31, 2025, commencing at 1:00 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia.

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1 PROCEEDINGS

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3 JUDGE OBERMANN: On the record, please. Good afternoon,
4 Counsel. This is a consolidated final hearing in *Cirrus Logic, Omnivision*
5 *Technologies, and Texas Instruments v. Greenthread*. This hearing is
6 consolidated and includes three related IPRs. We have IPR2024-00017
7 involving challenges to Patent 10,734,195 B2; IPR2024-00018 involving
8 challenges to Patent 9,190,502 B2; and we have IPR2024-00021 involving
9 Patent 11,121,222 B2.

10 Good afternoon. I'm Grace Obermann, and with me today are
11 Judges Monica Ullagaddi, Jeffrey Abraham, and Jon Torquist. This is not an
12 expanded panel, but includes judges assigned to one or more of the cases
13 being heard in this consolidated hearing. So let's start with introduction of
14 counsel. Who's on the line for Petitioner?

15 MR. WEIDENFELLER: Thank you, Judge Obermann, and good
16 afternoon. This is Scott Weidenfeller with Covington & Burling on behalf
17 of Petitioner. With me, also from Covington are Anupam Sharma and
18 Rajesh Paul. Also on behalf of Petitioners, David Bluestone with Benesch
19 Friedlander Coplan & Aronoff. And I understand joining us on the public
20 line from Global Foundries are Michael Lestrangle and Emery Yuzak.

21 JUDGE OBERMANN: Thank you, Mr. Weidenfeller. Who will be
22 presenting arguments today on behalf of Petitioner?

23 MR. WEIDENFELLER: Mr. Sharma first, and then Mr. Paul.

24 JUDGE OBERMANN: Thank you. And who do we have on the line
25 for Patent Owner?

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1 MR. WHITEHURST: Good afternoon, Your Honor. It's Alan
2 Whitehurst from McKool Smith for the Patent Owner Greenthread. And
3 with me and with me today, I have my colleagues Nicholas Matich and
4 Arvind Jairam. And on the public line from Greenthread, we have Dr. Rao
5 and Gerald Amen.

6 JUDGE OBERMANN: Thank you. It's Mr. Whitehurst?

7 MR. WHITEHURST: That's correct.

8 JUDGE OBERMANN: And who will be presenting argument on
9 behalf of Patent Owner?

10 MR. WHITEHURST: Today I will be presenting argument on behalf
11 of the Patent Owner, and then Mr. Matich will be addressing some of the
12 later issues.

13 JUDGE OBERMANN: Okay. Thank you, Counsel.

14 MR. WHITEHURST: Thank you.

15 JUDGE OBERMANN: This hearing, as you mentioned, is open to
16 the public. We do have a public line, and there may well be parties on the
17 line that we can't see listening into the argument because it is public. For
18 that reason, I'm going to instruct the parties to refrain from disclosing
19 confidential information during the hearing. To the extent that a party needs
20 to refer the judges to confidential information, please do so by referring us to
21 particular pages of the record without disclosing the confidential substance
22 of the material. We have access to the entirety of the record here before us
23 on our computers.

24 As I mentioned earlier, this is a consolidated hearing. But because
25 this is a virtual hearing, we ask that counsel please refer to their

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1 demonstrative exhibits by number every time so the judges can follow along.
2 And counsel should please refer to the specific paper numbers and exhibits
3 as well when discussing the record.

4 Importantly, the three cases at hand are related, but they're not
5 consolidated or joined. So for that reason, it's going to be imperative that
6 counsel refrain from blurring the record among the three proceedings. We
7 ask counsel to please not cite evidence from one proceeding when making
8 arguments about another proceeding. And please take care to make clear for
9 the record which proceeding is under consideration at any given time. If
10 you're discussing a matter that applies across all three proceedings, please
11 make that clear as well.

12 Both parties filed some objections yesterday to the other party's
13 demonstratives. And it appears to me, at least, that the objections are limited
14 to identifying allegedly new arguments raised in the demonstratives. I'm
15 going to ask counsel in turn to please confirm that. Petitioner?

16 MR. PAUL: Yes, Your Honor, we have -- this is Raj Paul on behalf
17 of Petitioner. We have a series of objections to improper new argument by
18 Greenthread, and we can describe those in detail.

19 JUDGE OBERMANN: No, I don't want you to. I've read your
20 papers. I just want to confirm that there's no other basis for the objections
21 except for alleged introduction of new material.

22 MR. PAUL: Correct.

23 JUDGE OBERMANN: Thank you. And Patent Owner, I'll ask you
24 the same question.

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1 MR. WHITEHURST: Your understanding of our objections is
2 correct, Your Honor.

3 JUDGE OBERMANN: Thank you very much. Thank you. Okay.
4 So both parties will be permitted to refer to their exhibits freely during this
5 hearing. And the panel will take account of the objections. And in reaching
6 any final written decision we're not going to give any weight or
7 consideration to arguments that are truly new that are raised in any exhibit.
8 And we have a great deal of experience distinguishing that. But we thank
9 you for your papers that will flag for us what you believe is new material.

10 So at this time, we're going to begin commencing the hearing. I'll
11 remind both parties that per our hearing order, each side has been allotted 90
12 minutes in total. And the series will be we're going to have Petitioner do its
13 case in chief. Then we're going to allow Patent Owner to respond. If
14 Petitioner wishes to reserve some time for rebuttal, they may do so. And
15 Patent Owner, you will have an opportunity for sur-rebuttal if you reserve
16 some of your time.

17 So let's start with Petitioner and I am going to ask Petitioners'
18 counsel, would you like to reserve any time for rebuttal?

19 MR. SHARMA: Yes, Your Honor. This is Anupam Sharma. We
20 would like to reserve 40 minutes for rebuttal.

21 JUDGE OBERMANN: Forty?

22 MR. SHARMA: Yes, Your Honor, 4-0, 40.

23 JUDGE OBERMANN: Four-zero, okay. So that means that you will
24 have 50 minutes in your direct. And I'm going to start the clock. It's now
25 1:12. And you can proceed. Thank you, Mr. Sharma.

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1 MR. SHARMA: Good morning, Your Honor. We have prepared
2 some demonstratives for the hearing. With your permission, I will share my
3 screen.

4 JUDGE OBERMANN: Thank you.

5 MR. SHARMA: I hope the Panel can see my screen. I have here
6 Exhibit 1072 of the Petitioners.

7 JUDGE OBERMANN: Yes, we can see it, Mr. Sharma. Thank you.

8 MR. SHARMA: You're on slide number 2 right now. The hearing
9 today pertains to the IPR petitions listed on the bottom row. There are three
10 of them and all of them call for a drift layer. Therefore, we refer to them as
11 the drift layer claims.

12 We are on slide number 3. This gives the tentative agenda for the
13 hearing today. We will provide a high-level overview of how we have
14 mapped the challenged claims to the prior art. And then we will focus on
15 the disputed limitations and show how the disputed limitation is shown in
16 the prior art, and I will address that argument. My colleague Mr. Raj will
17 address against such arguments that *Payne* is not a proper single reference
18 obviousness. And to the extent the Board has any questions on secondary
19 considerations, Mr. Raj will address those, too.

20 We have slide 4 now. Slides 4, 5, 6, and 7, the accepted claim 1 or
21 the independent claims from each of the three patents. And the purpose is to
22 show that at a high level all the three claims are very similar. They all are
23 quite similar. All three of them are apparatus claims and they all require
24 structural limitations. And our mapping for all the three patents and the

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1 challenged claims is same across all the petitions. So we have the same
2 argument that we make in all the three petitions.

3 In slides 8, 9, and 10 we have summarized the grounds on which the
4 petitions were instituted. And as the Panel can see, we mainly rely upon two
5 references as the anchor or the primary references. One is the *Payne* patent,
6 other is the *Onoda* patent. And we'll discuss those two in more detail today.

7 And we are slide number 11 now. And the following slides will give
8 you a high-level overview of how we map our claims to the patent.

9 We are on slide number 12. This is the first prior art reference we
10 discussed is a patent, Exhibit 1005. We refer to it as the *Payne* patent
11 (inaudible) inventor, Payne. It's an old patent. It was filed in 1981 and
12 issued in 1987, so many years ago.

13 We are on slide number 13 now. Here we have excerpted figures
14 from the *Payne* patent on the left. We also have excerpted claim 1 of the
15 '195 patent. And the color-coding over here shows how we have mapped the
16 claims onto the prior art. Looking on the left is figure 10 from the *Payne*
17 patent. It shows an NMOS transistor on the right and the PMOS transistor
18 on the left. And that is clear based on the dopant types. On the left, the
19 source and drain are P-type, therefore referred to as a P-type transistor. And
20 on the right the source and drain are both N-type, so *Payne* refers to it as the
21 N-type transistor. Together they form a CMOS transistor as mentioned in
22 the *Payne* patent.

23 Below is figure 11 from the *Payne* patent. It shows how the dopant
24 concentration changes with depth. Y-axis shows the concentration and
25 pertains to the top of the surface and the X-axis shows depth going into the

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1 substrate. *Payne* patent provides what the exemplary concentrations are. So
2 we have annotated graph 15 -- or figure 11 with those annotations. It shows
3 that the concentration on the surface can be 5 times 10^{16} . And as
4 you go into the substrate, by that time you get to 8 microns or so, the dopant
5 concentration is 2 times 10^{14} . These are usually measured as
6 dopants or atoms per centimeter cubed.

7 Let me quickly walk through the claims. The first claim is -- or
8 claim 1, the first limitation is a preamble. A CMOS semiconductor device,
9 to the extent the preamble is limiting, *Payne* shows a CMOS transistor.
10 Here on the left is NMOS and PMOS transistors. Together they form a
11 CMOS. And *Payne* also mentions explicitly in its specification that it
12 discloses a CMOS transistor.

13 One thing I want to point to the Board is that in the District Court
14 litigation between Greenthread and Intel, Greenthread submitted a
15 (inaudible) brief where they map the claims or the structures of the claims
16 onto figure 5B of their patent, and they mapped all the elements over there.
17 So in our IPR, as we mentioned, the petition relied upon Patent Owner's
18 mapping of these structures onto the figures. And we have done the same
19 mapping for our mapping with prior art.

20 So the first limitation in claim 1 is surface layer. And in the District
21 Court Petitioner drew a blue box on the tops and denoted that to be surface
22 layer. And we show over here both the NMOS and PMOS transistor.
23 There's a box that is shaded in blue that corresponds to the claimed surface
24 layer.

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1 Second limitation is a substrate. This is also shown on the left in
2 figure 10, element 10 shaded in gray, is a substrate and this is a substrate on
3 which the NMOS-PMOS transistors have been formed.

4 Third limitation is an active region, including a source in a drain
5 disposing one surface of side layer and that's shown in red on the left-hand
6 side, an active region shown in red. There is a source and a drain and it is
7 within the surface layer, and that's shown both in the PMOS and NMOS
8 transistors.

9 Next limitation is a drift layer that is between the surface layer and
10 the substrate. On the left-hand side In figure 10 of *Payne*, a drift layer is
11 denoted by layer number 17, that is labeled in tan, and that is the claimed
12 drift layer.

13 Finally, the last two limitations require a drift layer and a well
14 region. Before we address well region, the claim requires that the well
15 region be disposed within the single drift layer. That's shown in figure 10,
16 again, as your color-coded portions in green that correspond to the well
17 region and those are within the drift layer. That's element 17.

18 Now, both the drift layer and the well region contain one
19 requirement. They require that both the drift layer and the well region have
20 a graded concentration of dopants. And they also require that there be a
21 static unidirectional electric field. And the field must aid movement of
22 minority carriers from the surface to a substrate. There's one thing different
23 between the active region claims that we saw on Tuesday and this one is the
24 three patents that issued today mention movement of minority carriers,
25 unlike the previous claims that mention movement of carriers.

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1 Here figure 11 shows both the limitations are met by *Payne*
2 reference. Here, as we see from graph 11, the slope points -- the gradient
3 goes downwards as you go in depth. And therefore, both the active region
4 and the drift layer that is annotated in green and in tan over here have a
5 graded dopant concentrations. And then we know that if there's a gradient of
6 dopants it will create electric field. That's denoted by arrows E1 and E2 that
7 are marked in yellow. And the purpose of the arrows is to simply denote the
8 direction of the field. They are not meant to show exact start or end of the
9 field, just merely the direction in which the field will point. The electric
10 field will be coextensive with the gradient. If there is a gradient, there will
11 be a field. If there is no gradient, there will not be a field. And here you can
12 see there's a gradient all the way from the surface down to eight microns
13 over here. And since the field is pointing downwards it will aid the
14 movement of minority carriers in the appropriate direction.

15 One thing unique about the claim 1 of '195 patent is in the limitation
16 that is highlighted in tan. This is a drift layer limitation. It says a "drift
17 layer having a graded concentration of dopants extending between said
18 surface layer and substrate." So the claim requires a graded concentration
19 only between the surface layer and the substrate. So the drift layer is tan
20 over here. The claims require that the dopant concentration go from the blue
21 region, that is the surface layer, to the substrate, that is the gray layer. Even
22 though the smaller span, prior art discloses that the dopant concentration
23 goes from the surface all the way down to the substrate in gray.

24 And then move on to slide number 14 over here. This is claim 7 from
25 the '502 patent. Again, our mapping is similar. The same arguments apply.

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1 The difference over here, as I mentioned, is in the drift layer. Here the drift
2 layer simply says there's a greater concentration of dopants. There's no
3 requirement that it be bits (phonetic) from the surface layer to the substrate.

4 We have slide 15. Right now we have excerpted claim 44, the '222
5 patent. And in this one we have the same mapping as earlier, so our
6 arguments apply over here, too.

7 Now I'm on slide 16 now. And I have excerpted portions, front
8 cover of the *Onoda* application. It's Exhibit 1042. *Onoda* was a Japanese
9 application that was filed in 1995 and published in October 1996.

10 On slide 17 right now. Here we show mapping of claim 1 of the '195
11 patent to the figures and specification of the *Onoda* patent. On the left is a
12 figure that shows the structures, that is, the CMOS structures, NMOS and
13 CMOS structures and also flash memory structures that have been formed on
14 a substrate. The figure is small over here. But we excerptedd that and
15 present a (inaudible) view on the right-hand side that shows a NMOS
16 transistor, element 107, and how it has been formed on the substrate.

17 On the graph below is figure 11 that shows dopant profile of the
18 substrate in the *Onoda* publication. Again --

19 JUDGE ULLAGADDI: Let me ask a quick question about this.

20 MR. SHARMA: Yes, Your Honor.

21 JUDGE ULLAGADDI: Are the minority carriers in the NMOS going
22 to be holes and in the PMOS going to be electrons?

23 MR. SHARMA: Yeah, we'll address this issue in depth later. But just
24 to -- Dr. Banerjee explained that what's majority, what's minority depends
25 upon the dopant type. So if you're looking at the NMOS transistor and you

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1 look at the source and the drain, the source and the drain are N-type. So in
2 this case the majority carriers would be electrons because that's N and the
3 minority carriers will be holes.

4 However, if you look in the middle of the source and the drain, so
5 this NMOS transistor source and drain are N-type, the channel in the middle
6 will be P-type. In the P-type channel, the majority carriers will be holes and
7 the minority carriers will be electrons. So it's convention and we have
8 excerpts from Dr. Banerjee and also textbooks will show how we decide
9 what is a NMOS transistor. What's majority, minority is specific to the
10 region and the dopant type in the region.

11 JUDGE OBERMANN: Thank you.

12 MR. SHARMA: So, Your Honor, this is the first -- the preamble calls
13 for a CMOS semiconductor device. To the extent that preamble is limiting,
14 (inaudible) discloses a PMOS transistor. If you look at the blue circle on the
15 left-hand side in the figure 3 it shows the NMOS and the PMOS transistor.
16 It's hard to see, but we have put a blue circle around it.

17 Second element calls for a substrate. That's in a figure left as shown
18 in 101. That's the substrate. It's also colored in gray. In the zoom-out figure
19 I will show the substrate in gray. Second limitation, active region that has a
20 source and a drain, which is in the surface layer.

21 I apologize if I did not discuss surface layer, but if I repeat that to be
22 safe. First limitation, the surface layer. And as shown in the green
23 (inaudible) figure in a blue box there's the area near the surface that
24 Greenthread argued is surface layer. And to the extent Greenthread is
25 correct, (inaudible) surface layer.

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1 Coming back to the active region, the red box show an active region
2 in the *Onoda* publication. It shows it is in the surface area, in the surface
3 layer. It also has a source and a drain, both highlighted in red.

4 JUDGE OBERMANN: Counsel, one more question. Is the channel
5 part of the active region in *Onoda*?

6 MR. SHARMA: It depends upon how you define active region.
7 Active region is a region where transistors can be formed. So if that is the
8 right definition, then where the NMOS-PMOS have been formed, those will
9 be the active region.

10 And here in this claim over here it says active region is including
11 source and a drain, and that we are shown over here. And if the portion is
12 moving and the filler is hard to see over here, the source and the drain are
13 the big blue -- big red boxes. And the little area between the two will be the
14 channel. So it depends how you define the active region. If you define the
15 active region to be source, drain, and channel, in this case *Onoda* shows it.
16 If you define the active region only to be a source and drain, in that case also
17 *Onoda* discloses it.

18 Did I address Your Honor's question?

19 JUDGE OBERMANN: Yes. Thank you.

20 MR. SHARMA: The next limitation is the drift layer. That's
21 between the surface and the substrate. And we are shown over here that the
22 area marked as in the tan labeled as 102 is drift layer.

23 And finally, we have to show a well region that is formed within the
24 drift layer. And the zoomed-in figure we have marked the well region as the
25 green portion and well region has been formed within the drift layer. Now,

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1 both the drift layer and well region should have a graded concentration of
2 dopants. And that's shown in figure 11. We have marked -- we show how
3 the dopant goes from left to right and the portions in green and tan show
4 what is the -- how the dopants change, how the gradients change in the green
5 and the tan section.

6 And the case also requires that there be a unidirectional electric field.
7 That's shown in figures -- through arrow E1 and E2. Because the field is
8 present, it will aid movement of the minority carriers into the substrate. So
9 the field is pointing to the top. The -- it will aid movement of minority
10 carriers. It will be electrons over here and they will move into the substrate.
11 Again, figure 11 shows that it's a P-well profile. This means the substrate
12 has been drawn by P-type and the minority carriers are electrons.

13 We are slide 18 right now, and we show a mapping of claim 7 of the
14 '502 patent onto the *Onoda* publication. Because the claims are similar and
15 have same structure requirements, our arguments are the same.

16 On your slide number 19 right now, and we show the mapping of
17 claims 44 the '222 patent onto the *Onoda* publication. Because the claims
18 are similar, we do the same mapping.

19 Now on slide 20, we are showing *Wolf*. *Onoda* mentions PMOS-
20 NMOS transistor. But just to be -- in case the Board has a doubt that *Onoda*
21 does not disclose a CMOS transistor, we offer a ground where you combine
22 *Onoda* with *Wolf*. *Wolf* was published in 2000. It's a very well-reputed
23 textbook. It shows that the CMOS transistors can be formed using NMOS
24 and PMOS. And they also mentioned what is the benefits of CMOS

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1 transistor and also why, by 2000, CMOS transistors have become the
2 dominant technology.

3 On slide 21 we are excerpting portions of the *Parrillo* patent and
4 some of the claims require that the active regions or structures should be
5 formed on an epitaxial layer and *Parrillo* describes how to use a protection
6 layer to form transistors.

7 And finally, on slides 22, 23, we rely on Silverbrook to show that the
8 transistors -- CMOS transistors can be used to form image sensors.

9 On slide 24 now. I have gone through all the mapping that the
10 Petitioners offered in their three petitions and one of the limitations that
11 Greenthread has disputed is the graded concentration group limitation, just
12 like in the proceedings earlier this week. And I will go deeper into these
13 particular limitations and show how they are disclosed in the patent.

14 But before I begin, just want to point to the '195 patent. And this is a
15 slide we had last time, also, and I'm on slide number 25. Just want to repeat
16 that these are apparatus claims and each of these limitations over here are
17 structural limitations. And as we have cited to the *ParkerVision* case where
18 we mentioned that the apparatus can "cover what a device is, not what a
19 device does."

20 Greenthread is actually taking different views. They believe that the
21 claims require semiconductor device to do something. So they are going
22 into the domain of what the *ParkerVision* says is improper when evaluating
23 apparatus claims.

24 And on slide 26 now we excerpted certain portions of the
25 *ParkerVision* case just to explain how *ParkerVision* fits our argument. In

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1 the *ParkerVision* the issue was a circuit that could create harmonics. The
2 claims required harmonic and then we generated for the frequency. So if the
3 frequency was X, the harmonics would be 2X, 3X, 4X.

4 And for the apparatus claim, the issue was does it create harmonics
5 in all modes of operation? And to which the Federal Circuit mentioned,
6 "Where the claim language recites 'capability as opposed to actual
7 operation,' an apparatus that is 'reasonably capable' of performing the
8 claimed functions 'without significant alterations' can infringe those claims."
9 By logic, if you have a prior art, that will render the claims unpatentable.

10 And at the end the Board noted that, "Nozawa's circuit requires only
11 an oscillating signal that is reasonably capable of gating the bias signal in a
12 manner that generates signals having a plurality of harmonics." So the
13 Board in the Federal Circuit in that case rejected *ParkerVision*'s argument
14 that the device or the prior art show that the harmonics regenerated in every
15 situation. The Board said, for the apparatus claims, reasonable capability
16 was fine.

17 Now, one thing to note over here in *ParkerVision* there were two
18 claims at issue: apparatus claim and the method claim. The Board
19 disagreed with *ParkerVision* on the apparatus claim. However, the Board
20 agreed with *ParkerVision* on the method claims. And what we have is we
21 are challenging apparatus claims. We are not challenging any method
22 claims.

23 Greenthread tried to argue on -- earlier this week that this is a IPXL.
24 This is not a IPXL issue. We believe this is apparatus claim. All the
25 limitations are structural limitations. All we need to show that similar

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1 structural limitations are present in prior art. We are not arguing that this is
2 a mixing of the method and the apparatus claims. So *ParkerVision* and
3 (inaudible) apply with equal force on our case.

4 And on slide number 27 right now. This is an interesting slide. As I
5 mentioned in the -- there was prior litigation between Intel and Greenthread
6 in the District Court. In that litigation Intel argued that the "to aid"
7 limitation was indefinite, in fact. So, Greenthread was fitting this paragraph
8 112 (phonetic) indefiniteness argument. In that case, Greenthread
9 mentioned that the phrase "to aid movement of minority carriers" simply
10 nullifies this structural element and that's what they mentioned.

11 And I point the Board to the second highlight. And this case was
12 pending in the Western District of Texas, like our case. In the second
13 highlight the Board mentions how Greenthread argued to the District Court
14 and the claim turns on the presence of unidirectional electric field and the
15 phrase "to aid movement of minority carrier" merely states what the
16 unidirectional electric field does. It's simply pointing to the impact of the
17 unidirectional electric field.

18 Next sentence even more important, "The drift field points to one
19 direction and the charge carriers, when free to move, respond to the drift
20 field by moving in one direction or the other depending upon their charge
21 polarity." So there Greenthread told the Federal -- the District Court in
22 Western District that "to aid movement" is simply telling what the structure's
23 capability is. It should have a direction and it should impact the charge
24 carriers.

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1 And earlier in the same paragraph, if I may refer the Board to the
2 first highlight, we had mentioned, "It is not like Dr. Rao claimed 'to aid
3 movement' in a vacuum. Rather he claimed a specific drift layer with graded
4 dopants that create a particular type of electric field. By the time claim gets
5 to the phrase 'to aid movement,' it is merely clarifying what the electric field
6 does. Any question about what is meant by 'to aid movement' is answered
7 by the preceding claim language." And what is the preceding claim
8 language? Preceding claim language is the electric field.

9 So this is just some issue that we are (inaudible) tell them again,
10 Your Honor. This is, frankly, we have recurring pattern when in the Patent
11 Office or at the District Court. (Inaudible) Section 112, paragraph 1 attack,
12 it has one view of the claims. but to survive it, certainly the claims have
13 different requirements.

14 On slide number 28 now. This is quickly walk through the disputed
15 limitation. Claim 1 of '195 requires a drift layer and well region. It's
16 required that both of those drift and well regions have a graded
17 concentration. It also requires them to have a unidirectional field that is
18 created by the dopant concentration, and the orientation of the field is such
19 that it aid movement of minority carriers, not impede movement.

20 Now I'm on slide 29 now, on *Payne*. We walked through some of
21 the limitations earlier, but I just quickly point to some of the key aspects
22 over here. As we showed earlier, the portions in green 18 and 15 on the left
23 pertain to the PMOS, a P-type transistor. And those are the well region and
24 the drift layer. And those are shown in figure 11 to the right. The green is
25 the well region and the tan is the drift layer.

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1 Just pointing to the dopant profile on figure 11, I just want to point
2 the panel to column 5, line 56 to 58, of the *Payne* patent, and we excerpted a
3 portion in our petition, also. It refers to the dopant profile is high/low
4 implant profile. This means implant profile goes from high at the surface to
5 a low at 8 microns. Because the implants over here are N-type, electric field
6 will point into the direction of the substrate. They're shown with E1 and E2
7 over here. And since the substrate is N-type, the minority carriers will be
8 holes and the holes will move in the direction of electric field. So the fields
9 even in E2 aid movement of the carriers into the substrate.

10 One thing unique about the '195 patent, that it requires the field to be
11 from the surface layer to the substrate. That's highlighted by the red dotted
12 arrow, and thus you need to do '195 patent. We pointed the red dotted arrow
13 on the left to show that the gradient will go from the surface layer into the
14 substrate. However, as shown In figure 11, the gradient goes from the
15 surface all the way to 8 micron depth. And the electric field will be present
16 from the surface all the way down to 8 microns.

17 And just to alleviate any confusion, as I mentioned earlier, we have
18 put E1 and E2 arrows to show the direction of electric field and the
19 approximate location. The location of the arrow is not meant to show where
20 the electric field starts or electric field ends. Here the electric field starts at
21 the surface and go all the way down to 8 microns.

22 Now, in the substrate there is no gradient. Therefore, there will not
23 be an electric field in the gray portion.

24 I am on slide number 30 now, and we have shown a mapping from the
25 *Onoda* publication. And I'll just point to the specifics over here. Again, the

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1 well region and the drift layer are green and tan that are shown on the right-
2 hand side on figure 11. That shows the concentration of dopant gradients.
3 Here the gradients go from 0 at the high of 10 to power 17 and down to
4 about roughly 10 to power 16, about 5 micron depth. Since this is a P-type,
5 the dopant -- the electric fields will point upwards. Here the minority
6 carriers will be electrons and the electric field will aid their movement from
7 the surface into the substrate. They're shown by electrons E in red.

8 Just want to point to one issue. Here the field will start from the
9 surface and all the way down to 5 microns and the peak and the highest
10 concentration at the surface. And *Onoda* mentions that their expert on
11 paragraph 53 of *Onoda*, which is Exhibit 1042, *Onoda* mentions that the
12 well regions are formed through thermal diffusion. So he's talking about the
13 well regions like the one shown in green, they are formed through thermal
14 diffusion. But if you do the dopant implant and you heat up the substrate as
15 *Onoda* says in paragraph 53, "thus the dopant profiles thereof are profiles
16 that approximate Gaussian distributions." Patent Owner then clarifies what
17 is a Gaussian distribution. Says the concentration at maxima near the
18 surface. So *Onoda* expressly mentions in paragraph 53 that the dopant
19 profile will be maximum at the surface and then it will degrade or go down
20 as you go into the substrate.

21 Let me jump over to, with your permission, go a little bit out of
22 sequence. I'm at slide number 95 and we'll come back to this slide,
23 (inaudible) slide. And this goes back to Judge Ullagaddi's question about
24 how you define what is minority, what is majority. Okay, just over here.
25 This Dr. Banerjee explained in his declaration and also extensively during

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1 deposition that dopant type determines what is majority, what is minority.
2 In this case, the source and the drain in figure 5B of the challenged patents
3 are N-types with the majority carriers the electrons and minority carriers the
4 holes. Likewise, the portion in the middle, that's the channel region, that's
5 the opposite dopant type. That's how transistors are formed.

6 All transistors are, you know, N-P-N-type have opposite dopant type
7 in the middle, N-P-N. Likewise, a P-type transistor, a PMOS, will be P-N-P.
8 In this case, this is an N-P-N transistor. So source and drain are N-type,
9 substrate and the channel region in the middle is P-type. And here the vast
10 majority and minority will change. Here the majority carriers will be holes
11 and the minority carriers will be electrons.

12 And then we point to Dr. Banerjee's declaration and so on. But in
13 our rebuttal we'll show some intrinsic and extrinsic evidence to show that
14 how Dr. Banerjee's testimony and how he evaluated the patents are
15 consistent with a person of skill in the art (inaudible) this.

16 And this is a mapping that we've used when Dr. Banerjee evaluated
17 the *Payne* patent and when he evaluated *Onoda* patent to show what is
18 majority and what's minority, especially what's minority because both the
19 (inaudible) --

20 MR. SHARMA: Did somebody have a question?

21 Okay. Yeah, and Dr. Banerjee used this mapping to identify what's
22 minority carriers in *Onoda* and what are minority carriers in *Payne*.

23 I'll go back to slide number 31. And this is excerpt from Sze
24 textbooks were published in the '80s. It's a very fundamental book on
25 semiconductor design. We saw this figure last -- earlier this week. But I

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1 want to point out a couple of things over here. And this is also something
2 Dr. Banerjee cited in his expert report as basis of how he interprets majority
3 minority changes over here.

4 On the left is shown the arsenic atom that has been doped in a
5 semiconductor. Arsenic is a group 5 element, has 5 electrons. So a dopant
6 with semiconductor plus silicon donates electrons and becomes the positive
7 ions. (Inaudible). Now, any time you put dopants in there, you create extra
8 electrons because the majority carriers become the electrons and minority
9 carriers become the holes.

10 Likewise, on the right-hand side is shown how to dope
11 semiconductor boron. Boron is a P-type dopant. It accepts -- it's not an
12 accepted ion, it accepts ions, therefore it creates a hole as shown in the
13 figure. Therefore, in P-type the majority carriers become the holes and
14 minority carriers become the electrons. And the study is -- now Dr.
15 Banerjee said he's pointing to the textbook that is widely used in industry.

16 And slide number 32 is simply illustrating what happens in order if
17 you do it with boron atoms. If you do -- work with boron you get a lot of
18 negative ions on the surface and very few negative ions into the substrate
19 and, therefore, the minority carriers electrons will move from the surface to
20 the substrate. As you know, the electric field works opposite will have a
21 reverse impact on the holes.

22 And slide 33 now. And this simply shows what happens if you dope
23 the PMOS, which is shown on the left, with arsenic because the substrate is
24 N-type, so you put arsenic in there and arsenic clears out the positive --

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1 sorry, the negative ions on the top and that pushes the holes. And that's
2 shown with the field E1 and E2.

3 Now I'm on slide 34 now. And I put the excerpt from *Kamins* over
4 here and we cited to *Kamins* in the petition for the proposition that if you
5 have a dopant gradient, it will create electric field and it will act on the
6 canvas. As Dr. Banerjee testified, in figure 3, you have a drop in
7 concentration shown by graph 24. It's the N-type substrate and the peak is at
8 10 microns and, therefore, it points to electric field to the right when the
9 dopant gradient goes down and on the left-hand side dopant concentration
10 goes up as you're going from the surface into the substrate. So it goes up --
11 it's initially flat and then goes up and peaks at 10 micron. Here since the
12 concentration opposite you get opposite electric field, but otherwise he's
13 testified that in this case the minority carriers would be holes, and he
14 mentioned that in his expert report. And they will move to the left or to a
15 surface on the left and then they will go into the substrate on the right-hand
16 side.

17 And on slide number 35 now, we point to a patent issued to
18 Jastrzebski. This is also cited during the file history. It refers to a charged
19 coupled devices. Initial figure 1a there's electric field pointing from layer 11
20 deeper into the substrate. And the patent mentioned that this electric field
21 over here is a drift field and pushes carriers into the substrate. And why
22 does it do that? It can show that in figure 1b, what is the dopant
23 concentration. It's a log dopant concentration. This means that the gradient
24 is going very steep as you go into the surface and that concentration creates
25 electric field, which then creates the -- moves the carriers.

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1 Right now I will switch context and talk about the file history of
2 these '195 patents. We discussed this at length last time, but we're going to
3 repeat the things again we said last time, but point to a couple of things that
4 are relevant to the claims at issue today. As you mentioned last time, in
5 April 2012, Greenthread had filed a response to rejection. Rejection was by
6 -- based on 112, first paragraph. And also Examiner wanted to know
7 whether multiple forces and fields affect the carriers.

8 And as we saw last time, if you go through the next two pages or so,
9 (inaudible) the Patent Office know these multiple forces and fields do not
10 matter. What matters is the dopant or gradient. And then they disagreed
11 with the Examiner.

12 Now, we want to look at slide 37 for a slightly different perspective
13 over here, an excerpt from the April 17, 2012, response. Obviously, as you
14 mentioned last time, Greenthread agreed, but also told what is the electric
15 field and how the electric field is created and what is the impact of electric
16 field on the carriers. Greenthread mentioned "a unidirectional drift electric
17 field necessarily affects all the present minority carriers in the same way."
18 So we had underlining "necessarily" and "all," emphasize that if the electric
19 field, it will affect on all present minority carriers, moving all minority
20 carriers in the same direction because of the unidirectional drift. And it
21 pointed to Grove textbook to show that the "same electric field will then be
22 of such direction as to aid the motion of injected holes." Injected holes will
23 move because of the electric field.

24 Later on, as you saw last time, we clarified that the slope of the
25 gradient will move the carriers up or down. It means if there is slope

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1 upwards you move the carriers in one way, if the slope is downwards you
2 move a different way.

3 On slide 38, again, your excerpt from the file history, again to focus
4 the Board on the relationship between the concentration and electric field
5 and the impact of electric field on the carriers. We had mentioned that the
6 highlighted portion, the gradient local concentration itself creates a built-in
7 electric field that forces the movement of carriers in a particular direction
8 whereby the direction depends upon the slope of the gradient. And this also
9 refers to the question Judge Tornquist asked last time, how is the electric
10 field created? Here, once you have graded dopant concentration,
11 Greenthread told that that will create a built-in electric field.

12 So -- and the field doesn't go away. The word "static" means
13 dopants will be there, there will be gradient, there will always be electric
14 field. And then as you saw last time we had mentioned this, the built-in
15 unidirectional electric field is the additional parameter to make sure things
16 move.

17 Now slide number 39 now. This is something was mentioned by
18 Judge Tornquist right now -- last time. We pointed to two cases over here
19 that tells you how to evaluate the statements made by Greenthread
20 (inaudible) history. We pointed two opinions. One is the Federal Circuit
21 opinion, *Iridescent Networks*, that were issued in 2019. And here it's
22 interesting to note that any defense position was similar to what Greenthread
23 has argued over here and the Federal Circuit expressly rejected that position.
24 The Federal Circuit noticed "Iridescent contends that the prosecution history
25 is irrelevant to claim construction because there is no clear and unmistakable

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1 disavowal of claim scope." Federal Circuit said we disagree. "We have
2 explained that any explanation, elaboration, or qualification presented by the
3 inventor during patent examination is relevant, for the role of claim
4 construction is to 'capture the scope of the actual invention' that is disclosed,
5 described, and patented." So the statements that we have made to the Patent
6 Office are relevant under the Federal Circuit guidelines.

7 And then in the *Ultravision Technologies* that was issued in 2023, the
8 Board -- sorry, the Federal Circuit relied on *Iridescent* to argue or to state,
9 "The prosecution history is relevant for more than an evaluation of
10 disclaimer -- it provides additional context for evaluating how the term
11 should be understood." So there's no dispute that the file history is relevant
12 and the panel should evaluate it.

13 I do want to point to one thing that was mentioned. Look at my
14 notes. We looked at the sur-reply that Greenthread had filed in the '195
15 patent. On page 20 of the sur-reply Greenthread cited to the *Biogen* opinion
16 and the cite is 318 Fed.3d 1132, Federal Circuit 2003. And pin-cite
17 (phonetic) -- the pin-cite mentions on 1140. And Greenthread stated, I quote
18 Greenthread, "Representations during prosecution cannot enlarge the
19 claims."

20 However, if you go to the pin-cite 1140, that's not what Federal
21 Circuit said. Federal Circuit said representations during prosecution cannot
22 enlarge the specification. We agree with Federal Circuit over there. There
23 the Board -- Federal Circuit mentioned that, yeah, during prosecution you
24 cannot enlarge the specification. You said what was said in the
25 specification. You can't come back and say it means more.

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1 The next three slides or so we simply point that Greenthread experts
2 agreed over depositions and so on like this we make. But we can persist in
3 disputing the limitations.

4 The next few slides we reviewed earlier and the main thrust of these
5 slides, and I don't want to go through the slides again because Board has
6 already seen these, we argued that Dr. Glew mentioned in his declaration in
7 Patent Owner's response the magnitude, gradient, intrinsic resistance should
8 matter, but none of that are required by the (inaudible) in the specification.
9 And we also mentioned on slide 48 that Greenthread had made a contrary
10 representation to the PTO than Greenthread is making to the panel over here.

11 And I'll jump over to slide number 52. This one we saw again, but I
12 want to point to a different part of the slide. Here in the pending claims,
13 that's in 2009, I want to point the Board to the penultimate limitation. In this
14 case Greenthread had filed a claim on a semiconductor device and the
15 penultimate limitation says, "an isolation well region capable of providing a
16 localized drift electric field without the application of an external potential."
17 So in this case, Greenthread is asking the PTO to issue a claim where the
18 field would be created without the application of an external potential. This
19 means the field is static. It also means that the transistor would be in off
20 state. So at this time, Greenthread was contemplating a transistor in the off
21 state.

22 And on slide 53 we excerpted Greenthread's statements to the Patent
23 Office. Greenthread mentioned that the claims have been amended to
24 modify that the claimed invention relates to devices that "include a graded
25 dopant concentrations in regions capable of providing a localized drift field

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1 without the application of an external potential." Again, they're pointing to
2 the fact that these are capability case that fall under --

3 JUDGE OBERMANN: Mr. Sharma?

4 MR. SHARMA: Yes, our Honor.

5 JUDGE OBERMANN: I'll just give you about a five-minute warning
6 before you start digging into your rebuttal time.

7 MR. SHARMA: Thank you, Your Honor. I'll try to wind up in the
8 next five to seven minutes. We'll start under the *ParkerVision*. The next
9 few slides I think we have seen before. In slides 54 onwards, we point to
10 statements Greenthread has made in the Intel litigation that are contrary to
11 arguments they're making right now. So we just show the briefs on those.

12 Okay. And then just want to point to slide number 59 again. This is a
13 slide we presented to counter Greenthread's argument that you need a
14 voltage , potential, or electric force to release electrons. So point out over
15 here in slide 59 that if you have a semiconductor on the room temperature
16 there will be a conduction band, there will be carriers on conduction band.
17 So the (inaudible) dictates the semiconductor left open, you will have
18 carriers. Otherwise semiconductors will not operate.

19 I'm going to stop over here right now, Your Honor. I just want to
20 point to a couple of things and I will let Mr. Paul address some of the issues.

21 There are issues about majority/minority carriers that Greenthread is
22 likely to bring up. On this one our position is Greenthread cannot point to
23 any one expert declaration where the expert relied upon any intrinsic
24 evidence or any extrinsic evidence to argue that majority carriers in the P-
25 type are holes and minority carriers are electrons. We had argued last time

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1 that this was extensively briefed. There's nothing in the briefing between the
2 parties where Greenthread is arguing that we have mapped the
3 majority/minority carriers incorrectly.

4 And as we (inaudible) time, I will point to the Board how Dr.
5 Banerjee has mapped the claims that Dr. Banerjee relies upon in the intrinsic
6 evidence and extrinsic evidence to show that his reading, his interpretation is
7 consistent with how persons of ordinary skill will map it.

8 With that, if the Board has no other questions, I will let my colleague
9 Mr. Paul address the remaining issues.

10 JUDGE OBERMANN: Okay. Thank you so much. Mr. Paul, you
11 have three minutes unless you want to work into your rebuttal time.

12 MR. PAUL: Thank you, Your Honor. Thank you, Mr. Sharma. I'll
13 go ahead and share my screen now. Can you see my screen, Your Honor?

14 JUDGE OBERMANN: Yes. Yes.

15 MR. PAUL: So, yeah, I'll briefly address an argument that
16 Greenthread is making regarding the ability to rely on a single reference
17 ground of obviousness. They argue that as to the '195 and '222 IPRs, that
18 Petitioners' presented an improper obviousness argument for *Payne* and for
19 the '502 IPR, improper obviousness based on *Payne* and based on *Onoda*.
20 And their argument is that for each of those grounds, we didn't explain what
21 elements are missing and how there's a reasonable expectation of
22 successfully modifying the reference. But this entire argument, I want to
23 point out, hinges on a flawed premise, because as to those grounds, as Mr.
24 Sharma has demonstrated, Petitioners haven't contended that there's anything
25 missing from *Payne* or anything missing from *Onoda*.

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1 So I'll jump out of sequence to slide 82. So all of the cases that
2 they're citing for their argument are readily distinguishable: *Kranos* case --
3 *Kranos Corp.*, *M&K Holdings*, and so forth. These cases involve situations
4 in which there's a motivation to make a modification or make a combination
5 and there's, you know, express acknowledgement of a missing element in the
6 single reference that's being relied upon. Just as an example here, on slide
7 82, *M&K Holdings*, Samsung expressly stated in its petition that the
8 predetermined block limitation was missing from the prior art. So these
9 cases are distinguishable.

10 And now back to slide 81. You know, the Federal Circuit has
11 dispelled Greenthread's argument regarding the ability to rely on a single
12 reference obviousness in situations where, like here, we don't identify a
13 missing feature for that single reference. And we cited the real-time data
14 case from the Federal Circuit which reiterates the longstanding notion that a
15 disclosure that anticipates under 102, Section 102, also renders the claim
16 invalid under Section 103. For anticipation is the epitome of obviousness.

17 So unless the Board has any questions, I'll move on to another topic
18 briefly.

19 JUDGE OBERMANN: You're actually out of time. Did you want to
20 work from your rebuttal time?

21 MR. PAUL: Sure, sure. And I'll briefly address an issue for a few
22 minutes. I'm going to jump to slide --

23 JUDGE OBERMANN: How much time do you want to subtract from
24 rebuttal?

25 MR. PAUL: I believe I will take about three or four minutes for this.

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1 JUDGE OBERMANN: Okay. Thank you.

2 MR. PAUL: And so I want to address briefly Greenthread's criticisms
3 of Dr. Banerjee's reliability. Turning to slide 107 now. So first they
4 insinuate that Dr. Banerjee didn't perform a technical analysis in order to
5 reach the opinions that's offered in his declarations and that he essentially
6 copied and rubber-stamped another expert's analysis and declaration and
7 submitted it as his own. And that's not accurate.

8 They like to mention that Dr. Banerjee was completely up front
9 about his review and his usage of these other declarations. And he said in
10 paragraph 3 of his opening declaration, Exhibit 1003 in the '195 IPR, for
11 example, and I apologize, Your Honor, this image on the left here is actually
12 from the '842 IPR, but the language is substantially the same. And he says
13 that in connection with these efforts, you know, he reviewed the declarations
14 provided in connection with those other IPR proceedings. He conducted his
15 own independent analysis and for the sake of efficiency, he decided to
16 excerpt portions of those declarations in drafting his declaration. So he
17 verified the substantive portions of those declarations.

18 But not only that, I want to be clear, in these proceedings in
19 particular today, Dr. Banerjee performed analysis, substantial analysis, that
20 wasn't done in the prior proceedings. Specifically, the *Onoda* reference
21 relied upon in these proceedings today was not analyzed by any of the prior
22 Petitioners and their respective experts. And in all of the IPRs that have
23 been filed by Petitioner here, Dr. Banerjee offered a supplemental
24 declaration with robust technical analysis. Again, something that was not
25 done in any of the prior proceedings, any of the prior experts.

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1 And so next they allege that Dr. Banerjee has an undisclosed
2 financial relationship with Petitioner Texas Instruments. But that
3 relationship was not undisclosed because there's a timing issue here. We
4 filed a petition in the fall of 2023. Texas Instruments did not join as a
5 Petitioner until this past year, 2024. And they pointed Dr. Banerjee's
6 disclosure of his funding in his CV, which did not disclose TI. But they
7 neglect to mention that when they deposed Dr. Banerjee on this issue, he
8 made clear that his current funding from Texas Instruments began only in
9 April 2024.

10 JUDGE ULLAGADDI: Counsel, I have a question for you. Are
11 these arguments on the part of Patent Owner and replies on the part of
12 Petitioner of record in the cases that we're hearing today? I notice it's
13 pointing to the '16 case, slide 107.

14 MR. PAUL: Yeah, yeah. So these paragraph 3 and paragraph 5,
15 respectively, of the 00016 case, these paragraphs also appear in Exhibit 1003
16 of the respective 00017, '18, and '21 cases as well.

17 JUDGE ULLAGADDI: Thank you.

18 MR. PAUL: Okay. And so there's no issue with disclosure of his T.I.
19 funding. He was not being secretive about that due to the timing of the
20 filing of the petitions.

21 But more importantly, Greenthread's suggestion that he has a
22 relationship with T.I. that compromises his opinions is baseless. T.I. is one
23 of many companies from which he gets funding. Private funding from
24 industry is a routine aspect of university research. So there's nothing more
25 to say on this issue.

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1 And lastly, going into slide 108, they suggest that Dr. Banerjee's
2 redirect testimony is inaccurate. They suggest that it's not proper and,
3 therefore, should be ignored. Now, I defended Dr. Banerjee's deposition that
4 day and they accused me of improper witness coaching during that
5 deposition; that Mr. Whitehurst made some passing remarks this past
6 Tuesday, and they have offered several slides on this on this issue.

7 So, first of all, I take issue with the accusation that we did something
8 improper. The *Focal Therapeutics* case, you know, which was designated
9 precedential by the Board in 2019, makes clear that "counsel is permitted to
10 confer with a witness before redirect examination begins."

11 And second of all, Mr. Whitehurst neglected to mention that during
12 the deposition of his own expert, Dr. Glew, he used the exact same
13 techniques that he's now complaining are improper as reflected in the
14 deposition transcript of Dr. Glew, Exhibit 1063, starting at page 270, where
15 Mr. Whitehurst himself took a 30-minute break before conducting his own
16 redirect of Dr. Glew. He went on to instruct Dr. Glew to read verbatim
17 multiple portions of his declarations. Again, same thing he's complaining
18 about that's improper in the Dr. Banerjee redirect.

19 But the bottom line here is, you know, I want to make clear is that, as
20 Mr. Sharma pointed out, Dr. Banerjee made clear during that redirect that
21 the generalized explanation that he was making about potential other fields
22 was distinguishable from the claims at issue, which concern fields that are
23 caused by the graded dopant concentration specifically. So bottom line, they
24 don't like Dr. Banerjee's answers in terms of its substance, so they're now up
25 with complaining that it's improper.

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1 So unless the Board has any questions about what I've discussed, I'll
2 reserve the remaining time we have for rebuttal.

3 JUDGE OBERMANN: Okay. You did run actually two more
4 minutes over, so you'll have 34 minutes in your rebuttal. And let's just pause
5 for a second. We're not going to go offline, but I just want to pause for one
6 moment before we call up Patent Owner's counsel, so that I can confer with
7 the Panel, please.

8 I'm sorry, I didn't mute myself, so you heard me typing. I'm very
9 sorry about that. Okay. We have conferred and we are ready when Patent
10 Owner's counsel is ready to speak. You have 90 minutes as well. Would
11 you like to reserve any time for rebuttal?

12 MR. WHITEHURST: We will reserve some time. I don't believe
13 we're going to need 70 minutes. But I don't want you to think that when I
14 say I'm only reserving 20 that I'm going to go a full 70. But we'll reserve 20,
15 Your Honor.

16 JUDGE OBERMANN: All right. Thank you so much. So I'm going
17 to consider that you have 70 minutes when you begin speaking.

18 MR. WHITEHURST: Terrific. If I can just confirm that you can see
19 my screen?

20 JUDGE OBERMANN: Yes, we can.

21 MR. WHITEHURST: Terrific. And may it please the Board, I'm
22 going to give a quick overview, but I'm going to be careful to not talk about
23 any evidence. I just want to highlight for the Board the issues that I'm going
24 to cover to just give you a roadmap and overview of what I intend to present.

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1 You'll see issue 1. I'm going to start by showing the claims required
2 movement of carriers from the surface layer. And I'm going to explain that
3 the surface layer is where the active region is located.

4 Next, I'm going to cover that the '195 and '502 claims specifically
5 require movement of minority carriers from the surface layer. And I will be
6 addressing those terms.

7 Now, you'll see issue 3 there on the screen. I will in full
8 transparency tell you that this is duplicative of what we covered during the
9 January 28th hearing. As the Board may appreciate, rather than doing seven
10 depositions, we did one deposition that would cover all seven. So the
11 evidence that was presented during the January 28th hearing would also
12 apply to these IPR proceedings. So I don't intend to spend a lot of time on
13 issue 3, but I'll recap just some of the high level points for the benefit of all
14 the Judges present today.

15 JUDGE OBERMANN: Okay. I'm going to have to say something
16 here because the panel is a bit concerned because all counsel now have
17 referred us back to hearings in other cases. I'm probably going to have an
18 instruction at the end, but the gist of it is going to be that if you don't raise
19 something at this hearing, we're not going to go and look at the other
20 transcripts. At least that's our position right now. So please be aware, you
21 know, obviously we know the other cases, but to the extent that you don't
22 highlight something with respect to a particular distinct case in this
23 proceeding, we're going to rest on the papers. Okay? So please be aware of
24 that as you proceed.

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1 MR. WHITEHURST: And I'm glad that you gave us that, your
2 instruction, Your Honor. And we'll proceed with that understanding. We
3 certainly appreciate your guidance on that point.

4 Next issue 4, I'll be covering the reasons why *Payne* does not
5 disclose movement of carriers and movement of minority carriers from the
6 surface layer. Issue 5, I'll be showing the same thing for *Onoda*.

7 And then for issues 6 and 7, I will show why the surface layer is
8 different due to the gate and gate oxide fields that are present in the surface
9 layer. Issues 8 and 9, I'll explain why Petitioners cannot meet their burden
10 because they didn't analyze the gate, gate oxide, and other fields in the
11 surface layer.

12 And I'll certainly be addressing today, you know, both *ParkerVision*
13 and its predecessor, *Ball Aerosol*, why Petitioners fail under either test. And
14 I will be addressing both the cases, like *Transclean* and other cases, that say
15 the prior art must necessarily, as well as what the Federal Circuit said in
16 *ParkerVision*.

17 Issue 10, I'll be addressing some of the statements that we just heard
18 about the prosecution. I'll show why Petitioners' reading of those is
19 incorrect, but I'll also show why they are further proof that these are not
20 capability claims. They are claims that necessarily require a particular claim
21 to result and put it in the language that Judge O'Malley used herself, these
22 are configured to claims as opposed to capability claims.

23 I don't intend to spend a lot of time on issue 11. I don't believe it's a
24 significant issue here. And issue 12, I was not planning to cover today.
25 These issues have been fully briefed and we intend to rely on our briefs. I

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1 just want to ensure the Judges that these issues are fully set forth in our
2 briefs. But the new argument that we heard just now is not in the briefs.

3 I do want to respond to one minor point. I heard that we took a 30-
4 minute break during Dr. Glew's deposition. I want to assure the panel at no
5 time during that 30 minutes did I confer with Dr. Glew about his testimony.
6 So I certainly resent counsel representing to the panel that because there was
7 a break, I somehow conferred with him. Simply not the case. That's all I'm
8 going to say. I'm not going to say anything more on those points.

9 And then finally, I will, hopefully, have enough time that my co-
10 counsel, Mr. Matich, can address the importance of Greenthread's existing
11 licenses.

12 And with that I'm going to proceed to slide 3 and now slide 4.
13 Hopefully, you can see on the screen where I'm going to place my cursor on
14 the green language that's highlighted there. You'll see that claim 1 from the
15 '195 patent says "aid the movement of minority carriers." And when it's
16 talking about these minority carriers, it's talking about moving them from a
17 particular place, the surface layer, to somewhere else. And you'll see that
18 the claim right above it is specifying that there is "a first static unidirectional
19 electric drift field" which is moving these carriers from the surface layer to
20 somewhere else.

21 And if you now look to the right, to claim 7 of the '502, it's not
22 underlined in this slide, but you'll see the same language. There's "a first
23 static unidirectional electric drift field." And like we saw in the '195 patent,
24 it's moving these carriers from the surface layer to somewhere else.

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1 And in the name of completeness, I will direct the Board's attention
2 to the '222 patent, claim 44. And you'll see the same thing there.

3 Now, in all of these claims, they're not just saying moving, they're
4 not saying moving downward. The claims are referring to a specific
5 structure, a first static unidirectional electric drift field, that is moving these
6 carriers from a specific place, from the surface layer to somewhere else.
7 And I will be showing today why this is significant because Petitioners' own
8 expert, not Patent Owner's expert, Petitioners' own expert, Dr. Banerjee,
9 testified that in order for an electric field to move carriers from the surface
10 layer where the active region is located, there must be an electric field that
11 starts in the surface layer. And I want to address that point.

12 You see here it says, "from said surface layer." Well, if you go to
13 preceding claim language that's providing antecedent basis here, you'll see
14 that there's an active region "disposed on one surface of said surface layer."
15 And you'll see here shortly why this means that the active region is inside
16 the surface layer.

17 With that, I'm going to proceed to slide 5. You just heard from
18 Petitioners' counsel when he was addressing slide 13 of Petitioners'
19 demonstratives that they used a particular claim construction brief to draft
20 their petition. And I want to show you some portions of that claim
21 construction brief so you'll understand it in more detail and understand why
22 it undercuts many of the things that Petitioners' counsel said today. The
23 Board will see that in all of these slides, we've referred back to IPR ending
24 in 1-7. And you'll see here we're citing to Exhibit 1030. But I want to
25 assure the Board that this evidence 1030 was an attachment to all of the

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1 petitions that have been filed against Greenthread's patents by Cirrus Logic
2 and the other Petitioners, and I believe it's Exhibit 1030 in all of those
3 proceedings. So while you see here a reference to '017, what I'm saying
4 here, referring to Exhibit 1030, is evident the same exhibit number in all
5 seven of the IPR proceedings.

6 Now, you'll see here that in the claim construction brief which
7 Petitioners' counsel mentioned and Petitioners have attached as an exhibit to
8 all of their petitions, there was some color-coding: 1, 2, 3, 4, 5, 6. And you
9 see here on the screen a particular screenshot that appears on page 16 of the
10 claim construction brief that was attached to the petitions and then
11 reproduced in the body of their petitions. But I think it's a good use of our
12 time today, I'm going to -- bear with me -- pull up for you now Exhibit 1030,
13 so that you can see this in more detail.

14 You'll see, and I apologize if I'm moving quickly, I know that can
15 sometimes be aggravating, but I want to show you that at the outset of this
16 claim -- well, let me show you the caption of it first. You'll see that this is a
17 responsive claim construction brief in a district litigation filed in the Western
18 District of Texas by Greenthread against Intel, Dell, and others. So you see
19 here Exhibit 1030, which is in all of the petitions.

20 Now, if I go to, bear with me, page little D, you'll see where these
21 numbers came from. The exemplary claim is the '195 one claim that we're
22 discussing today. And you can see that if you go into the brief, there's
23 discussion about how transistors work, and this will be particularly relevant
24 later today. You will see how Greenthread and their expert explained in
25 detail about NMOS transistors. And you can see here an NMOS transistor

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1 and a P-well, and you'll see that here is a footnote in Exhibit 1030, which
2 appears in all of the petitions. And I apologize for my technical ineptness.
3 I'm not good at zooming in. But hopefully, you can see here footnote 5, and
4 you will see that Greenthread said in the very exhibit, the very brief that's
5 attached to all of their petitions, because the channel is formed by electrons
6 with a negative charge, the MOSFET is referred to as an n-channel
7 MOSFET. "In an n-channel MOSFET, the electrons are referred to as the
8 majority carriers, and here's the most important part, "and the minority
9 carriers are holes."

10 So it's a head scratcher for us why Petitioners have said that they're
11 surprised by this argument. The very brief that they relied on as the basis for
12 their petition says on the face of page 4 what we've said all along. This is in
13 Dr. Glew's declaration, which was incorporated and referenced in our POR.
14 They had the opportunity to depose Dr. Glew. They asked him questions
15 about this very topic. And when Petitioners did their petition, they knew --
16 they were fully aware or should have been aware of Greenthread's position
17 on this point, but yet chose to never address it in the petition and still
18 haven't.

19 JUDGE ULLAGADDI: Can I ask a question about this figure? I'm
20 not sure I'm understanding what the difference between Patent Owner and
21 Petitioners' positions are here. It looks like there's a -- the minority carriers
22 are the holes, and they're being pulled down to the substrate. If I'm not
23 mistaken, that's what Petitioners' figures showed as well?

24 MR. WHITEHURST: No, it's the opposite, Your Honor, and I'm glad
25 you asked that question and I'll certainly address it. They contend that the

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1 minority -- they've pointed to the opposite, Your Honor, and I'll certainly get
2 to that here shortly. Where we've said the majority carrier is the electron,
3 they've said it's the hole. Where we said the minority carriers are holes, they
4 said it's the electrons. And we'll show why that's incorrect, why they never
5 addressed it, and why their petition is flawed. It's set forth the opposite,
6 which is wrong. It's inconsistent with the patent, Dr. Rao's preferred
7 embodiment. And we know Federal Circuit has told us numerous times that
8 when you -- a claim construction or position like Petitioners', where it
9 excludes the preferred embodiment, which is shown in figure 5D, it's rarely,
10 if ever, a claim construction.

11 Now, I want to be clear that we are not here to, you know, argue
12 about claim construction. It was Petitioners' burden and (inaudible) their
13 petitions. If they believe there was a claim construction issue, they should
14 have certainly raised that in their petition, but they never did it. And when
15 they filed their petitions, they were fully aware or should have been aware of
16 Greenthread's position on this point, yet chose to never address it. And I'll
17 certainly cover this in more detail.

18 JUDGE ULLAGADDI: Maybe in your rebuttal time or another time
19 you could point to which one of their demonstratives or papers that show the
20 opposite of what we're seeing on this slide?

21 MR. WHITEHURST: Absolutely, Your Honor. I'll certainly
22 endeavor to do that and make sure that it happens.

23 JUDGE ABRAHAM: Counsel, I have a question for you. If I
24 understand what's going on here, the parties appear to disagree as to what the
25 minority carriers are and what the majority carriers are in different figures

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1 that we're looking at. And my question is, did you raise this issue in your
2 Patent Owner response that you disagree with what Petitioner considers to
3 be the majority or minority carriers? And if so, can you direct us to where
4 that is in the papers?

5 MR. WHITEHURST: Yes, I will certainly do that. In the very first
6 sentence we said that they failed to show aiding carrier movement of
7 minority carriers. We have a reference to Dr. Glew's paragraph 36, which
8 repeats, I believe verbatim, exactly what we saw here of the claim
9 construction brief. But you'll see whether it's carriers or minority carriers,
10 we've argued throughout consistently that they have not identified an electric
11 field that can do the recited result, which is moving carriers from the surface
12 layer to the substrate. Or I'm going to show you in just a second '222, claim
13 4 has slightly different language which shows why arguments made during
14 Petitioners' opening are incorrect.

15 JUDGE ABRAHAM: I understand that your argument is they haven't
16 shown movement of minority carriers. But you -- from what I understand,
17 I've never seen an argument about disputing what exactly those minority
18 carriers are. The disputes seem to be whether or not there was some
19 movement of something. But you're getting now to a more granular level of
20 what if there is movement, what is actually moving? And I don't know that
21 I've seen that. I can't recall seeing it.

22 So if you can get it to -- point us to this particular argument of, you
23 know, you got an image on the screen and it's showing some holes that are
24 moving and one party says that's majority, the other party says that's
25 minority. That particular dispute about what exactly is moving, if you can

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1 point us to where that issue has been raised before, that would be extremely
2 helpful because otherwise, what we're getting into now seems to be new
3 arguments that have not been raised in the papers. And, you know, what
4 we're supposed to do with that kind of thing is very clear. So to the extent
5 you can direct us to where in the record this level of particularity is, that
6 would be much appreciated.

7 MR. WHITEHURST: Yeah, and I certainly will do that, Your Honor.
8 But I do want to make it clear that in our POR we said the minority carriers
9 are the opposite. And the very first line of the Patent Owner's response says
10 they haven't shown aiding carrier movement.

11 JUDGE OBERMANN: Counsel, I'm going to reiterate with what
12 Judge Abraham said, and I would like to see where you put your opposing
13 counsel on notice that you are relying on the footnote 5, where in your
14 response.

15 MR. WHITEHURST: Okay. Yes, Your Honor, I will certainly do
16 that. And you'll see that on page 4 of our Patent Owner response, I just want
17 to get this in the record, you'll see Exhibit 2057, Glew declaration, citing to
18 paragraph 33 and then more specifically 35 and 36. And 36 says exactly
19 this, that the electrons are referred to as the majority carriers and the
20 minority carriers are holes. This exact language is in Glew declaration 36,
21 and it's mentioned on the face of our POR.

22 Now, I know my time is limited, so I do want to, while I've got this
23 document on the screen, address some other points. You'll know that
24 Petitioner put up some certain drawings, illustrations, screenshots that
25 suggest that the electric field must start from below the surface layer and that

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1 that's sufficient. I want to show you why that's very misleading, because in
2 the claim construction brief that they based their petition on and relied on. I
3 want to try to -- I may be dating myself here, but if you're familiar with the
4 Russian nesting dolls, if you can imagine, you know, the smallest one being
5 inside of a slightly larger doll, inside of a third one, inside of a fourth one,
6 you'll see that the smallest doll here would be the active region. And you'll
7 recognize these screenshots because they're also in the petition. The
8 smallest doll would be the active region and Greenthread and Petitioner did
9 this in their petition as well. The active region would be in a slightly larger
10 doll, which in this case would be the surface layer.

11 So you can see that reference numeral 3. You may see where my
12 cursor here, the active region, which also includes the channel, is in the
13 surface layer. Now, one size larger, the surface layer, which includes the
14 active region is in the well region. And you heard from Petitioner that the
15 well region starts below the surface layer. That's not what's in our claim
16 construction brief. That's not what's in their petition. And you'll see why
17 this is so important to the issues before the Board today.

18 You can see that reference numeral 6, and this exact same figure
19 appears in their petition, goes all the way up to the surface, where the
20 channel is between the source and the drain. So you can see the smallest
21 doll, the active region, is inside the surface layer, which is inside the well
22 region. And the well region, number 6, is inside the single drift layer. But
23 this is showing why in order to move something from the surface layer and
24 more specifically from the active region, you're going to have an electric

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1 field that starts in the green region in order to pull it from the surface. And
2 in this case we know that it's pulling minority carriers from the surface.

3 And you'll see, I'll take this down, that if we pull up the petition, you
4 see the same figure in the petition on page 17. I'm referencing the '195
5 petition, 17. But a similar screenshot would appear in the other petitions.
6 You can see their own paper, petition shows the well region going all the
7 way up to the surface. Now, this is important because the electric field, the
8 graded dopant concentration well region is actually pulling the minority
9 carriers from the surface layer to somewhere else.

10 And you heard Petitioners' counsel that it's okay to be below the
11 surface layer, not inside the surface layer, but that's not the case. Because I
12 want to go back to the slides, you'll see slide 5 here. If you go to the next
13 one, you'll see that they've acknowledged that, now we're on slide 6, that the
14 active region is inside the surface layer. But they haven't shown that the
15 well region, which is also going up to the surface, is what is doing the
16 pulling from the surface layer or the active region to somewhere else.

17 As we discussed during the January 28th, but I want this record to be
18 complete, so you'll see slide 7, looking to column 3 of the specification,
19 you'll see that you want to pull these unwanted carriers from the active
20 circuitry at the surface. And what they've identified in their petition is not
21 capable and it's certainly not necessarily going to do this because they've
22 identified electric fields in the wrong location. I'll also show you why
23 they're pointing in the wrong direction, but at a minimum, they're in the
24 wrong location.

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1 JUDGE OBERMANN: I'm sorry to interrupt, but you just mentioned
2 that it has to necessarily occur. Can you please explain the position if we are
3 to -- if in the hypothetical we were to accept the *ParkerVision* view that it
4 need only be capable of doing this?

5 MR. WHITEHURST: Yes, I'm going to jump past slide 8; slide 9,
6 which explains figure 5B. And I'm now going to turn to the point that you
7 just asked me about, Your Honor. The parties agree that the challenged
8 claims do not mix apparatus and method limitations, but in their briefs,
9 Petitioners have misrepresented *ParkerVision*, that *ParkerVision* doesn't --
10 an apparatus can't require necessarily an achieved result, and that's not true.

11 I want to get to Judge OMalley's decision and go through it in detail.
12 But before I do, I just want to highlight for the Board that these are not
13 general processor claims. These are not module software claims. These are
14 something with a tangible definite structure. You'll see that they have
15 multiple structures. We have a single drift layer. We have a graded
16 concentration of dopants. Third, we have a first static unidirectional electric
17 drift field. Four, we have a well region with five, a graded concentration of
18 dopants. And six, we have a second static unidirectional electric drift field.
19 So you can see that whether it's the claims that we have here: '195, claim 1;
20 '502 claim 7; '222, claim 44.

21 And this would be true for the other Greenthread claims that we
22 covered on January 28th. But you'll see that all of them have these very
23 specific structures that are achieving the result of moving these minority
24 carriers from the surface layer to the substrate. And I'm going to get to it
25 later in the '222. It's going to show move them from the surface layer to the

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1 area of the substrate where there are no active regions. And I'm going to
2 show why this means that you need to necessarily or be reasonably capable
3 of moving them from the surface layer. It's not sufficient to just be below it.
4 You have to actually move it. And I'll explain why this language in '222 is
5 relevant to that point.

6 But I want to get back to Your Honor's question about *ParkerVision*.
7 And in order to fully answer your question, I need to also mention its
8 predecessors: *Ericsson*, *Ball Aerosol*, *Transclean*, and *In re Robertson*.
9 Now, when Judge Lourie wrote *Ball Aerosol*, he rejected the argument that
10 the candle tin claim is a capability claim. I assume the Board is familiar
11 with the *Ball Aerosol* decision. It was -- I'm probably dating myself again
12 here. I can actually remember candles that had a cover. You would take it
13 off, it would have four feet, and then you could rest the candle on top of it,
14 so that the cover could also be the stand. And Judge Lourie explained why
15 this was a configured to claim. He said the cover had to actually be used as
16 a base underneath the candle and it had to have feet as opposed to being
17 reasonably capable. And when they looked at the allegedly infringing
18 product, it had to be modified in order to meet the claimed result. That's not
19 the case here.

20 So when Judge O'Malley wrote *ParkerVision*, she did not overrule
21 *Ball Aerosol*. She also did not overrule *Transclean* or *In re Robertson*, like
22 Petitioners wrongly suggest in their brief. As I just mentioned, while
23 *Aerosol* said that in order to prove infringement of a configured to claim, the
24 claim must necessarily do the claim result. And I may have just misspoken,
25 but that's the same thing that we have here.

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1 Similarly, *Transclean*, *In re Robertson*, which also were not
2 overruled by *ParkerVision*, those cases said that in order to prove
3 anticipation or obviousness, the prior art must necessarily achieve the
4 claimed result. When Judge O'Malley wrote *ParkerVision*, she did not
5 overrule these cases. Instead, she drew a distinction between configured to
6 claims and capability claims on the basis of whether they recited sufficient
7 structure. But as I just show, there is specific structure here.

8 And you know, as the case went through, if you look at what was at
9 issue in *ParkerVision* and the *Ericsson* case that she referred to, I'll start with
10 *Ericsson*, the *Ericsson* was talking about a processor for arranging
11 information for transmission. And in *ParkerVision*, the claims just said
12 module to receive certain signals. So these were limitations that could be
13 done completely in software. And the claims did not recite hardware or any
14 other specific structures. But here we see something very different that is
15 like *Ball Aerosol*, where there are specific structures achieving a particular
16 result.

17 And I want to make seven quick points. I'll hit on all seven of these,
18 and I'll try to be quick and brief on each one. But, Your Honor, I think
19 they'll fully address your question.

20 When you look at the claims that appear on slide 11, the claims never
21 use the word "capability" or anything close. They talk about the first static
22 unidirectional electric field aiding the movement of minority carriers from
23 the surface layer. And when you look at the claims that are issue here on
24 slide 11, and this would apply to the claims -- the other claims from the
25 January 28th hearing as well, these are not software or processor claims like

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1 you see in *ParkerVision* or *Ericsson*. These are like the candle tin that we
2 see in *Ball Aerosol*. And my third point is these are specific structures that
3 are configured to move the minority carriers from the surface layer.

4 JUDGE OBERMANN: Excuse me, Counsel. I just reviewed the
5 papers, and I don't see you relying on *Ball aerosol* in your papers. Can you
6 direct me to where you rely on the case?

7 MR. WHITEHURST: Well, Your Honor, we have certainly discussed
8 *ParkerVision*. I was just trying to address your question about *ParkerVision*
9 where Judge O'Malley was talking about, if you can imagine, you know, one
10 column of the capable and the other the configured to. And as you can see
11 on the next slide, slide 12, Petitioners have made an issue of *ParkerVision*.
12 And you'll see that in the *ParkerVision* decision, Judge O'Malley specifically
13 references *Ball Aerosol*. So on January 28th Judge Ullagaddi asked whether
14 we could distinguish *ParkerVision*. You asked a similar question about
15 *ParkerVision*. So when I mention *Ball Aerosol*, we're mentioning it in the
16 context of *ParkerVision* and what Judge O'Malley said herself about *Ball*
17 *Aerosol*.

18 So we certainly addressed *ParkerVision*. And you can see here from
19 pages 1361 and 1362, Judge O'Malley said, "unlike in *Ball Aerosol*, the
20 claims here recite no structural limitations that would preclude a prior art
21 reference that discloses a different structure from performing the claimed
22 function." So you can see here when she was saying that the module claims
23 and *ParkerVision* were like the processor claims and *Ericsson*, she was
24 distinguishing *Ball Aerosol* and the candle tin. So that's why I mentioned
25 *Ball Aerosol* like I have.

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1 But -- and Your Honor, I see that you're looking at slide 12. If it's
2 okay with you, or may it please the Board, I was going to go back to slide 11
3 because I wanted to finish this point I was making on claim 4. Greenthread
4 has never said that these claims would cover electric drift field that's capable
5 of moving. Greenthread has consistently said that carriers must move from
6 the surface layer or active region. This is a very different situation from
7 what the court was addressing in *ParkerVision*. In fact, in *ParkerVision*, it
8 was not disputed that the prior art did it some of the time. That is definitely
9 not the case here. But you saw during Petitioners' arguments screenshots of
10 the prosecution history and the claim construction briefs. I'm going to show
11 you why Petitioner is misreading them. The very document --

12 JUDGE OBERMANN: Excuse me, Counsel. I just went back and I
13 reread your sur-reply and I do not see any argument. You only discussed
14 *ParkerVision* on pages 11 and 12 and do so in the context of trying to
15 address whether this particular device would have been capable of operating
16 in the way that Petitioner would have it. And you said Petitioners' burden to
17 show how the prior is capable of operating has not been met. So I -- the
18 arguments you're making here today I'm not seeing in the papers. Please
19 direct me to a paper if I'm wrong.

20 MR. WHITEHURST: And, Your Honor, we cite *Transclean*, which
21 says that the prior art must necessarily because it's a configured to claim,
22 Petitioners never distinguish *Transclean*. So we have a situation where we,
23 the Patent Owner, have cited *Transclean*. This is on page 2 of our POR.
24 From the outset, it's been our position that the prior art, like it would in
25 *Transclean* or *In re Robertson* or *Ball Aerosol*, where you are dealing with a

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1 configured to claim that the prior art must necessarily. We said this in our
2 POR, page 2, when we cited *Transclean*. It was Petitioner who made the
3 contrary argument that, no, *ParkerVision* controls here. From the outset, we
4 have said that *Transclean* configured to would be the test here. It's
5 Petitioner then, that was trying to rebut our citation of *Transclean* that --

6 JUDGE OBERMANN: I'm sorry, but I just read that page and this is
7 all about inherency. *In re Robertson* is clearly an inherency case. So what
8 you're doing is pivoting away from your argument that you somehow cited
9 and relied upon this line of cases that are in *ParkerVision*, including *Ball*
10 *Aerosol*. I'm just not seeing where you made those arguments, much less
11 where you put the Petitioner on notice that you were going to rely on *Ball*
12 *Aerosol*.

13 MR. WHITEHURST: Well, Your Honor, we have always taken the
14 position, whether it was the claim construction brief, whether it was our
15 paper from the outset, that -- we have never taken a contrary position that
16 these claims would allow just capable of. We have always said that these
17 claims must necessarily move the carriers, so --

18 JUDGE OBERMANN: Well, you're saying in your sur-reply,
19 counsel, on pages 11 and 12, when you cite *ParkerVision*, it's all about
20 whether Petitioners showed sufficiently that the device would have been
21 capable of this limitation.

22 MR. WHITEHURST: And Your Honor, I understand your argument,
23 but in our POR right from the outset, we said that the prior art must
24 necessarily move carriers. So --

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1 JUDGE OBERMANN: In the context of inherency arguments,
2 counsel.

3 MR. WHITEHURST: Well, not just inherency, but the prior art must
4 somewhere disclose necessarily moving. And that's been our position from
5 the very outset. We've never said otherwise. But the point I'm making is a
6 point that Petitioner contested in their reply. We've always taken the
7 position that the claims, whether it's for infringement or whether it's for prior
8 art, must necessarily move minority carriers or carriers from the surface
9 layer.

10 So I am surprised to hear that you're saying that we're somehow
11 raising a new argument when it's been our position from the very outset that
12 these claims require actual movement. That's always been our position, and
13 it was only Petitioner that then said, oh, no, *ParkerVision* controls here.

14 Now, Petitioners have never distinguished *Transclean* and *In re*
15 *Robertson*, and they've never shown that *Payne* or *Onoda* will necessarily
16 achieve the claim result. But even if the Board comes to the opposite
17 conclusion than what we've said from the outset, we said the claims require
18 movement even if the claim -- the Board was to reject our argument and say
19 -- even though we've said the opposite from the very outset, even if the
20 Board is to reject our position and say these claims could be infringed if it
21 was capable, which has never been our position, Petitioners still have not
22 proved that *Payne* or *Onoda* are reasonably capable of achieving the claim
23 result.

24 So I do want to make it clear that it's our position from the outset that
25 these claims require actual movement, that they're configured to claim, and

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1 that Petitioners don't meet that test. But I want to make it clear that even if
2 the Board rejects our argument, which has been our position from the very
3 beginning, that these claims are capability claims, Petitioners still can't meet
4 that test because the electric fields that they've identified are in the wrong
5 location, pointing in the wrong direction. So even if the Board rules against
6 us on this point, which I believe would be improper, they still haven't met --
7 excuse me, the Petitioners still haven't met the reasonably capable test that's
8 in *ParkerVision*.

9 I want to make something very clear. In *ParkerVision*, when you
10 look at the prior art, it was undisputed that the prior art device sometimes did
11 the claim function. That's definitely not the case here. There's no evidence
12 the prior art ever moves carriers from the surface layer. That's simply
13 physically impossible based on the electric fields that they've identified in
14 the wrong location and that are pointing in the wrong direction.

15 I'm going to move on from this point, but I do want to pull up very
16 briefly Petitioners' slides. You heard Petitioners' counsel speak at length
17 about this claim construction brief. This is the same claim construction brief
18 I showed you earlier, Exhibit 1030. I just want to explain a small point.
19 This was in response to a 112 indefiniteness challenge, and Petitioners'
20 counsel was misreading it. He said the phrase "'to aid the movement of
21 minority carriers' merely states what the unidirectional electric field does."
22 Well, the reason why it says "merely" here is because they had made an
23 indefiniteness challenge to what the "aid the movement of minority carriers"
24 meant.

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1 And Petitioners' counsel was trying to say that this somehow
2 supports a capability argument, which is simply not the case here. The very
3 brief that they displayed to you is saying exactly what we said in the claim
4 construction brief. It's exactly what we said in our POR. It has been our
5 position from the outset that the unidirectional electric field is the structure
6 that is aiding the movement of minority carriers. It doesn't say the
7 unidirectional electric drift field may move minority carriers. It says the
8 unidirectional electric field does move the minority carriers. That's always
9 been our position. And the very document that Petitioner was pointing to
10 says the opposite, not what they claim it says.

11 Similarly, on slide 38, when they were talking about the inherent
12 built-in field, they actually made comments that support our argument, not
13 theirs. You were hearing from him that when you look at the prosecution
14 history, when you look at what was said, you heard Petitioner argue that the
15 electric drift field, which we have identified as the structure, will necessarily
16 have inherent built in. Well, that doesn't sound like capability to me.

17 And we've certainly never taken the position that the drift field is just
18 capable. And you certainly didn't hear that from Petitioner either. It is a
19 configured to situation where this unidirectional electric drift field -- so I'm
20 going to do it --

21 JUDGE OBERMANN: Can I ask you a direct question, counsel?
22 Setting aside your argument that this is -- that the claim requires more than
23 an apparatus that's configured to aid the movement, what's your position
24 directly? Does the prior art -- is the prior art configured to aid the
25 movement? And if so -- if not, why not?

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1 MR. WHITEHURST: It's not, Your Honor. I will certainly cover that
2 point. When you look at the petition, they've identified electric fields that
3 are in the wrong location pointing in the wrong direction. So they are not
4 configured to. It would be physically impossible for what Petitioner
5 identified in the petition to ever achieve the claim result.

6 And then to take it one step farther, even if the Board was to say no,
7 these are not "configured to" claims. They are capable claims. Apply the
8 *ParkerVision* test to make it abundantly clear it is impossible, not reasonably
9 -- it's not reasonably capable, it's physically impossible for the electric field
10 identified by Petitioner to ever achieve the claim result. And so I want to
11 make that point clear. It doesn't matter whether you treat them as configured
12 to or capable. They lose under either test because the claim says the electric
13 drift field is what's moving. When you look at the petition and what
14 Petitioner identified as the corresponding electric drift field, no matter how
15 you view it, it's physically possible -- it's not incapable, it's physically
16 impossible for them to move carriers from the active region and, even more
17 so, move minority carriers for the active region.

18 Their own expert, not our expert, their own expert said that in order
19 to move carriers from the surface layer where the active region is located,
20 I'm going to use his own words and this is in the record, I don't want you to
21 think that this is attorney argument, in his own words, he says, "The electric
22 field has to be in the correct location pointing in the correct direction."
23 When you take what their expert said and you apply it to what Petitioner
24 identified in their petition, it is impossible, not incapable, impossible for it to

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1 achieve the claim result. So no matter which test you apply, they come up
2 short.

3 I'm going to take --

4 JUDGE ABRAHAM: Before you move on.

5 MR. WHITEHURST: Yes, Your Honor.

6 JUDGE ABRAHAM: The argument, from my understanding, is that
7 the Petitioners' pointing -- that the fields that they point to are in the wrong
8 place and that the fields that they point to will be moving things in the wrong
9 direction. And that's your argument for why you should prevail. Those
10 specific arguments, that's what I'm looking for in your papers in this case.

11 I understand you have a statement at the beginning of your response
12 that says they failed to show the limitations are disclosed. That's a very
13 broad statement. What you've just said in the arguments today are much
14 more specific, that there's electric fields are in the wrong place and that the
15 electric fields are pointing -- the carrier is moving in the wrong direction. I'd
16 like you to identify where those things are, those specific arguments are in
17 our papers, not where they've been raised in other proceedings or other
18 arguments. I'd like to know where they are in these papers when you get a
19 chance. It can be in your rebuttal. But I just want to clarify my question
20 earlier because you seem to narrow down some issues and some arguments
21 and those are the ones that I like to see in this case.

22 MR. WHITEHURST: I will certainly do that, but I will get in the --
23 well, we're getting that for you, but I'm looking at page 14 and page 15, and
24 you'll see there. And then we'll get you a more fully identification and I'll
25 pull that up for you.

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1 JUDGE ABRAHAM: Just to clarify 14 and 15 of which document?

2 The Patent Owner response?

3 MR. WHITEHURST: I'm looking at Patent Owner's sur-reply in
4 addition to the cites that are on the -- all of these are on the slides and we'll
5 pull those up for you here shortly. My co-counsel is getting these for me
6 right now.

7 I do -- I am now going back to slide 14. Or actually before I do that,
8 I do want to address one other point before I move on. You heard
9 Petitioners' counsel, and this is what's in the petition, saying it's okay to
10 identify an electric field that's below the surface layer because that would
11 move them from the surface layer. But if you look at claim 44 of the '222
12 patent, and this argument would apply to all of the challenged claims, you
13 will see that it talks about moving carriers from the surface layer to the area
14 of the substrate where there are no active regions. Well, if under Petitioners'
15 position, you could just point to any arrow below the surface layer, it would
16 make no sense to say where there are no active regions, because you would
17 be pointing to something where there are no active -- you would be moving
18 it from a region where there are no active regions to another region where
19 there are no active regions.

20 So you can see here, when the claim says from the surface layer to
21 the area of the substrate where there are no active regions, they're referring
22 to the channel region, the active region, and moving those carriers from the
23 surface layer to somewhere else. You're not moving them from below the
24 surface layer to somewhere else. You're moving them from the surface layer
25 to somewhere else. And when you construe this language consistently

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1 across all the claims, you see that "from the surface layer." It's not saying
2 below the surface layer, it's from the surface layer.

3 I'm going to move on now to Section 2, which is on slide 15. As I
4 mentioned earlier, it talks about aiding movement of minority carriers from
5 the surface layer. You can see here on the screen Exhibit 1001, column 1,
6 23 to 45. And you'll see here on the bottom left where these appear in the
7 record. And you've got here a reference to Exhibit 7 -- to Exhibit 2057.
8 Glew declaration at paragraph 36, number -- note 3, explaining that the
9 minority carriers are holes.

10 You can see here in column 1, the patent itself says, "MOS devices
11 are majority carrier devices for conduction. The conduction is channel
12 dominated." If you look at the NMOS transistor illustrated in figure 5B,
13 you'll see that when it says the conduction is channel dominated, it's
14 referring to the channel between the source and the drain, which in this case
15 would come from a heavily doped negative region of electrons. Those
16 electrons would move through the channel to the other heavily doped
17 electron area. And that's what it means when it says, "MOS devices are
18 majority carriers for conduction," and that, "The conduction is channel
19 dominated."

20 And you also see Dr. Glew explaining this in paragraph 36 and more
21 specifically, note 3 portion of his declaration. And we also saw it in Exhibit
22 1030, which Petitioners attached to their petition.

23 Now, as you see here on the screen, the patent itself, Exhibit 1001 at
24 column 3, 14-40, is addressing the problem that was being solved. And you
25 can see here references to "unwanted minority carriers." Well, we know that

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1 in order to turn on an NMOS transistor, like what's shown in figure 5B, you
2 need to form a channel of electrons. You don't want to get rid of the
3 electrons, you need them to form the channel. What you do want to get rid
4 of are these unwanted minority carriers that are interfering with the channel.
5 So we know from the patent itself, we know from Exhibit 1030, we know
6 from Dr. Glew's declaration that what the patent is talking about here is
7 getting rid of these unwanted minority carriers that are interfering with the
8 active circuitry of the surface and the formation of the channel.

9 We also know that this is confirmed by the face of figure 5B itself,
10 because we see an electric field in the downward direction. The electric
11 field in the downward direction tells you right on the face of the patent that it
12 has to be a hole, because only a hole would move in the direction of the
13 electric field. We have testimony from Dr. Banerjee himself that holes
14 move in the direction of electric field. Electrons, on the other hand, would
15 move in the opposite direction.

16 So when Dr. Rao was illustrating his preferred embodiment, the face
17 of it tells you that the minority carriers has to be a hole because that's the
18 only thing that would move in the direction of electric field. And he says
19 you pull the minority carriers from the surface. Now, what Petitioner has
20 done is construed the claims in a way that would exclude figure 5B. They
21 would exclude 3 -- column 3, lines 14 through 40, and it would be at odds
22 with the very document 1030 that they attached to their petition and never
23 addressed.

24 Now, if I go to the next slide 17, you'll see the point that I was just
25 mentioning that the minority carriers interfere with the MOSFET channel.

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1 And that's why on slide 18, we see in column 3 that there's a specific
2 structure, the drift field. It's not a general purpose processor or module that's
3 sweeping these unwanted minority carriers from the surface. It's this hole
4 that moves in the direction of the pink arrow in the same direction of the
5 electric field.

6 Now, Dr. Glew explained that in figure 5B, the minority carriers are
7 holes. You see the citation to the right record here on slide 19. And we also
8 have it in Exhibit 1063, which is --

9 JUDGE ULLAGADDI: Let me ask you a quick question. Is it Patent
10 Owner's position that the minority carriers change depending on whether the
11 device is on or are they only identified when the device is on or -- and are
12 they different when the device is on?

13 MR. WHITEHURST: It's the same in both situations. And Dr. Glew
14 was asked about this during his deposition. Whether it's on or whether it's
15 off, it never changes that what would conduct the charge between the source
16 and the drain is the carrier of interest. So --

17 JUDGE ULLAGADDI: I don't think that's quite the question I was
18 asking. It's more that, okay, we have a source and a drain that are heavily N-
19 doped. The channel is P-doped and it has a majority of holes and it has a
20 minority of electrons. When a threshold bias voltage is added, it becomes an
21 N channel connecting the source and drain. And then you're saying it
22 remains the same, the minority carriers are still the electrons or now they're
23 the hole?

24 MR. WHITEHURST: I think we have two different situations, and
25 your question is a very good one, and I'm glad you asked that. When you

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1 have a source that's in negative electrons and you have a drain, what is
2 between them is a P-well, so it's an N-P-N. The specification -- this is not a
3 question of whether it's on or off. The specification says what is the
4 majority carrier that's going to conduct the charge. What's in the P-well will
5 never conduct the charge. It's not a question of whether it's on or off. It's
6 what's going to conduct the charge? And in a N-P-N situation, the only
7 carrier that can conduct the charge and allow current to ultimately flow is
8 going to be the electron, and that's why it's the majority carrier.

9 The patent was written from the perspective of what's going to flow
10 between the source and the drain, not what's in the well between them. The
11 well between them is preventing the conduction of charge. It's what's in the
12 channel. Now, it's petition says on and off, but that's not the case. And Dr.
13 Glew explains in his deposition whether it's on or whether it's off, for an
14 NMOS transistor, the fact never changes that what -- the only carrier that
15 can conduct charge in a N-P-N situation is a negatively charged electron. In
16 a PMOS, it would be the opposite. It would go P-N-P. But regardless of
17 whether it's on or off, in both situations it doesn't change that only one
18 carrier can conduct charge.

19 So in an N-P-N NMOS situation, the only carrier that can conduct
20 charge is the negatively charged electron and the opposite situation, where
21 it's a P-N-P PMOS, the only carrier that can conduct charge is the positively
22 charged hole. And that's exactly what Dr. Glew is explaining here on 25,
23 line 6, to 26, line 1, that it doesn't matter whether it's on or off, it's going to
24 be the same regardless; that only one carrier can conduct charge.

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1 What's in the well is preventing conduction of charge. That's why
2 Petitioner got it wrong. They looked at it in isolation, ignored what
3 Greenthread and Dr. Glew said and read it contrary to what's described in
4 the specification.

5 I'm told that I only have five minutes left. I believe we're going to
6 go a little bit over, but I do want to get to Sections 4 and 5 where I
7 substantively show why the petition is fundamentally flawed and can't meet
8 either a configurative "necessarily" or a *ParkerVision* "capable" and why it's
9 physically impossible in both situations (inaudible).

10 I do want to just highlight, though, on slide 21 you see an
11 explanation that NMOS, the minority carrier, is a hole and a PMOS
12 transistor, the minority carrier, is an electron. It doesn't matter whether it's
13 on or off. It's going to be true in any situation and the reason being that only
14 one carrier, the majority carrier, can conduct the charge.

15 On slide 22 you'll see testimony by Dr. Banerjee confirming that in
16 an NMOS transistor the majority carrier in the channel is an electron. Now.
17 it doesn't matter whether it's on or off. This is still going to be true that
18 there's only one carrier that can carry charge moving from the source to the
19 drain. Whether it's on or off, this is still a true statement that there's only one
20 charge carrier that's capable -- or only one charge carrier that will move
21 from the source of the drain and hence the electrons. Going --

22 JUDGE ABRAHAM: Counsel, if you could back up just a second.

23 MR. WHITEHURST: Yes, Your Honor.

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1 JUDGE ABRAHAM: That question talks about when a channel
2 forms between the source and the drain. Isn't that referring to when the
3 device is on?

4 MR. WHITEHURST: It is, but it's a true statement if it's off. And
5 that was the point that Dr. Glew made in his deposition and why Dr. Rao
6 made the statements that he did in the specification. You're correct that
7 when the channel is formed, these electrons will move back and forth. But if
8 it's off, it's still a true statement that there's only one carrier, in this case the
9 majority carrier, that's going to -- that is going to carry charge. The other
10 one that's in the well is preventing conduction. So Petitioners have tried to
11 confuse this issue. But whether it's on or off, it's still true that only one
12 carrier is going to be the induction carrier.

13 Going on to slide 23, of course, the Board is familiar that claims are
14 read in light of the specification. But looking at 24 you'll see that Dr.
15 Banerjee agreed with this. Twenty-five, I've already covered this, that
16 Petitioners are reading the claims in a way that would exclude the preferred
17 embodiment, which tells us that it must be wrong.

18 When you look at slide 26 you'll see that he prepared his declaration
19 based on his understanding of majority and minority. On slide 27 he
20 testified he did not use the language of the specification. If you go to 28, Dr.
21 Banerjee could not recall how minority carriers was used in the
22 specification, which brings me to Section 3.

23 I'm going to move forward to Sections 4 and 5. But you will see on
24 slide 30 Dr. Banerjee's testimony about the Kamins reference; slide 31, his
25 identification of the active region. Slide 32 is testimony why and where the

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1 region -- in regions where the dopants are flat or uniform, there's no electric
2 field. On 33 you'll see his testimony, why an electric field in the wrong
3 location is not going to move carriers from the active region or the surface
4 location. If you go to 34 you'll see that he explained that in this figure the
5 electric field is in the wrong location because it doesn't start or end in the
6 purple-shaded active region. We're talking about the surface layer where the
7 active region is located. If you go to 35 he explained why this electric field
8 is -- it's impossible, not incapable, impossible for this electric field to aid
9 carrier movement from the purple region because not only is it in the wrong
10 location, it's pointing in the wrong direction.

11 JUDGE OBERMANN: You're into your rebuttal time. Where did
12 you -- you cited this at pages 14 and 15 of the sur-reply. Okay.

13 MR. WHITEHURST: Thank you. One second.

14 JUDGE OBERMANN: You make these arguments on pages 14 and
15 15 of your sur-reply?

16 MR. WHITEHURST: Yes, Your Honor. Going to slide 36, you can
17 see why this electric field also does not move carriers from the active region.
18 And you'll see on slide 38 that Dr. Banerjee confirmed that you have to
19 know the direction and location of the electric field.

20 With that, I'm moving to slide 39 and Section 4. And you'll see on
21 slide 40, *Payne* never mentions carriers, much less moving minority carriers
22 from the surface.

23 Going to slide 41, you'll see from the petition itself, Petitioners are
24 identifying the active region in the surface layer. And they've used the same
25 color-coding that was in the claim construction brief, Exhibit 1030. You can

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1 see that when they wrote their petition, they identified a graded dopant
2 concentration. They used the exact same word that Dr. Banerjee used that
3 starts at the bottom of the surface layer. But Dr. Banerjee confirmed that an
4 electric field that starts below a layer is not going to move carriers from the
5 layer. In order for it to even be capable, much less necessarily perform the
6 recited result, they had the burden to identify a field that started in the
7 surface layer. As you can see right here on the face of the petition, they
8 haven't done that. They've identified something that starts below the surface
9 layer. And you can see over there on the right citations to where we have
10 mentioned this in the briefing.

11 Now on slide 43, the doping concentration is flat in the surface --

12 JUDGE ABRAHAM: I'm sorry, Counsel, can you back up to the last
13 slide for me? Where in it does it say that -- in the Patent Owner response,
14 does it say that this argument that you're making that it's where inside the
15 surface layer is what we're looking at? I mean, all I see is that they just say
16 that there's a gradient. The slope is not enough to show movement. It
17 doesn't say it's got to be in a particular place inside that layer.

18 MR. WHITEHURST: We respectfully disagree, Your Honor. I
19 mean, we said here moving carriers from the active circuitry at the surface is
20 missing from the prior art. We also --

21 JUDGE ABRAHAM: I understand that, but then is the next sentence
22 meant to explain why it's missing?

23 MR. WHITEHURST: Well --

24 MR. MATICH: Your Honor, I would also point you to page 14 of our
25 sur-reply, which I think Judge Obermann was addressing. So our point all

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1 along has been that they don't -- that they have the burden to show how the
2 graded dopants would actually aid carrier movement. Because it's
3 undisputed that *Payne* and *Onoda* say absolutely nothing about moving
4 carriers. *Payne* and *Onoda* just have a gradient, like someplace. It's not
5 even -- we would also argue there's not even a gradient in the right place.
6 But --

7 JUDGE OBERMANN: But wait a second, counsel, because I did just
8 read pages 14 and 15, and I don't see any of the arguments that you're
9 presenting at this hearing there. What I see is the same arguments we saw in
10 the other cases, including on page 15, the basic argument that there may be
11 other forces that are affecting this. So I want you to show me where you've
12 made these arguments. They seem to be brand new at the hearing.

13 MR. WHITEHURST: Well, Your Honor, I feel like you're shifting
14 the burden to us. We've said --

15 JUDGE OBERMANN: We're not shifting the burden to you,
16 Counsel. You can say that they haven't made their case, but unless you tell
17 us why, we're not going to let you come in with new whys at the hearing.
18 And that's what you seem to be doing here, unless you can point us to these
19 arguments in your paper.

20 MR. WHITEHURST: Well, Your Honor, we said from the very
21 outset that they don't aid movement from the surface layer.

22 JUDGE OBERMANN: I agree, Counsel, but the why is missing in
23 your papers and you're trying to fill it in here.

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1 MR. WHITEHURST: Okay. Your Honor, I'm going to, in the
2 essence, I'm going to cover this and then I don't know how much time's left,
3 but I will address this in the --

4 JUDGE OBERMANN: You're six minutes into your rebuttal.

5 MR. WHITEHURST: Yes. Yes, Your Honor. So you can see here
6 on slide 43, there is no evidence that there's a graded doping concentration in
7 the surface layer. They've never presented any evidence on this point.

8 As you can see on slide 44, they've only identified an electric field
9 that does not start in the surface layer. There is no identification in the
10 partition of an electric field that starts in the surface layer.

11 You see on slide 45, they've identified E1 and E2. They've identified
12 not one, but two electric fields that are in the wrong location. There's
13 nothing in the petition that would be necessarily or capable of moving
14 carriers from the surface layer.

15 This is what Dr. Banerjee explained in this deposition. That's what's
16 shown on 46. He himself said that in order for electric fields to do what they
17 claim is done, it would have to start in the surface layer, not pull up.

18 Looking at slide 47, as we pointed out, there's no evidence that
19 there's a graded dopant concentration in the surface layer. And you can see
20 here what Dr. Banerjee said. When that's the case, there's not going to be a
21 built in electric field where it needs to be.

22 You see more testimony on 48; 49, he reiterated this over and over
23 again. On slide 50, not only did he say there was no built-in electric field in
24 the surface layer or channel region, he said there's also other structures such
25 as the gate and gate oxide fields. He himself acknowledged that there was

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1 no electric field due to the graded dopant or doping concentration, but there
2 were other fields such as the gate.

3 JUDGE OBERMANN: I'm sorry to interrupt you again, but I'm
4 reading your paper. You're referring me to the sur-reply and I'm not seeing
5 this particular part of Mr. Banerjee's deposition cited. Can you please tell
6 me what page it's on?

7 MR. WHITEHURST: We will get that information for you, Your
8 Honor. You know, we raised this argument at the last hearing and we were
9 told that -- we heard counsel for Petitioner say that it was in the exhibit. We
10 pointed out it wasn't in the brief.

11 JUDGE OBERMANN: Right now, counsel, I'm just asking you to
12 please direct me to where Banerjee's deposition transcripts at pages 218 to
13 219 are cited in your papers.

14 MR. WHITEHURST: Yes, Your Honor. If I can get that information
15 for you, I will.

16 JUDGE OBERMANN: Thank you.

17 MR. WHITEHURST: I understand your question. I'm going to move
18 on now to slide 54. You'll see that Petitioners identify a PMOS transistor
19 and an N-well. Looking at slide 55, you'll see that the petition identifies the
20 minority carriers as holes in an N-well, as we discussed earlier. When it's a
21 NMOS transistor in a P-well, this goes back to your question, Your Honor,
22 Judge Ullagaddi, when it's a NMOS and a P-well, they're saying here that
23 the minority carriers in an N-well, which would be a PMOS transistor as a
24 hole, but in a NMOS transistor in a P-well, which is what is shown in figure

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1 5B, they're saying the minority carrier is the electron, which is the opposite
2 of what we were addressing earlier.

3 You can see here on the petition, they have identified a PMOS
4 transistor in a in an N-well and they've identified the wrong minority carrier.
5 Why is this significant? When you use the proper reading of minority
6 carrier, the electric fields that Petitioners have identified in their petition are
7 not going to move the minority carrier from the surface layer. As you can
8 see, they've identified E1 and E2, that the minority carrier is the electron.
9 And we know that electrons are going to move in the opposite direction of
10 the electric field. So to the extent these carriers are going to move at all, and
11 we have it -- there's insufficient evidence on that point, but to the extent
12 they're going to move at all, they're not going to move from the surface
13 layer. If they're going to move at all, they're going to move in the opposite
14 direction, too.

15 I'm just going to cover real quickly on slide 59 we see the same
16 situation that we saw in *Payne*. On slide 60 we see the same situation that
17 Petitioners identify the active region and the surface layer. On 61, you'll see
18 that Petitioners never identified a field that starts in the surface layer. Rather
19 they identified something beneath it.

20 On slide 62 the dopant concentration is flat in the surface layer and
21 they've not presented any evidence that it's graded. When you look at what
22 they've identified, they do not start in the surface layer like their expert said
23 is required and you see their experts testimony on this. On slide 64, when
24 you go to, you'll see the --

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1 JUDGE OBERMANN: Counsel, where is the -- you said that the
2 graded dopant is flat somewhere?

3 MR. WHITEHURST: That's correct, Your Honor, in the surface layer
4 that's blue. They never presented any evidence that it was graded, much less
5 efficiently graded in the blue surface layer. And they've identified electric
6 fields that are not in the surface layer but deeper in the stack. The electric
7 fields that they've identified would not be capable and they certainly
8 wouldn't necessarily move a carrier from the circuitry at the surface.

9 JUDGE OBERMANN: During your sur-rebuttal, I would like you to
10 identify where you've cited in your papers Banerjee's deposition transcript at
11 page 260 as well, please.

12 MR. WHITEHURST: Yes, Your Honor. Going to slide 65, you'll see
13 like before, the electric fields are in the wrong location. Slide 66 shows
14 again why the electric fields are in the wrong location. Slide 67 shows that
15 Petitioners identified an NMOS transistor and a P-well. Slide 68 shows
16 where Petitioners have identified the wrong carrier as the minority carrier.
17 Slide 69, you'll see additional support why they've identified the wrong
18 minority carrier in their petition. Going to slide 70, you'll see why the
19 electric fields identified by Petitioners will not move holes from the surface
20 layer.

21 The minority carrier here for the reasons that I've discussed earlier is
22 a hole, and you'll see that the electric fields that they've identified to the
23 extent they move this carrier at all, they're going to move it in the wrong
24 direction.

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1 With that, I'm going to reserve the rest of my time. And unless there
2 are any questions, I'll conclude my argument.

3 JUDGE OBERMANN: Okay. I'm seeing no questions from the
4 Panel. You'll have six minutes on sur-rebuttal. Thank you, Counsel.

5 It is now 3:34 and we're going to take a 10-minute break. We'll
6 reconvene at 3:44. Thank you, Counsel. We'll see you soon.

7 (Recess)

8 JUDGE OBERMANN: Thank you and welcome back. Okay. We
9 have up next Petitioner for their rebuttal. Petitioner, you have 34 minutes
10 remaining in your rebuttal. And I'll start to time you when you begin
11 speaking.

12 MR. SHARMA: Thank you, Your Honor. Hopefully, we won't take
13 all of 34 minutes. Before I begin, are there any questions that the Board
14 would like me to address in the sur-rebuttal?

15 JUDGE ULLAGADDI: Yes, I have a question. I think I'm
16 understanding that one of the primary disputes between the parties is
17 whether the minority and majority carriers change designation based on
18 whether the transistor is on or off or whether they are the same the whole
19 time and purely determined by dopant concentration in the region that the
20 gradient dopant concentration is in. And in any event, I would like some
21 evidence to back the position up.

22 MR. SHARMA: Okay. Thank you. Let me address that, Your
23 Honor. Anything else from any of the Panel members?

24 Okay. Let me address Judge Ullagaddi's question first. Let me share
25 my screen. All the world can see my screen.

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1 Let me start with on this issue first. Pointing to judge -- to our expert
2 -- maybe I will find slides in a minute. But let me first point to our expert's
3 declaration. Dr. Banerjee explained -- it'd be easier there if I just bring the
4 document up and point to exactly where Dr. Banerjee explained this issue.
5 Give me one second.

6 The Panel can see Dr. Banerjee's declaration. That's Exhibit 1060.
7 And here Dr. Banerjee explains how we determine the majority and minority
8 carriers over here. Dr. Banerjee explained by -- what I can point you to. Go
9 to page 9 of Dr. Banerjee's declaration, Exhibit 1060. And page 9, Dr.
10 Banerjee refers to this is Banerjee describing how those semiconductors
11 work. He points to figure 23 from the Sze textbook that's shown on page 9
12 and paragraph 17. And Banerjee mentioned that if you dope a substrate by
13 arsenic, it becomes N-type. And the N-type electrons are majority carriers
14 while holes are minority carriers.

15 And on the right-hand side we showed paragraph -- a boron in figure
16 23B. Boron is a P-type carrier with (inaudible) holes shown over here on
17 figure 23B. In subsequent paragraphs Dr. Banerjee explained that in P-type
18 silicon, holes are majority carriers, electrons are minority carriers. That's
19 one thing he mentioned clearly and unambiguously in his report.

20 I'm also pointing the Board to paragraphs 81 and 85 of his report. I'll
21 take you to page 80 -- paragraph 81 of his report. And paragraph 81 is over
22 here, 81. Here he is responding to Dr. Glew's argument. Dr. Glew did not
23 mention in his declaration as was his majority what's minority? How this
24 changes off and on, we'll go back and take a look at Dr. Glew's declaration.
25 In fact, we'll look at the footnote, which is at best ambiguous. But we were

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1 suspecting that he may make the argument even though they did not make
2 this argument in the POR.

3 And Dr. Banerjee clarified our argument was Dr. Glew is making
4 arguments about what is the net force intrinsic resistance magnitude, which
5 is not technically sound. Here's another example of what is not technically
6 sound. Dr. Banerjee explained over here the identity of majority/minority
7 does not change when the MOSFET is turned on or MOSFET is turned off.
8 It is a property of the dopant type.

9 Now, in this case over here, this is an excerpt from Dr. Wu's
10 (phonetic) declaration. The source is N-type, drain is N-type, the substrate is
11 P-type. Now -- and therefore, the majority carriers for the source are always
12 electrons and minority are holes. Likewise for P-type substrate of channel,
13 the majority carriers are the holes and minority are the electrons. What's
14 happening over here is a temporary phenomena. You have in this case Dr.
15 Wu has applied the voltage, positive voltage at the gate. Once you apply a
16 positive voltage it impacts what's happening in the semiconductor. In this
17 case, the electrons have moved up to the gate voltage and holes have moved
18 down. Whatever action you're seeing over here, attraction electrons to the
19 gate and away of the holes -- of the holes away, that's because the gate
20 voltage. It is not happening due to the gradient over. That's all a temporary
21 thing.

22 Dr. Banerjee goes on to explain that this is -- Dr. Glew has not
23 thought his way through on all these issues. Here the electrons and holes are
24 moving because of the gate voltage, but the gradient is pointing them
25 upwards. So that is an incorrect temporary phenomenon. And also Dr.

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1 Banerjee in his declaration explained how the source and drain and electrons
2 work. That is on page 24 and 35, paragraph 44. Go up there.

3 Dr. Banerjee explains how a transistor works by citing to the *Wolf*
4 textbook and his own textbook. And here that's exactly the phenomena the
5 Board was asking about. You have applied voltage on the top, it creates a
6 temporary imbalance in the channel, but does not mean that it was
7 majority/minority has changed. But always in the textbook, the intrinsic
8 effort is always determined by what is happening at the -- what is the dopant
9 type.

10 We also have some slides that I can point to. If you want to have
11 more questions I can keep going on this issue further.

12 JUDGE ULLAGADDI: I think this is helpful.

13 MR. SHARMA: Okay. So just in summary, Your Honor, I'll direct
14 your attention to paragraphs 1 through 25 of Dr. Banerjee's declaration
15 where he gave the background technology, explains what's
16 majority/minority, point to paragraphs 44 and 45 and 46 where he explains
17 how the transistors operate. And then point to paragraphs 81 and 85 of his
18 declaration and explain how the -- both the majority and minority does not
19 change the entire system on and off. It is a property of the material.

20 Here's an example of -- here, again, I'm pointing to Exhibit 1030 of
21 the Patent Owner response. And this is the supplement they are pointing to.
22 So this footnote is from the (inaudible) brief. But the same footnote occurs
23 in Dr. Glew's declaration that facilitated in this proceeding. Again, the
24 footnote. Let's take a look at the footnote and I'll go further into the source.

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1 In footnote 5, Dr. Glew or Greenthread are pointing to the figure on
2 the top. Because the channel is formed by electrons with a negative charge,
3 which is N, the MOSFET is referred to as an N-channel MOSFET. And that
4 is correct because the source and the drain are N-type and, therefore, the
5 majority carriers between are the electrons because source creates the
6 electrons, they go to the drain. Now, if the transfer is P-type, then the holes
7 will majority carrier because the P-type source will create P-type holes
8 known to transmit. And the carriers that are created by the source are the
9 carriers that go through the channel. If in this case the source is N-type, it
10 needs N-type carriers to conduct. And therefore an N-type transistor is also
11 referred to as N-channel transistor.

12 Now here Dr. Wu at least (phonetic) had mentioned in an N-channel
13 MOSFET, electrons are referred to as the majority carriers and the minority
14 carriers are holes. Again, he's pointing to the n-channel MOSFET, the
15 source, drain, and the channel. He does not come out and say what
16 Greenthread is saying today. He did not say that the holes are the majority
17 carriers in the channel region. He's not saying they are the majority carriers
18 in the source region. He's taking it away. Indeed, his statement to say
19 electrons are referred to as majority carriers and minority carriers, the holes,
20 that is true for the source and the drain. Here the source is N-type.
21 Therefore, electrons and majority carriers. The drain is the N-type. That is
22 true for there, too.

23 However, he is wrong to the extent he's pointing to the channel
24 because the channel of P-type, where the majority is the holes, minority will
25 be electrons. They don't come out and say that. And Your Honor, you heard

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1 him talk today. They want us to rely on this one footnote and say they are
2 making a majority/minority argument in their briefs. This is all evidence we
3 have, a statement by Dr. Glew without citing to intrinsic records, without
4 citing to extrinsic records, and assume that we can divine. And I will
5 mention to you this statement at least is ambiguous on its face.

6 Not only that, our interpretation where majority/minority carriers
7 was mentioned, the (inaudible) was pointing to the source and the drain and
8 we record of that (inaudible). And I point to *Onoda* reference, that's Exhibit
9 1042 on paragraph 44. *Onoda* talks about N-channel MOSFETs and P-
10 channel MOSFETs. And that diagram has finally make it clear when you
11 say N-channel MOSFET and the majority/minority carriers, you're talking
12 about the doping type of the source and the drain. If the doping type of the
13 source and the drain is N-type, they're known as NMOS N-type or N-
14 channel MOSFETs. If the doping type of the source and drain is P-type,
15 they're referred to as P-type, P-channel, or PMOS transistors. That is also
16 reflected in the *Onoda* reference that was published in 1996.

17 Again, what's important over here to notice is of Dr. Glew and he has
18 not cited to any evidence to this issue. I have just a few slides to counter this
19 argument. This is if the Board is interested, I can quickly go through those,
20 which we point to the intrinsic record of how Dr. Glew is incorrect. We also
21 point to things that Dr. Banerjee relied upon to come to his conclusion as to
22 what is N-type and what is P-type.

23 This is we are on slide 94 of Petitioners' demonstrative, 1072. And
24 this is we excerpted Greenthread's position. And we mentioned that this is
25 all (inaudible) of Dr. Glew's and he never clearly pointed -- he never made

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1 the argument either in the POR or in the sur-reply that we have pointed to
2 wrong majority or minority carriers.

3 This is a slide from 95 that we showed earlier. It simply summarizes
4 our position that we -- that the position -- where the majority/minority
5 carriers are determined by the group and type, not in the transistor operating
6 or not operating. And as you saw earlier on the slide, we pointed out
7 Greenthread have submitted a claim where they said the drift is created
8 without any external voltages. So they are contemplating that the claims
9 cover a situation where no voltage applied. So to that extent, Greenthread
10 argues today that the claims are limited to only on state or off state. There is
11 no extra statement. The claims don't say. If it's apparatus claim, they don't
12 say the transistor must be turned on or external voltage is applied. The
13 specification doesn't describe that.

14 JUDGE ULLAGADDI: Counsel, did I hear you say that the --
15 another point in prosecution had said that -- I lost my train of thought, that it
16 does matter whether the device is on or off?

17 MR. SHARMA: No, Your Honor. We have no specification where
18 the Greenthread mentioned that the device has to be on. The point we made
19 earlier today was when they submitted a claim to the Patent Office in 2009,
20 where they mentioned that the -- said the drift layer can be formed without
21 application of external voltages. And I can give you the slide number on this
22 one. I have jumped there for one second. So slide 52 of Exhibit 1072 where
23 the Patent Owner has submitted a claim where the electric drift field without
24 the application of external potential. And on slide 53 we excerpted their
25 response also from the file history where they mentioned that a drift --

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1 graded dopant concentration capable of providing drift field without
2 application of extreme potential.

3 Okay. Again, Dr. Banerjee, here on slide 96, we excerpted Dr.
4 Banerjee's expert report on from paragraph 83. He mentioned majority
5 carrier refers to carrier type provided by the dopants. Again determined by
6 the dopants. In his deposition he clarified again. They tried to ask him is it
7 a position that majority or minority carriers will change depending on where
8 you are in your semiconductor device? It clarifies, consistent with his
9 declaration, it is dependent upon what the dopant type is. "If the doping
10 type is acceptors, holes are majority, electrons are the minority. And that's
11 not my position. That's accepted terminology."

12 And we saw the Sze textbook use the same language: acceptor and
13 donors. If you are acceptors, you donate electrons, majority are electrons. If
14 you're a donor, you accept electron, you donate a hole, the majority carriers
15 are holes.

16 Now this is slide 97. We referred to some of this excerpts, Your
17 Honor, on the Tuesday (phonetic) proceedings, so let me repeat here. On
18 slide 97, on the bottom we have Exhibit 1070, which is Greenthread's
19 submission to the Patent Office which was made in August of 2024. This is
20 where they mentioned what is majority, what's minority. They mentioned
21 that holes are minority carriers for a P-N-P transistor. Okay. So what they
22 mentioned over here in the P-N-P transistor, P is the -- yeah. So this will be
23 in the base region. The base region is a region disposed through which the
24 holes minority carriers for a P-N-P transistor.

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1 So the N would be the region where the minority carriers are holes
2 and majority carriers electrons. And then they go on and say electrons are
3 minority carriers for the N-P-N transistor. Again, what I talked about,
4 they're talking to the P portion in the middle. That's the P-type channel or
5 the base. If this is P-type, electrons are the minority carriers. And we made
6 the same representation earlier in 2011, we talked about holes and the
7 minority carriers in the P-N-P.

8 So here they did not mention anything that majority/minority are
9 determined by what's on and what's off. They seem to imply that it is based
10 on the dopant type. They did not mention that holes are minority carriers
11 when the transistors are on or electrons are majority carriers when transistors
12 is off. That is incorrect.

13 Now, on slide 98, some of this discussion I had with Your Honor is
14 not in the briefing. This is arguments we saw we made in the slides. We are
15 trying to compare some responses to the (inaudible) argument some
16 majority/minority cases. This is a portion of the spec we mentioned, I
17 referred to earlier. MOS are majority carrier devices for conduction. So,
18 again, the statement over here implies a state that you're not saying what is
19 the different type and so on. Simply saying if you are looking at a MOS
20 transistor and the contrast to BJT, bipolar junction transistor, a totally
21 different mechanism. Here you have a source and a drain. Source will have
22 majority carriers and those majority carriers are then transported to the drain.
23 That's what it says. So if you have anti-transistor, also the majority carriers
24 go into the drain. If you have a anti-transistor, electrons will be the majority.
25 They will go through the drain.

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1 And same thing in the next sentence on column 3 of the '195 patent
2 on slide 98. The patent mentions MOS devices "accelerate majority carriers
3 towards the drain." So now they are talking about embodiment (inaudible)
4 that is not claimed. They say you can do a grouping site between the source
5 and the drain and that can push things up. And pointing to the purple arrow,
6 the horizontal purple arrow, they're talking about carriers moving from the
7 source to the drain because of that gradient. And that's embodiment that is
8 not claimed. In our embodiment the current flows from the source to the
9 drain and the drift field is movement perpendicular to that. So these
10 statements do not amount to any statement from the Patent Owner that they
11 are trying to treat majority/minority in some different manner.

12 And again, Dr. Banerjee is very clear. They pointed to some
13 excerpts from Dr. Banerjee's deposition where he didn't remember a few
14 things, trying to imply that he has made incorrect analysis. That is not
15 correct. You have slide 99, the Dr. Banerjee's depo transcript where he said
16 that. And they're asking about the same sentence in the specifications that I
17 pointed over here. When this sentence mentioned majority carriers, do you
18 have an understanding of what regional device they are referring to? Once
19 again, majority carrier in the regional location refer to the carriers created by
20 the built-ins. If you're looking at the NMOS, majority areas are source.
21 Electrons will flow from the source to the drain.

22 So, Your Honor, the statement they point to in the specification do
23 not rise to a clear, express intent by the Patent Owner to redefine the term.
24 They did not redefine the term. They're simply describing what happens in
25 the MOS devices being majority carriers. We're also talking about the

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1 embodiment, which is not claimed, where you are accelerating minority
2 carriers or majority carriers from the source to the drain.

3 And here more arguments. Slide 102, Patent Owner talks about how
4 you have to move the carriers from the surface to the substrate. Yeah, that's
5 one of the embodiments. But the reason for that is incorrect. They talk
6 about how transistor is operating, how you may interfere and so on. And
7 that is true when they have a claim, claim 8, which moves the minority
8 carriers in the opposite direction. Here they claim that the drift will be such
9 that the magnetic carriers will go from the substrate to the surface layer. So
10 if the purpose of the invention is to move the carriers away from the active
11 devices, well, why do they have a claim where the things move the opposite
12 direction?

13 So the conclusion is clear over here. The explanation they have
14 provided as to why figure 5B (inaudible) is basically incorrect and it is
15 proven by claim 8 from the patent.

16 Yes, 103, slide 103, we point to the Grove patent, cited in the file
17 history that supports our view of what is majority/minority is defined by the
18 dopant type, not by the operation of the transistor. And here the Grove
19 textbook is talking about what will happen when a BJT is operating and the
20 Grove textbook refers to, of course, minority carriers based on the dopant
21 type. It does not mention that, oh, these are the minority carriers because the
22 BJT is operating.

23 This I think we saw in an earlier slide, 104, as Dr. Banerjee in his
24 expert report relied upon or informed that definition, understanding of
25 majority and minority is consistent with what's also in Sze.

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1 So that's all I have, Your Honor, on the majority/minority carrier
2 issue. I have a few minutes left. May I request the Court to tell me how
3 much time I have?

4 JUDGE OBERMANN: You still have 10 minutes. You have until
5 4:19.

6 MR. SHARMA: Okay. Thank you very much, Your Honor. I'll try
7 to finish a few things rather quickly.

8 Well, the point of some inconsistencies or incorrect
9 characterizations in their slides. Let me take you to slide 22. This is a
10 question, I see both panel members asked about this slide. They are saying
11 on the top Dr. Banerjee confirmed an NMOS transistor majority carrier is a
12 channel in the electron. That is incorrect. The (inaudible) exhibits on brief
13 (inaudible) demonstrative slide 22. They asked him, the NMOS transistor,
14 when a channel forms, which charge carrier is moving from the source of the
15 drain? He said that's electron. He did not say that majority carrier is the
16 electron. Later on he clarifies it and highlighted the portion below, and he
17 tries to explain it further. So the minority carrier electron will flow towards
18 the surface, but the carrier keep going because they're blocked by the
19 insulator.

20 Later in his deposition he clarified that the minority carriers are
21 electrons, not majority. They render incorrect conclusions on his testimony.
22 Let me go to slide number 42 of this here. We're talking about the red
23 dotted line, but we have to look at the sentence we have been talking about.
24 We are saying that in figure 11 below, illustrates the dopant concentration
25 measured along the red dotted line in figure 10, which starts at the bottom,

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1 the surface blue, and extends to the surface gray. So when we are saying --
2 talking about the position of the red dotted line, we are not saying that the
3 electric fields start only at the end of dotted line and the end of it here..

4 Figure 11 makes clear, as I said earlier, that in this field in *Onoda* --
5 sorry, this is *Payne-Onoda*. In *Payne*, as mentioned, this is a high to low
6 grouping. And as shown in figure 11, the dopant start at the surface and then
7 go down up to the depth of I think it says eight microns. Again, we didn't
8 say that we are pointing only to a limited portion. The gradients are formed
9 entirely over the entire duration. The electric field is formed over the entire
10 duration.

11 Let me point to -- go to slide 64. On slide 64, they mentioned that
12 there will not be the dopant concentration of *Onoda*, would not be highest of
13 the surface. That's totally incorrect. We cited to *Onoda's* paragraph 53 and
14 also referenced that paragraph this morning. In paragraph 53, *Onoda*
15 mentioned that all the active regions and the well regions are formed by
16 thermal diffusion. And this is because thermal diffusion, the grouping
17 concentration is (inaudible) and they also (inaudible) that and the peaks
18 occur at the surface -- at the peak of the surface, which means that anything
19 below the surface is going to be less than the peak. That makes it perfectly
20 clear in that *Onoda*, the peak of the dopamine concentration is separate and
21 then it goes downwards as you go deeper into the substrate.

22 Quickly, a bunch of questions on *Ball Aerosol*. *Ball Aerosol* is a
23 case which is about configured to claims where the issue was whether a
24 device infringed or not. In that case the Federal Circuit noted *Ball Aerosol*
25 (inaudible) configured to claim to infringe the accused device, you should

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1 not have to make any changes to the device. There the customer had to
2 change the oil lamp and, therefore, it was not configured to in the plain
3 manner. It's a shift. It has nothing to do what's disputed over here.

4 And I think we have already mentioned on *ParkerVision*. If the
5 Board has any further questions, we have nothing more to say on the issue of
6 *ParkerVision*.

7 That's all the questions I have, anything I have to say. Unless the
8 Board has any questions, I will let Mr. Paul address -- take two minutes of
9 your time.

10 JUDGE OBERMANN: Thank you, Counsel. I'll confer with my
11 Panel members and see if there are any questions before you depart the
12 podium. Anything? Nothing? Okay.

13 Okey doke. So when you're ready, Patent Owner's Counsel, you
14 have six minutes and I will start the clock running when you begin to speak.

15 MR. SHARMA: Thank you.

16 MR. WHITEHURST: Yes, Your Honor, I'm not going to make any
17 additional arguments at this time, but I do want to respond to your questions
18 earlier.

19 I do not believe page 260 of the transcript, I've not seen it cited in the
20 sur-reply, but page 219 is cited on pages 4 and 11. I just briefly want to
21 identify some things on the record. Like I said, I don't intend to make any
22 additional arguments at this time.

23 But turning to the sur-reply, page 1, I just want to note for the record
24 that the first sentence talks about the gradient alone does not aid the
25 movement of minority carriers. It goes on to say that Dr. Banerjee testified

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1 that without knowing the cumulative effect of multiple forces in fields, it's
2 impossible to determine minority carrier movement as that term is ordinarily
3 understood. Since Dr. Banerjee did not consider these other forces in his
4 analysis, the petition fails.

5 I also want to note that there on the same page, page 1 of the sur-
6 reply, it states that the specification and claim language speak of moving
7 electrons from one location to another to influence the operation of the
8 device. Turning to page 3 of the sur-reply, you'll see that it says petition
9 fails to show the aid to movement of minority carriers limitation in the prior
10 art. And you'll see there in the first paragraph it says the petition fails
11 because Petitioners' expert admitted that, one, numerous forces act on
12 carriers; two, carrier motion is determined by the sum of these forces; and
13 three, he did not analyze any forces except the gradient itself. The next
14 sentence continues, "Since Petitioners cannot say whether, when, or in
15 which direction a carrier in the prior art devices would move, they have
16 failed to carry their burden of showing that the prior art renders obvious the
17 aid the movement of minority carriers limitation."

18 As I noted on page 19 and is cited on page 4, I just want to note for
19 the record, page 5, that the sur-reply explains on page 5 that Dr. Banerjee did
20 not analyze the forces to determine carrier movement. And the next
21 sentence says, "Dr. Banerjee admitted that he did not find the vector sum or
22 the magnitude of any electric field in the prior art." And lower in that
23 paragraph it says, "Since Dr. Banerjee admitted that analysis of multiple
24 forces are necessary to determine whether and in what direction carriers will
25 move in a device, but failed to analyze those other forces, the petition

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1 necessarily fails to demonstrate that the prior teaches the same subject
2 matter."

3 I just want to note for the record at the top of page 7 it goes on to
4 say, "For example, the specification speaks to sweeping unwanted minority
5 carriers from the active circuitry at the surface and accelerating towards the
6 surface," and then it continues on. And continuing, page 10, want to identify
7 on the record that at the top of page 10 it says, "Dr. Banerjee's admissions
8 doomed the petition. The claims require, one, aiding the movement of
9 minority carriers; two, from said surface layer to said substrate. And then
10 lower on that page it says, "If Dr. Banerjee cannot determine the location or
11 path or travel of individual charge carriers, he cannot say whether they are in
12 the surface layer or active region and whether they move from the surface
13 layer or active region. If Dr. Banerjee does not know that, Petitioners cannot
14 carry their burden."

15 I don't know how much time I have left. I probably should have read
16 these a little quicker, but I'm trying not to rush. On page 11, I just want to
17 note for the record that on page 11 it says, "Dr. Banerjee testified that the
18 gate electrode and gate oxide on a transistor can create a countervailing
19 electric field that would be present in the active region or surface layer. You
20 can see all these examples of how we were talking about the importance of
21 the active region in the surface layer and actually moving carriers from this
22 area." Page 11, "This field exists whether or not any voltage is applied to
23 the gate." It continues on talking about the built in structural features of
24 transistors. And then it continues, "Dr. Banerjee did not consider the effect
25 of these device components on the electric field created by the prior art

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1 doping gradient. Indeed, Dr. Banerjee admitted that it was impossible to
2 conduct that analysis." That would be with the information in the prior art.

3 It continues on to the next page. "By failing to consider how built-in
4 structural features of the prior art work, Dr. Banerjee fails to answer the
5 question whether the prior art device was reasonably capable of operating so
6 as to meet the claim limitations." Page 14 it continues that, "The petition
7 fails to demonstrate that *Onoda* or *Payne* teach the aid the movement of
8 minority carrier limitation. It says, "Neither *Onoda* or *Payne* say that a
9 dopant gradient has any effect on the carriers at all." It explains that for
10 *Onoda*, the petition points to *Onoda* disclosing a downward sloping
11 gradient. And we explain that without -- I'm sorry, it says, "And without
12 more, alleges that the resulting built-in electric field moves minority
13 carriers."

14 It points out in the next paragraph at the bottom of 4 that the petition
15 similarly points only to degraded concentration. It notes here that *Payne's*
16 PMOS formed in the N-well and, I'm sorry, has a graded concentration of N-
17 type dopants and the resulting built-in electric field. That's quoting from the
18 petition. And then in this sentence at the top of page 15 it says, "As
19 explained above, the existence of a downward sloping graded dopant
20 concentration alone is not sufficient to establish the aid the movement of
21 minority carriers claim limitation." And it cites to the Section 2C above.
22 The next sentence reads, "Without any support from the references
23 themselves or analysis from Dr. Banerjee, Petitioners cannot show that
24 graded concentration of dopants for either *Onoda* or *Payne* would move

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1 carriers as claimed." And then it continues on the next paragraph, "Dr.

2 Banerjee admitted that he did not calculate the --"

3 JUDGE OBERMANN: Counsel, I think you're about out of time, so
4 if you could wrap up, please.

5 MR. WHITEHURST: Yes, Your Honor. I'll just note on the record
6 page 17 that it talks again more about the claims require a slope that will aid
7 the movement of minority carriers. Just note on the record in paragraph 18,
8 the paragraph that begins, "Petitioners repeat their argument," and how it
9 comes from the background section of the claim construction. And then it
10 explains on the next page, "Rather the Court said, consistent with
11 Greenthread's argument here, that the graded concentration has to be
12 sufficiently graded to cause movement. And when the --"

13 JUDGE OBERMANN: You are out of time. And I want you to
14 understand that we are going to read the papers and we appreciate you
15 reiterating the sur-reply. We'll take it under consideration. So at this time --
16 thank you. At this time I just want to check did I cut off Petitioner from
17 having Mr. Raj speak?

18 MR. SHARMA: Yes, Your Honor. I'll check with Raj. I left two
19 minutes to respond to an argument. But if Your Honor --

20 JUDGE OBERMANN: What I'd like to do -- I'm very sorry that that
21 happened. I will give you three minutes, Mr. Raj, and then I Patent Owner's
22 counsel an extra three minutes to rebut just what Mr. Raj has to offer now.
23 And, Mr. Raj, (inaudible) I'll begin the clock

24 MR. PAUL: Unless the Judges have any questions, I don't have
25 anything further.

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1 JUDGE OBERMANN: Doesn't look like it. We have the Panel on
2 the line. Is there anything else we need to address today? I'll ask Petitioners'
3 counsel first.

4 MR. SHARMA: No, Your Honor. Nothing for us to address.

5 JUDGE OBERMANN: Okay. Thank you. Anything from Patent
6 Owner?

7 MR. WHITEHURST: No, Your Honor. I was going to identify
8 additional language from the POR, but I understand that I'm out of time.
9 That's all, Your Honor.

10 JUDGE OBERMANN: How much time do you need to identify what
11 you want to identify?

12 MR. WHITEHURST: Well, just -- I believe I can do it in less than 90
13 seconds.

14 JUDGE OBERMANN: Okay. Go ahead, please.

15 MR. WHITEHURST: Just noting on the record the language on page
16 19 of the sur-reply, the first paragraph on page 1 through the paragraph on
17 page 3 that ends, "Petitioners cannot take aid the movement of minority
18 carriers limitation out of the patent."

19 And then I just want to note on the record the section that begins --
20 Section 6 that begins on page 7 and noting in particular on page 11
21 Greenthread actually wrote is that "A graded dopant concentration must
22 move carriers to meet the claim limitation." Not that any and every graded
23 doping concentration must on new carriers.

24 I don't want to run over. Thirteen, just want to note the first
25 paragraph in Section B1. Similarly on page 15, explaining why the mere

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1 existence of a downward sloping concentration is not sufficient to aid carrier
2 movement.

3 And then I just want to note for the record on page 24 the
4 explanation about the specification of the challenged patent and moving
5 unwanted minority carriers and how it improves the performance. Similarly
6 the paragraph -- full paragraph on page 25 and then the paragraph that
7 begins, "Moreover, moving carriers from the active circuitry at the surface is
8 missing." Both -- is missing from the prior art, both *Payne* and *Onoda*
9 (inaudible), with downward sloping gradient with no information about
10 whether, why, or how such a gradient might be useful.

11 Thank you, Your Honor. I certainly appreciate the additional time.
12 That was very kind. I have nothing more to add at this time.

13 JUDGE ABRAHAM: Counsel, one quick question. Can you identify
14 which paper and which case you're referring to with these citations?

15 MR. WHITEHURST: So I was reading from the '195 Patent Owner
16 response and the '195 sur-reply, which is at issue in the IPR ending in 1-7.
17 But I believe similar language would appear in the POR and sur-reply for the
18 other patents as well.

19 JUDGE ABRAHAM: Okay. Thank you for that specification.
20 Appreciate it.

21 MR. WHITEHURST: Thank you, Your Honor.

22 JUDGE OBERMANN: Thank you, Counsel. And, Mr. Sharma, I'll
23 give you another second or two just in case you wanted to add anything.

24 MR. SHARMA: Nothing new, Your Honor.

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1 JUDGE OBERMANN: Okay. Thank you so much. In that case, I
2 want to just say thank you very much, Counsel. This is a helpful hearing
3 and I appreciate both sides being prepared to answer our questions today.
4 The case is submitted. A final written decision will issue in due course, and
5 the hearing is adjourned. Please stay on the line, Counsel, for the court
6 reporter, but the Panel will exit now. Take care.

7 MR. SHARMA: Thank you, Your Honor.

8 MR. WHITEHURST: Thank you, Your Honors.

9 SPEAKER: Thank you, Your Honor.

10 (Whereupon, the proceedings at 4:27 p.m. were concluded.)

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PETITIONER:

Scott Weidenfeller
Anupam Sharma
Han Park
COVINGTON & BURLING LLP
sweidenfeller@cov.com
asharma@cov.com
hpark@cov.com

Gilbert Greene
William Liddell
DUANE MORRIS LLP
bgreene@duanemorris.com
waliddell@duanemorris.com

Daniel Nguyen
Emma Bennett
LOCKE LORD LLP
dnguyen@lockelord.com
emma.bennett@lockelord.com

David Bluestone
BENESCH FRIEDLANDER COPLAN & ARONOFF LLP
dbluestone@beneschlaw.com

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PATENT OWNER:

Alan Whitehurst
Nicholas Matich
Arvind Jairam
Stuart McCommas
Archis Ozarkar
MCKOOL SMITH, P.C.
awhitehurst@mckoolsmith.com
nmatich@mckoolsmith.com
ajairam@mckoolsmith.com
smccommas@mckoolsmith.com
nozarkar@mckoolsmith.com