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

SAVANT TECHNOLOGIES LLC d/b/a)	
GE LIGHTING and LEDVANCE LLC,)	
)	
Petitioners,)	
)	
vs.)	Case No. IPR2024-01357
)	US Patent
FEIT ELECTRIC COMPANY, INC.,)	No. 8,604,678
)	
Patent Owner.)	
)	
SAVANT TECHNOLOGIES LLC d/b/a)	
GE LIGHTING, ELONG)	
INTERNATIONAL USA INC., and)	
XIAMEN LONGSTAR LIGHTING CO.)	
LTD.,)	Case No. IPR2025-00260
)	US Patent
Petitioners,)	No. 8,604,678
)	
vs.)	
)	
FEIT ELECTRIC COMPANY, INC.,)	
)	
Patent Owner.)	

ZOOM DEPOSITION OF WILIAM A. DOOLITTLE, Ph.D.
JULY 18, 2025

Reported by Celena D. Davis, RPR, CSR

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REGISTERED PROFESSIONAL REPORTER

CERTIFIED COURT REPORTER (MO)

CERTIFIED SHORTHAND REPORTER (IL)

CERTIFIED SHORTHAND REPORTER (KS)

CERTIFIED SHORTHAND REPORTER (CA)

CERTIFIED SHORTHAND REPORTER (TN)

CERTIFIED LIVENOTE REPORTER

PLANET DEPOS

Celena D. Davis

Also Present: Nick Kliever

1 (The deposition commenced at 10:01
2 Central.)

3 (Witness sworn.)

4 WILLIAM A. DOOLITTLE, Ph.D.,
5 duly sworn to tell the truth, the whole truth, and
6 nothing but the truth, testified as follows:

7 EXAMINATION

8 QUESTIONS BY MR. DAMARIO:

9 Q. Thank you. And good morning, Professor
10 Doolittle. It's good to see you again.

11 A. Good morning.

12 MR. DAMARIO: We should make a record of
13 who is appearing.

14 Tom DaMario and Charlie McMahon on behalf
15 of the patent owner Feit Electric. Also with us is
16 client representative Nick Kliever.

17 MR. BROWN: Andy Brown of Radulescu LLP on
18 behalf of petitioners.

19 BY MR. DAMARIO:

20 Q. So it's good to see you again, Professor
21 Doolittle. It's been a while. I'm sorry I wasn't able
22 to join your last deposition, but I read the transcript.

23 And so I believe that deposition was on
24 June 10th; does that sound right?

25 A. I'll take your word for it. Sounds about

1 right.

2 Q. And that was with my colleague Mr. McMahon;
3 does that sound right?

4 A. Yes.

5 Q. In general, I'll go over the ground rules.
6 But can we agree that the same ground rules from that
7 deposition apply to this deposition?

8 A. Yes.

9 Q. Just a couple reminders: You know, because
10 we have a court reporter, I don't want to talk over each
11 other. So I'll try to let you finish your questions and
12 I would ask that you do the same. If you don't
13 understand the question, can we agree that you'll ask
14 for clarification?

15 A. Yes.

16 Q. Otherwise, I'll understand that you
17 understood the question. Just let me know if you need
18 to take a break. Let's see.

19 Is there any reason you can't provide fully
20 competent testimony today?

21 A. Not that I know of.

22 Q. Okay. We talked a little bit about this,
23 but because this is a remote deposition, is there anyone
24 currently in the room with you?

25 A. No, there's not.

1 Q. Are you in contact with anybody via
2 Messenger, phone, any other device?

3 A. No.

4 Q. Do you have any materials either on your
5 computer screen or printed out in front of you?

6 A. I do not have anything printed out and I
7 don't have anything on my computer screen. I am in my
8 personal office which has generic stuff, but nothing
9 related to this case.

10 Q. Great. Let's see. What did you do to
11 prepare for today's deposition?

12 A. Read over the materials, including my
13 declarations. I met with Mr. Brown yesterday via video,
14 and just more or less reviewed all the patents and so
15 forth.

16 Q. Okay. Does that include review of the
17 references that you used to challenge the asserted
18 patent in this case that were included in your
19 declaration?

20 A. The major ones, yes.

21 Q. Okay. So that includes I think Basin 2007;
22 does that sound right?

23 A. Yes.

24 Q. And Basin 2005?

25 A. Yes.

1 Q. And Krummacher?

2 A. Yes.

3 Q. Stokes?

4 A. Yes.

5 Q. I'm going to pronounce this wrong, but
6 Shimizu?

7 A. That's the way I would pronounce it, too,
8 so we'd both be wrong. Yes.

9 Q. Just for the record, those are respectively
10 Exhibits 1005, 1006, 1007, 1008 and 1010. Let's see.

11 So just to confirm, you reviewed all those
12 in preparation for your deposition?

13 A. In varying degrees. Not entirely re-read
14 all, but I did look over those again.

15 Q. I'd like to -- and just to confirm, you did
16 review the challenged patent in this case, which is US
17 8,604,678; is that right?

18 A. Yes.

19 Q. Okay. If I refer to that as the '678
20 patent, will you understand what I'm referring to?

21 A. Yes.

22 Q. I'm going to start with the '678 patent.
23 So that you have a copy in front of you, I'm going to
24 put it in the chat, and so just let me know if you have
25 any trouble accessing that.

1 And for the record, this is Exhibit 1001.

2 A. For the sake of efficiency, can I set up a
3 folder on my desktop and save these so we can --

4 Q. Absolutely. Yeah.

5 A. Give me just a second. All right. I think
6 I'm with you. Sorry it took that long.

7 (Exhibit 1001 was marked for
8 identification.)

9 BY MR. DAMARIO:

10 Q. Okay. So in the '678 patent, I first
11 wanted to talk about Figure 8. So if you could have
12 Figure 8 up, and I'm going to direct you to the
13 corresponding description in the '678 patent that talks
14 about Figure 8.

15 I'll just say in general, that is columns
16 13 line 33 through column 14 line 3. So...

17 A. 13:38, you said?

18 Q. Sorry. I'll say it again. Column 13, line
19 33 through column 14, line 3.

20 A. Give me just a second while I rearrange
21 these monitors so I can read a little better. All
22 right. I think I'm up with you.

23 Q. Okay. So I'd like to start by looking at
24 Figure 8. And feel free to reference to the
25 corresponding description if you need to. There's a lot

1 going on in Figure 8, so I want to break it down a
2 little bit.

3 Let's start with, if you can see with me,
4 there is a black horizontal or mostly horizontal line
5 that runs from the left-most side of the chart to the
6 right-most side of the chart; do you see that?

7 A. I see that, yes.

8 Q. And that's labeled the black body curve?

9 A. That's correct.

10 Q. Underneath that, there are four dotted-line
11 segments, starting -- all four line segments start from,
12 relative to the chart, the bottom-left side and slope up
13 to the top right side of the chart.

14 Do you see those line segments, dotted-line
15 segments?

16 A. I do.

17 Q. And would you agree with me those
18 dotted-line segments represent -- sorry -- a percent
19 loading of titanium dioxide in the light-diffusing
20 layer?

21 A. They correspond to the chromaticity diagram
22 coordinates for percent loading, if that's what you
23 mean, yes.

24 Q. Various percent loadings of titanium
25 dioxide; is that right?

1 A. Yes.

2 Q. Okay. And the left-most line represents
3 zero percent loading; is that right?

4 A. That would appear to be -- I will say that
5 the -- I'm going to have a little trouble with the dash
6 lines because all of them are fairly blurred out in this
7 particular copy. But yes, I believe you're correct.

8 Q. Okay. Is there any reason that you have to
9 doubt that the left-most line represents zero percent?

10 A. No, I believe that that is correct. That
11 one I think is clear.

12 Q. Okay. And moving to the right, we have
13 dash lines for 10 percent, 15 percent and 20 percent;
14 does that sound right?

15 A. It does, yes.

16 Q. Beyond those dashed lines, we have various
17 -- what I will call -- or what the patent calls
18 subquadrangles. And those are labeled S02, S03, S06,
19 S07, R02, R03, R06, R07. Do you see those
20 subquadrangles?

21 A. I do.

22 Q. And on this chromaticity diagram, each of
23 these quadrangles represents approximately four MacAdam
24 ellipses; would you agree with that?

25 A. That is what the patent describes, yes.

1 Q. Okay. So keeping those quadrangles in
2 mind, and keeping the dotted lines, which represent the
3 titanium dioxide loading, focusing first on the zero
4 percent dotted line, would you agree that over the
5 entire emission range, over the entire range of that
6 line, it's approximately three MacAdam ellipses in
7 distance? And to maybe short-circuit this, I'll refer
8 you to the description in column 13, lines 49 to 52.

9 A. That would be roughly what it indicates,
10 yes.

11 Q. Okay.

12 A. Yes.

13 Q. And moving to the 10 percent weight
14 loading, so that is the dotted line immediately to the
15 right of the zero percent dotted line that we were just
16 talking about, can we agree that that line is less than
17 two MacAdam ellipses?

18 A. That is what the patent says, yes.

19 Q. Do you have any reason to dispute what the
20 patent says there?

21 A. No.

22 Q. Okay. Moving to the next line, which
23 represents 15 percent weight loading, that is
24 approximately one MacAdam ellipse; do you agree?

25 A. Again, that's what the patent says. Of

1 course it crosses over the boundary, but yes, that is
2 what the patent says.

3 Q. Do you have any reason to dispute what the
4 patent says?

5 A. I'll just clarify. I haven't verified that
6 these correspond to MacAdam ellipses there. I'm just
7 taking it at face value of what the patent is claiming
8 this to be. I haven't done the calculation. That's why
9 I'm answering the way I am.

10 Q. Understood. But you would agree that the
11 patent describes this as the MacAdam ellipses that we
12 talked about; would you agree with that?

13 A. I would agree that that's the way the
14 patent describes it, yes.

15 Q. So I want to make sure that I caught the
16 last answer. So for the 15 weight loading line, that is
17 approximately one MacAdam; do you agree?

18 A. That is what the patent says, yes.

19 Q. And you don't have any reason to dispute
20 what the patent says sitting here today?

21 A. I have not done that calculation so I
22 cannot dispute that.

23 Q. Okay. Moving on to the final one, which is
24 a 20 percent weight loading of titanium dioxide, you
25 would agree that that is less than one MacAdam ellipse;

1 correct?

2 A. I would agree that that's what the patent
3 says, yes.

4 Q. Okay. Do you have any reason to dispute
5 that that's disclosed in the patent?

6 A. Again, I've not done that calculation here,
7 so I can't verify that these are, in fact, corresponding
8 to MacAdam ellipses. And as such, all I can go by is
9 what the patent says.

10 Q. Okay. But you agree that's disclosed in
11 the patent; correct?

12 A. It is disclosed in the patent.

13 Q. Okay. I would like to -- earlier on, you
14 mentioned that you haven't verified this information;
15 you haven't done those calculations. Is there a
16 specific calculation that you had in mind?

17 A. Well, this typically involves -- if you
18 were to going to do this calculation, the modern way to
19 do is to use various simulation software that would
20 actually recreate the ellipses around a particular
21 chromaticity point, and I have not done that.

22 Q. Is there any other way to verify this
23 information?

24 A. Certainly that's the way I would do it. I
25 wouldn't go back and look in the 1930s for the

1 information that was the foundation of the chromaticity
2 diagram. The simulation programs are pretty simple and
3 easy to use.

4 Q. Okay. So the simulation program that you
5 refer to is the standard way of making this measurement;
6 is that correct?

7 A. It would be the one to make the -- to draw
8 out the chromaticity diagram and to identify where the
9 MacAdam ellipses are in that chromaticity diagram. You
10 would have to then superimpose the data that they have
11 here for these large particles onto that diagram.

12 Q. Okay. Do you have any reason to doubt that
13 that's the process that was followed in generating
14 Figure 8?

15 A. I have no basis to know what the process
16 was. It didn't say what it was, it just stated what the
17 results are.

18 Q. Okay. We talked a little bit earlier about
19 the prior art references that are identified in your
20 declaration, and I'd like to just briefly talk about
21 those. I know you reviewed those in preparation for
22 your deposition.

23 Are you aware of, in any of Basin 2007,
24 Basin 2005, Stokes, Shimizu or Krummacher, any
25 disclosure of or any discussion of MacAdam ellipses?

1 A. Can I have access to those files?

2 Q. Absolutely. Definitely. Let me put those
3 up. And give me just a minute. Sorry about that. I
4 wasn't trying to play hide the ball. I've just uploaded
5 those. Feel free to review those.

6 A. Okay. Just having reviewed the first one,
7 Basin, it does show -- chromaticity diagrams, it does
8 show the moving of appearance from yellowish color to
9 whitish. If you increase the loading, it actually comes
10 closer to the white figure.

11 So in general, it shows the same
12 relationship in terms of -- the adding of the TiO₂
13 particles makes the appearance more white-appearing. It
14 does show a region that is labeled with I think just
15 generic dash lines. I don't think that necessarily
16 represents the MacAdam ellipses.

17 So I can review the others as well. I
18 think you're muted.

19 Q. Sorry about that. I want to make sure
20 we're talking about the same reference. You said Basin.
21 Are we referring to Basin 2007, which is Exhibit 1005?

22 A. That is correct.

23 Q. Okay.

24 A. Figure 3 is what I was referring to.

25 Q. Okay.

1 A. It shows the same features and same
2 behavior. It just doesn't specifically call out the
3 MacAdam ellipses, as far as I can tell.

4 Q. Okay. Just for clarity, Basin 2007, which
5 is Exhibit 1005, does not disclose MacAdam ellipses;
6 correct?

7 MR. BROWN: Objection.

8 A. As I said, it shows the same behavior of
9 adding TiO₂ particles, making the appearance more white
10 and adding a higher loading percentage and it becoming
11 more white. So the behavior is the same, but it just
12 doesn't superimpose on this graph where the MacAdam
13 ellipses would be on the CIE diagram.

14 MR. DAMARIO: Dr. Doolittle, I'm going to
15 move to strike that as non-responsive.

16 BY MR. DAMARIO:

17 Q. My question was specific to MacAdam
18 ellipses. Does Exhibit 1005 reference MacAdam ellipses?

19 MR. BROWN: Objection. I'm just going to
20 make a standing objection to the, quote/unquote, motions
21 to strike. But I'm not going to keep on interrupting
22 you. Go ahead, Professor Doolittle.

23 A. Okay. Can you repeat the question? I'm
24 sorry. I got lost in the objections.

25 BY MR. DAMARIO:

1 Q. Yeah. Does Exhibit 1005 reference MacAdam
2 ellipses?

3 A. No. It references the same data that --
4 the same behavior as I just described. Sorry.

5 Q. Okay. Did you review -- in the time that
6 you took to review, did you review any of the other
7 references?

8 A. Not yet.

9 Q. Okay. Are you aware of anything in -- as
10 you sit here today, in Basin 2005, which is
11 Exhibit 1006, that discusses MacAdam ellipses?

12 A. I'm trying to download it. For some
13 reason, when I click on it, it's not doing anything. I
14 click to download, and when I click on it, it's not
15 doing anything.

16 Q. Okay. Let me try to re-upload it for you.

17 A. I'm showing a checkmark beside it, green
18 checkmark. And when I click on that, it does the same
19 thing. Am I missing something here? I've never had
20 that happen before.

21 Q. I'm not sure, but I'm happy to e-mail you
22 these documents.

23 MR. DAMARIO: Maybe we can go off the
24 record for a little bit so we can get the technical
25 difficulties cleared up.

1 MR. BROWN: Yeah.

2 (A discussion was held off the record.)

3 (Exhibits 1005, 1006, 1007, 1008 and 1010
4 were marked for identification.)

5 BY MR. DAMARIO:

6 Q. Professor Doolittle, we're back on the
7 record. I understand that you now have copies of
8 Exhibit 1005, which is Basin 2007; and Exhibit 1006,
9 which is Basin 2005; Exhibit 1007, which is the
10 Krummacher reference; 1008, which is Stokes;
11 Exhibit 1010, which is the Shimizu reference; is that
12 correct?

13 A. Yes.

14 Q. Great. So does repeating the question that
15 I had prior, Basin 2005, which is Exhibit 1006, do you
16 agree that Basin 2005 does not disclose or discuss
17 MacAdam ellipses?

18 A. I do not see that in there.

19 Q. Same question for Exhibit 10007 Krummacher:
20 Would you agree that Exhibit 1007, Krummacher, does not
21 discuss or disclose MacAdam ellipses?

22 A. I do not see it in Krummacher, either.

23 Q. Would you agree that Exhibit 1008, which is
24 the Stokes reference, does not disclose or discuss
25 MacAdam ellipses?

1 A. I do not see that in there as well. Excuse
2 me.

3 Q. And you agree that Exhibit 1010, which is
4 the Shimizu reference, does not disclose or discuss
5 MacAdam ellipses?

6 A. So Shimizu does have two CIE diagrams where
7 they talk about color shifting issues similar to the
8 same content, but does not mention MacAdam ellipses.

9 Q. Just to confirm, a chromaticity diagram is
10 not the same thing as a MacAdam ellipse; correct?

11 A. A MacAdam ellipsis is a region inside of a
12 chromaticity diagram.

13 Q. My question is: A chromaticity diagram is
14 different than a MacAdam ellipse; correct?

15 MR. BROWN: Objection.

16 A. I think I answered that. But it's --
17 MacAdam ellipse is a subset, a subregion of a
18 chromaticity diagram.

19 BY MR. DAMARIO:

20 Q. But they're not the same thing; correct?

21 A. One is the hair on the dog, one is the dog,
22 I guess is the way I would describe it. They're part of
23 the same thing. But a MacAdam ellipse is part of
24 same -- part of the chromaticity diagram. So I wouldn't
25 say -- they're not the same thing would be incorrect, I

1 think.

2 Q. Going by your analogy, though, the hair on
3 the dog is not the dog; correct?

4 A. If -- they're related, yes, but not the
5 same, I guess is the --

6 Q. Okay. Sounds like we can agree that they
7 may be related, but they are not the same thing;
8 correct?

9 A. They can convey similar or the same
10 information.

11 MR. DAMARIO: I am going to object to that
12 as non-responsive and move to strike it.

13 BY MR. DAMARIO:

14 Q. The question I asked was whether or not
15 they are the same thing. So a MacAdam ellipse is not
16 the same thing as a chromaticity diagram; correct?

17 A. According to your distinctions, I would say
18 yes.

19 Q. Okay. I want to turn back to the '678
20 patent, which is Exhibit 1001. Let me know once you
21 have that up.

22 A. I'm with you.

23 Q. Okay. And so looking at Figure 1, and
24 there's a corresponding description of Figure 1, which
25 I'll refer you to -- but maybe let me know once you have

1 Figure 1 available.

2 A. I've got you.

3 Q. So Figure 1 shows a -- Figure 1 shows a
4 schematic partial cutaway plan and sectional views of a
5 solid state emitting device in accordance with an
6 embodiment of the invention of the '678 patent; correct?

7 A. If you're referring to column 6, I believe
8 is where Figure 1 comes up, in order to just expedite
9 the answer, Figure 1 shows the schematic partial cutaway
10 plan and sectional views of the device.

11 Is that what you're referring to? You read
12 it, so I was just trying to -- to go word for word, I
13 didn't want to take up your time by --

14 Q. Fair enough. Fair enough. I was reading a
15 different section, but I think they convey the same
16 information. So let me short-circuit this.

17 Column 6, lines 55 through 61 indicate that
18 Figure 1 is a schematic partial cutaway plan and
19 sectional view of the device; correct?

20 A. In accordance with one embodiment.

21 Q. One embodiment of the '678 patent; correct?

22 A. Of what's purported to be the invention,
23 yes.

24 Q. Okay. And looking at that same section, so
25 column 6, lines 55 through 61, the patent indicates that

1 the device disclosed in Figure 1 is configured to
2 generate a warm white light with a correlated comfort
3 color temperature of approximately 3000 kelvin and a
4 luminous flux of approximately 1000 lumens; correct?

5 A. Yes.

6 Q. I'd like to move to Figure 9 of the patent.
7 Let me know once you're there.

8 MR. BROWN: Will the relevance of these
9 questions to Claims 11 through 14 be apparent at some
10 point?

11 MR. DAMARIO: Sorry. Could you repeat the
12 question?

13 MR. BROWN: I was asking whether the
14 relevance of these questions to Claims 11 through 14
15 would be apparent at some point.

16 MR. DAMARIO: I don't think that is
17 something that we need to get into right now or
18 something that's really relevant to our requirement.

19 MR. BROWN: Well, I'll just ask for a
20 standing objection on that basis, too, then.

21 BY MR. DAMARIO:

22 Q. All right. So Professor Doolittle, let me
23 know once you're at Figure 9, please.

24 A. I'm at Figure 9.

25 Q. Thanks. And I'm looking at the

1 corresponding description at column 20, lines 30 to 32.

2 Let me know once you've reviewed that.

3 A. Column 20 -- I'm sorry. What were the
4 lines?

5 Q. 30 to 32.

6 A. I think I'm with you. I read through that.
7 I will just say when you asked me if I reviewed the
8 patents, I should clarify that I was informed that this
9 would be -- this deposition would be only on the
10 supplemental claims of 11 through 14, and I was reading
11 these patents with that in mind.

12 So now that you're asking questions that
13 are outside of that scope, I'm going to need to take a
14 little bit longer each time to review these patents. I
15 apologize for the amount of time I just took to do that.

16 Q. No apology is necessary. I will try to
17 direct you where I'm able. And, really, I just have one
18 question on the lines that you just read, which is that
19 column 20, lines 30 to 32 indicate that the device in
20 Figure 9 has a luminous flux of about 11,000 -- or
21 1100 lumens; correct?

22 A. I believe slightly more, because it adds
23 the red LEDs, so yes. Number 50 is a red LED that's
24 added to the package for Figure 9 that wasn't there in
25 Figure 1.

1 Q. Okay. But the '678 patent indicates that
2 it's about 1100 lumens; would you agree with that?

3 A. With the added addition, yes.

4 Q. Okay. I'd like to turn back to the
5 references that are cited in your declaration in support
6 of challenging -- your opinions on Claims 11 to 14. So
7 those are Basin 2007, Basin 2005, Stokes, Shimizu and
8 Krummacher. Do you still have those references with
9 you?

10 A. I do.

11 Q. Are you aware of anywhere in any of those
12 references that discloses or discusses luminous flux?

13 A. So Basin 2007 talks about various different
14 weight loading of TiO₂ and the increase in luminous
15 output in page 2, paragraph 33, I guess. I haven't
16 fully read through the rest of it. But there is
17 certainly -- in this paragraph, there is discussion of
18 that.

19 Q. Okay. Basin 2007 doesn't use the words
20 "luminous flux"; correct?

21 A. It provides the lumens there, so yes, it
22 does; the same unit of measure.

23 Q. The lumens are a unit of measure not only
24 for luminous flux, but other -- sorry. Strike that.

25 A. It's the light output here.

1 Q. I'm sorry?

2 A. It describes its light output. It's
3 talking about the same thing.

4 Q. Okay. But Basin 2007 doesn't use the words
5 "luminous flux"; correct?

6 A. It's describing the same thing, as best I
7 can say. If we want to pick the wording apart to say if
8 it uses that specific wording, no, it does not.

9 Q. Okay. Same question for Basin 2005.

10 A. I can't say definitively, because I'm in
11 the reading this thing in the present format. But I do
12 not see it here at present.

13 Q. So as you sit here today, you are not aware
14 of anywhere in Basin 2005 that says "luminous flux";
15 correct?

16 A. I do not -- I'm not aware of it. I cannot
17 say it's not there, because I haven't read the entire
18 thing today. I can take the time to read the whole
19 thing if you would like for me to take the time to read
20 the whole thing. I just want to be respectful of your
21 time.

22 Q. I'd like to move on to Krummacher, which is
23 Exhibit 1007. You're not aware of anything in
24 Krummacher that discloses luminous flux; correct?

25 A. Again, I've not read the whole thing in

1 Krummacher -- excuse me -- but -- and just scanning
2 through, I do not see those specific words used.

3 Q. Okay. And Exhibit 1008, which is the
4 Stokes reference, you would agree that that reference
5 does not disclose luminous flux; correct?

6 A. It describes various intensities, but I do
7 not see the specific words "luminous flux."

8 Q. Thank you. And last reference is Shimizu
9 Exhibit 1010. You would agree that Shimizu does not
10 disclose luminous flux; correct?

11 A. Shimizu does talk about luminous intensity,
12 which would be the same thing. But if you're looking
13 for the specific wording as you seem to indicate before
14 you were, at luminous flux, it's not present as far as I
15 can tell.

16 Q. So the word luminous flux does not appear
17 in Shimizu; correct?

18 A. Luminous intensity does, but luminous flux
19 appears not to be in Shimizu.

20 MR. DAMARIO: I'm going to object to that
21 as non-responsive.

22 BY MR. DAMARIO:

23 Q. My question is: The word luminous flux
24 does not appear in Shimizu; correct?

25 MR. BROWN: Objection.

1 A. If you're looking for that specific wording
2 instead of the ones that I've already given you that
3 mean the same thing, it does not appear.

4 MR. DAMARIO: All right. We've been going
5 for about an hour. Let's take a break and I think we're
6 at a good stopping point for now.

7 (A break was taken.)

8 MR. BROWN: Before we get into the
9 questions, I don't want to disrupt your deposition, but
10 I did want to state for the record that we understood
11 this was going to be cross-examination on Professor
12 Doolittle's Supplemental Declaration in IPR 2025-00260.
13 The questions so far have been outside the scope of
14 proper cross-examination, so we object to the
15 questioning on that basis.

16 MR. DAMARIO: Your objection is noted. I
17 believe we are skipping to the scope of the challenged
18 claims in IPR 2025-00260, which are Claims 1, 11 to 14.
19 BY MR. DAMARIO:

20 Q. Welcome back, Professor Doolittle. Before
21 the break, we he had a little discussion about luminous
22 flux. And you said that luminous intensity and luminous
23 flux are basically the same thing; do you remember that?

24 A. That's not what I said. I said they convey
25 the same information. Luminous intensity has a

1 different unit than luminous flux, but they both
2 represent the amount of light coming out of the LED.

3 Q. So I want to make sure I understand:
4 Luminous flux and luminous intensity are not the same
5 thing; correct?

6 A. They convey very similar information, but
7 they have different units.

8 Q. What type of information does luminous
9 intensity convey that is different from luminous flux?

10 A. So you can think of luminous intensity as
11 basically being the total amount of light coming out, as
12 measured in candela. And then luminous flux is the
13 light, how much light is in a particular what we call
14 solid angle or steradian. So it would have the candela
15 times steradian, which is basically one is talking about
16 the flux, one is talking about the total integrated
17 intensity.

18 Q. So you can't determine luminous flux from
19 just luminous intensity; correct?

20 A. If the proper solid angle for which it's
21 measured is known, you could.

22 Q. But you need more information, other than
23 just luminous intensity, in order to determine luminous
24 flux; correct?

25 A. That would be correct, yes.

1 (Exhibit 1022 was marked for
2 identification.)

3 BY MR. DAMARIO:

4 Q. I've sent Mr. Brown Exhibit 1022, which is
5 your declaration in IPR 2025-00260. My understanding is
6 that Mr. Brown will be forwarding that on to you. So if
7 you could let me know once you have that available, that
8 would be great.

9 MR. BROWN: I just forwarded it.

10 MR. DAMARIO: Thanks.

11 A. Still nothing. I've re-updated my folder
12 twice now. Nothing.

13 BY MR. DAMARIO:

14 Q. I can try putting it back in Messenger just
15 in case. We'll see if one reaches you faster than the
16 other.

17 A. It's doing the same thing. It shows "click
18 to download," and when I click it, nothing happens.

19 Q. Okay. Let's wait for Mr. Brown's e-mail to
20 come through.

21 MR. MCMAHON: Professor Doolittle, in case
22 it helps, when I click on the blue arrow, it turns to a
23 green checkmark and the file shows up in my downloads
24 folder. I don't know if that's different on your end.

25 THE WITNESS: I do not have it in my

1 downloads.

2 MR. BROWN: We can go off the record.

3 (A discussion was held off the record.)

4 BY MR. DAMARIO:

5 Q. Professor Doolittle, just to confirm, do
6 you have a copy of Exhibit 1022, which is your
7 declaration in support of IPR 2025-00260, available?

8 A. Yes, I do.

9 Q. Okay. I'd like to turn your attention to
10 paragraph 22 of your declaration. Let me know once
11 you're there.

12 A. I'm here.

13 Q. Paragraph 22 lays out a summary of your
14 invalidity positions in this declaration; is that
15 correct?

16 A. That is correct.

17 Q. And in particular, it lays out the three
18 grounds that you have described in your declaration; is
19 that correct?

20 A. That is correct.

21 Q. Okay. Grounds 2 and 3 are the only grounds
22 that challenge claims 11 through 14 of the '678 patent;
23 correct?

24 A. That is correct.

25 Q. And grounds 2 and 3 are the only grounds

1 described in your declaration that rely on the Stokes
2 reference; is that correct?

3 MR. BROWN: Objection.

4 A. In terms of this specific declaration,
5 grounds 2 and 3 do rely on Stokes. But I incorporate my
6 declaration from the previous claims in this as well.

7 BY MR. DAMARIO:

8 Q. Okay. And just to confirm for the record,
9 you're referring to Exhibit 1002, which is your
10 declaration in IPR 2024-01357?

11 A. I don't have the exhibit number with me.
12 If you'd like to send that one, I certainly can.

13 MR. DAMARIO: Fair enough. I'll send it
14 over. Let's go off the record. I want to make sure you
15 have a complete set of your declarations.

16 (A discussion was held off the record.)

17 BY MR. DAMARIO:

18 Q. For the record, Professor Doolittle, do you
19 have a copy of Exhibit 1002, which is your declaration
20 in support of IPR 2024-01357?

21 A. Yes.

22 Q. Okay. So turning back to Exhibit 1022,
23 which is your declaration in support of IPR 2025-00260,
24 we were talking about paragraph 22, which is a summary
25 of your invalidity positions. And in this declaration,

1 you discuss your opinions with respect to Claims 1, 11,
2 12, 13 and 14 of the '678 patent; correct?

3 A. Yes.

4 MR. BROWN: Objection.

5 A. I'm sorry. Can you repeat the question?

6 BY MR. DAMARIO:

7 Q. Yeah. So in Exhibit 1022, you provide your
8 opinions regarding Claims 1, 11, 12, 13 and 14 of the
9 '678 patent; correct?

10 MR. BROWN: Objection.

11 A. I provide my opinions about 11 through 14
12 and I incorporate my opinions about Claim 1 from my
13 previous declaration.

14 BY MR. DAMARIO:

15 Q. Your previous declaration, which is
16 Exhibit 1002, does not provide any opinion on Claims 11
17 through 14 of the '678 patent; correct?

18 A. 1002?

19 Q. If it would be helpful, I can refer you to
20 paragraph 87 of Exhibit 1002.

21 A. No, I was just trying to figure out how to
22 manage the screen. Because when I was clicking on the
23 bottom of the page, it wasn't going there. I apologize.
24 I'm with you now, Exhibit 1002.

25 Please repeat your question.

1 Q. Sure. Your declaration, which is
2 Exhibit 1002, which is your declaration in support of
3 IPR 2024-01357, does not incorporate any claims on the
4 '678 patent; correct?

5 A. I believe that's correct, yes.

6 Q. So I want to focus on your opinions of
7 Claims 11 through 14, which I understand are included
8 only in your declaration that is Exhibit 1022.

9 A. You cut out there at the beginning. I
10 think it's a simple question, but I want to make sure I
11 hear the whole thing.

12 Q. Sure. I would like to focus on
13 Exhibit 1022, which I understand is the only declaration
14 that you have submitted in this investigation that
15 opines on Claims 11 through 14 of the '678 patent. And
16 in particular, I want to direct you to paragraph 22 of
17 Exhibit 1022.

18 A. I'm with you.

19 Q. Okay. Ground 1 does not challenge Claims
20 11 through 14; would you agree with me?

21 A. Ground 1 focuses only on Claim 1, which 11
22 through 14 came from.

23 Q. Ground 1 also does not rely on the Stokes
24 reference, which is Exhibit 1008; agreed?

25 A. That is correct.

1 Q. Okay. Turning to Grounds 2 and 3, those
2 are the only two grounds where you opine on Claims 11
3 through 14 of the '678 patent; correct?

4 A. With the exception, obviously, of
5 incorporated parts of my 1002 declaration into those.

6 Q. I'm sorry. I'm not following there. So
7 Grounds 2 and 3 challenge Claims 11 through 14; correct?

8 A. Yes. But Claim 1 is also included in the
9 table there for Ground 3; right? Because I incorporate,
10 just as I did with Claim 1, Ground 1, I incorporate my
11 Exhibit 1002 into that discussion relevant to Claim 1,
12 which the others defend from.

13 Q. Okay. I'm just focusing on 11 through 14.
14 I'm not trying to ask any trick questions. I just want
15 to make sure that I understand your grounds for
16 challenging Claims 11 through 14 only. And my
17 understanding is that it is just Grounds 2 and 3 as
18 disclosed in Exhibit 1022.

19 Are there any other opinions where you
20 challenge Claims 11 through 14?

21 A. I believe that there are not.

22 Q. Okay. Thank you. And Grounds 2 and 3,
23 which challenge -- which are the only grounds that
24 challenge Claims 11 through 14 both rely on the Stokes
25 reference; correct?

1 A. Yes.

2 Q. Okay. So I'd like to talk about the Stokes
3 reference if we could. That's Exhibit 1008. Let me
4 know once you have that available.

5 A. I believe I'm with you.

6 Q. Okay. You're familiar with this reference?
7 I think you said you reviewed it prior to the
8 deposition; correct?

9 A. Yes.

10 Q. The goal of Stokes is to reduce the
11 directionality of the blue light LED chip in order to
12 reduce the halo effect; would you agree with me there?

13 MR. BROWN: Objection.

14 A. I think more generally, it just uses
15 light-scattering materials to improve uniformity. It
16 would be a little more generally that I would describe
17 it. The abstract, as far as I can tell, for example,
18 which normally would summarize the key aspects of what
19 the inventor thinks is the key aspects doesn't talk
20 about halos or any of that.

21 BY MR. DAMARIO:

22 Q. Okay. So I understand that you were
23 focusing on the abstract there. Maybe it would be
24 helpful if I directed you to portions of Stokes that
25 might help refresh your memory.

1 So I'm looking at Stokes Column 1, lines 37
2 to 38. Would you agree with me that Stokes Column 1,
3 lines 37 to 38 indicate that the halo effect and the
4 number effect are undesirable?

5 A. Stokes does make that statement, yes.

6 Q. Okay. Can you describe the halo effect and
7 the number effect?

8 A. Basically, these have to do with lights
9 being projected in essentially a circular pattern
10 instead of a Lambertian pattern. Obviously, the pattern
11 you'd want from an LED is a Lambertian effect where
12 there's uniform light in all directions. These are two
13 different terms that describe basically having a -- more
14 of a circular pattern.

15 Q. Okay. So the goal is definitely to have a
16 more uniform light pattern; is that right?

17 MR. BROWN: Objection.

18 A. It's a desirable goal in all cases -- in
19 almost all cases, I would imagine.

20 BY MR. DAMARIO:

21 Q. And Stokes indicates that the halo effect
22 and the penumbra effect are undesirable. I think we
23 talked about that earlier. Do you agree with that?

24 A. Yes. They would generally be undesirable.
25 I imagine there are some situations where you might

1 could use it. But, in general, it's something that you
2 want to avoid.

3 Q. Okay. And Stokes is attempting to mitigate
4 those two undesirable effects; correct?

5 A. I would say it's more general than that, as
6 I said before. You kind of characterized it as I'd need
7 to read it to remind me, and I don't think that's the
8 case. I think I just disagree with your
9 characterization. I think that this patent is more
10 generally approaching generating uniform light.

11 Q. Okay. And the way that Stokes addresses
12 the nonuniform light, or tries to make light more
13 uniform, excuse me, is -- strike that.

14 Would you agree with me that the halo
15 effect is due to the directional nature of the blue LED
16 light chip?

17 A. It certainly could be one source, yes.

18 Q. Okay. And, in fact, Stokes talks about the
19 halo effect being due to the directional nature of the
20 blue LED light chip; correct? I'm looking at Stokes
21 column 3, lines 51 to 57.

22 A. You broke up. I'm sorry.

23 Q. I'm sorry. I'll repeat the question.

24 Stokes indicates that the halo effect is
25 due to the directional nature of the blue LED chip. And

1 I'm looking at Stokes column 3, lines 51 through 57.

2 Would you agree with that statement?

3 A. I would make a slight distinction to what
4 you said. It says, "At present, inventors have realized
5 that one of the causes of the halo effect is the
6 directional nature of the blue LED emission."

7 So with that distinction, I would otherwise
8 agree.

9 Q. And would you agree that the inventors
10 are -- of Stokes are attempting to mitigate the
11 directional nature of the blue LED emission in order to
12 reduce the halo effect?

13 A. Well, as I said, I think this is just one
14 example of -- I think the halo effect is just one thing
15 they mention. I think, in general, it's more directed
16 toward making uniform illumination. So it's not -- I
17 mean, does it improve the uniformity? Yes. Does it get
18 rid of some of the halo effect? Yes. But the general
19 topic of this patent is to improve the general
20 uniformity of the light.

21 Q. Okay. And reducing the halo effect does
22 improve the general uniformity of the light; correct?

23 A. Well, there are some ways to reduce the
24 halo effect that wouldn't necessarily improve the
25 light -- the light uniformity in ways that you would

1 want to accept.

2 For example, you could lower the intensity
3 of the light or preventing as much blue light coming out
4 that wouldn't necessarily be a desirable way to do it,
5 because you could actually get rid of the halo, but you
6 also would get rid of some of your white coloring;
7 right.

8 So that's why I said that it's more
9 generally applicable to making a more uniform white LED.

10 Q. So do you disagree that the inventors of
11 Stokes were attempting to reduce the halo effect by
12 making light more uniform, light output more uniform?

13 A. Again, I'm saying that they're saying it's
14 more general than just the halo effect, was to increase
15 the uniformity of the LED, and while still maintaining
16 the color quality that you want. It's not one or the
17 other, it's both.

18 Q. Okay. And in order to -- let's stick with
19 your interpretation, which is to generally increase the
20 uniformity of the LED. Did I state that correctly?

21 A. Yes.

22 Q. Okay. So the inventors of Stokes were
23 generally interested in increasing the color uniformity
24 of the LED. In order to do that, they needed to
25 decrease the directional nature of the blue light LED;

1 would you agree with me there?

2 A. Again, with slight wording -- that's how
3 they chose to do it. I don't think that's necessarily
4 the only way to do it, but yes, that is how they chose
5 to do it.

6 Q. So Stokes discloses reducing directionality
7 of the blue light LED in order to --

8 A. You broke up again. I'm sorry. You broke
9 up again.

10 Q. Stokes discloses reducing the
11 directionality of the blue light LED in order to
12 increase the color uniformity of the LED output;
13 correct?

14 A. Could you repeat the first part of that
15 again? I apologize.

16 Q. Stokes discloses reducing the
17 directionality of the blue light LED in order to
18 increase the directionality of the light output;
19 correct?

20 A. Yes, I agree.

21 Q. Okay. And in order to do that, Stokes
22 places a diffusion layer in between the blue light LED
23 and the phosphor layer; correct?

24 A. That is correct, yes.

25 Q. So the diffusion layer is underneath the

1 phosphor layer in Stokes; correct?

2 A. That would be accurate. And I didn't rely
3 on the placement for my analysis. I only relied on the
4 figure that describes the scattering -- preferential
5 scattering of blue light.

6 Q. And if we look at Figure 5 of Stokes -- let
7 me know once you have that up.

8 A. I'm with you.

9 Q. So Figure 5 has three different, what I'll
10 call boxes. The bottom-most box is labeled "Element
11 43." That's the blue light LED; correct?

12 A. That is correct.

13 Q. Okay. And the middle box is "Element 46,"
14 which Stokes calls the scattering material. That's the
15 light-scattering layer; correct?

16 A. That is correct.

17 Q. And then the top-most box is "Element 45,"
18 which Stokes calls the luminescent material. That's the
19 phosphor layer; correct?

20 A. That would be correct.

21 Q. And all these layers in Stokes are stacked
22 on top of each other; correct?

23 A. They are -- one is above the other, as
24 shown in Figure 5.

25 Q. Okay. So an observer looking at the --

1 what I'll call the element of Stokes, which includes all
2 three of these layers, would see the top-most layer;
3 correct?

4 A. Just to be clear, you're talking about the
5 entire ensemble from Figure 5 labeled 41, you're saying
6 looking from the top down?

7 Q. That's correct.

8 A. And your question about that perspective
9 is, what, now?

10 Q. An observer looking from the top down would
11 see the phosphor layer; correct?

12 A. That would be correct in Stokes.

13 Q. The observer would not be able to directly
14 see the scattering material layer except through the
15 phosphor layer; correct?

16 A. It could -- depending on the thickness and
17 density and all that, you could see it, as you said,
18 through the phosphor layer. But you would be looking at
19 and facing the phosphor layer in Stokes.

20 Q. Okay. And, similarly, an observer would
21 not be able to see the blue light LED, except through,
22 first, the phosphor layer and then the scattering layer;
23 correct?

24 A. If they're looking from the top, I would
25 agree with that. Again, depending on, you know, the

1 density of the layers and other factors, you may not be
2 able to see the LED as you've suggested.

3 Q. Okay. But the phosphor layer is the
4 exterior coating in this Stokes filament; correct?

5 A. That would be correct.

6 MR. DAMARIO: Okay. We've been going for a
7 little bit. I realize some of that was off the record.
8 Let's take a break.

9 (A break was taken.)

10 MR. BROWN: Before the questioning started,
11 I did want to note that we received an order from the
12 Board during the break that says, "Cross-Examination of
13 Dr. Doolittle is strictly limited to the subject matter
14 of this declaration and will avoid repeating subjects
15 covered in his previous deposition in IPR 2024-01357."

16 And so I want to make sure it was clear on
17 the record that we have received that during the break.

18 MR. DAMARIO: Okay. I have not had an
19 opportunity to review that during the break, but I will
20 take your word for it that that includes the challenges
21 that are included to Claims 11 to 14, which is the new
22 material in IPR 2025-00260.

23 BY MR. DAMARIO:

24 Q. So Professor Doolittle, thank you for your
25 testimony thus far. I wanted to turn to the '678 patent

1 at Figure 7. My page is mixed up. Figure 7, if you
2 could let me know once you're there.

3 A. I'm with you.

4 Q. Okay. And just for your reference, there
5 is a corresponding description of Figure 7 in column 13
6 in the patent. I can direct you, if necessary, as we
7 discuss, but wanted to flag that for you. So let me
8 know once you're ready to proceed.

9 A. I'm ready to proceed. But I'll also note
10 that, once again, this figure refers to the large
11 particles that are discussed in the '678 patent and,
12 thus, have no bearing on the Claims 11 through 14, which
13 involve small particles and the preferential scattering
14 of blue light.

15 But feel free to proceed. I just want to
16 make that point, that the only data in '678 that refers
17 to anything to do with the small particles that are
18 relevant to 11 through 14 is the Figure -- I believe
19 it's 10, if I'm not mistaken, Figure 10.

20 But with that noted, feel free to ask
21 whatever you'd like.

22 Q. Well, your comment was very timely because
23 my next question was going to be: Can you tell me what
24 Figure 7 shows you?

25 A. I have lost the -- perhaps to save some

1 time, if you redirect me to the rows in column 13 that
2 you were wanting to reference.

3 Q. Sure. Let me make sure it's just column
4 13. So there's a portion that refers to Figure 7 at
5 column -- it refers to both Figure 6 and Figure 7 at
6 column 13, lines 26 through 32. And then it picks up at
7 column 13, line 52 through 66.

8 A. So speaking for just what the patent is
9 saying, this is, again, regarding the large particles,
10 not the ones relevant at all to Claims 11 through 14.

11 The Figure 7 shows corresponding measured
12 luminous efficacy versus CIE color change at an emission
13 angle of zero percent equals 60 degrees.

14 In a sense, what this is saying, that as
15 you improve the color uniformity, what-have-you -- sorry
16 -- the white count with this method, your total
17 efficiency, the total amount of light coming out is
18 going to be reduced.

19 Q. Sorry. Is that the luminous efficiency
20 that's being reduced?

21 A. Efficacy.

22 Q. Efficacy. Sorry, I misspoke. Just to
23 confirm --

24 A. You're breaking up again. Just to be
25 clear, it's luminous efficacy in Figure 7.

1 Q. Thank you, Professor Doolittle, for the
2 correction. Just to confirm --

3 A. Are you there?

4 Q. I'm sorry. There -- sorry. I wanted to
5 restate my question using the right word, efficacy, not
6 efficiency. So I was looking for the exact wording of
7 any previous question, but I'll just rephrase it from
8 memory.

9 Can you confirm that Figure 7 represents
10 luminous efficacy as charted against various levels of
11 titanium dioxide loading?

12 A. With one caveat, again: It's
13 large-particle not the sub-micron particles that are at
14 issue in Claims 11 through 14.

15 Q. You've said that a couple times. Can you
16 point me to something in the '678 patent that suggests
17 this is large particle versus other size particles?

18 A. Yes. It will take me a second, but I can
19 find it for you.

20 Q. Thanks.

21 A. So there's a statement in column 12
22 starting at line 29. "All emission color measurements
23 were measured at a distance of 10 m from the lamp, 10
24 for wavelength conversion components in which the light
25 diffusing layer comprises light diffractive particles of

1 TiO2 with an average particle size of 5 microns."

2 All right. So that's talking about all of
3 the measurements that are essentially radiometric
4 measurements in this patent.

5 The only reference, as far as I know, to
6 the -- to the relevant claims of 11 through 14 is what's
7 described in Figure 10, which is the one that was lifted
8 from the DuPont -- DuPont website or DuPont data sheets
9 or what-have-you.

10 All of this radiometric data, otherwise is,
11 according to that statement, is for 5 micron particle
12 size, which would not have a diffraction effect that
13 would prefer blue over any other color.

14 Q. Other than column 12, lines 29 through 33
15 that you referenced, are there any other portions of the
16 '678 patent that lead you to believe that Figure 7 is of
17 a specific particle size?

18 A. Column 3, for example, the bottom of the
19 column talks about particle sizes. "In one arrangement,
20 the light-diffractive material has an average particle
21 size in a range of 1 micron to 50 microns and more
22 preferably in a range 10 to 20 microns."

23 This is talking about -- I believe in this
24 section, it's talking about the phosphor. You asked
25 more general about the particle size there, so...

1 Q. Sorry. You're -- I didn't mean to
2 interrupt.

3 A. I apologize. It's talking about -- it is
4 talking about the light-diffractive particle size being
5 1 to 50 microns, 10 to 20 microns.

6 Q. And just to confirm, the reference that you
7 cited at the bottom of column 3, you're saying that that
8 relates to Figure 7?

9 MR. BROWN: Objection.

10 A. No. You asked if there are other places
11 that refer to the particle sizes being larger than
12 necessary to scatter blue light, preferentially.

13 BY MR. DAMARIO:

14 Q. Understood. Sorry. I didn't mean to
15 interrupt. Understood. So maybe that was my bad as far
16 as phrasing the question. So I'll rephrase.

17 With respect to Figure 7, we talked about a
18 citation in column 12 that you relied upon to suggest
19 that the particle sizes are large particle sizes. Are
20 there any other references in the '678 patent that lead
21 you to believe that the particle sizes in Figure 7 are
22 large particle sizes?

23 A. I just gave you the one in the bottom of
24 column 3. Are you asking for more? So there's two I've
25 given you. One says "all measurements" and then this

1 one specifically is talking about in the arrangements of
2 these particles here.

3 Q. So now I'm a little bit confused. I want
4 to double-check something. So at this bottom of column
5 3, you just said that that does not relate to Figure 7.
6 So I'm asking strictly about Figure 7. Is there
7 anything in the '678 patent that leads you to believe
8 that there are specific large particle sizes associated
9 with Figure 7?

10 A. I've already answered that and said that --
11 I've quoted you the reference that says all the
12 radiometric measurements, all measurements. Everything
13 measured here is for 5 micron particle sizes, is what it
14 says.

15 Q. Okay.

16 A. That's not me saying it, that's the patent
17 saying it. Now if you're asking for more general
18 statements, yes, in the summary of the invention in the
19 first part, it talks about -- and the bottom of column
20 3, it confirms that it's talking about particle sizes
21 for 1 to 50 microns, and preferably in a 5 to 20 micron
22 range, there are other references that are similar to
23 that, if I'm not mistaken.

24 I can continue scanning if you'd like to
25 find more of those. But certainly the one that says all

1 covers all.

2 Q. Okay. I wanted to make sure that I didn't
3 talk over you. I realize I did that a couple times
4 throughout the questions, so apologies.

5 So I've got the reference in column 12, you
6 also reference the reference in column 3, and a
7 reference from the background section. Is there
8 anything else in the '678 patent that leads you to
9 believe that Figure 7 is related to large particle
10 sizes?

11 A. Consistent with the all meaning all, on
12 column 8, there's a statement that says, "In one
13 arrangement, the average particle size of the
14 light-diffractive material is in a range -- 5 micron to
15 50 microns range."

16 In other words, it's basically saying over
17 and over again that all the data they're showing is for
18 large particle sizes. But based on this lifted -- if it
19 was an academic, I would say plagiarized, but I don't
20 know what you call it in patent literature.

21 But this comment here or whatever you want
22 to call it in Figure 10 from the DuPont thing there
23 suggesting that you can use smaller sizes. But the data
24 for all these radiometric figures, as I just said, all
25 meaning all in that statement I read earlier is all for

1 large particle sizes.

2 Q. Okay.

3 A. There's a reference here for phosphor
4 materials, if you want to go into that. But I think
5 we're just specifically talking about the -- the
6 light -- the diffracting -- the light-diffusing layer.

7 Q. Does Figure 7 refer to particle sizes in
8 the phosphor layer?

9 A. No, it's TiO₂.

10 Q. Okay. Looking at Figure 7, I just want to
11 confirm three data points with you. So let me know once
12 you've got Figure 7 up.

13 A. I'm with you.

14 Q. Okay. So at the 10 percent -- do you see
15 the 10 percent titanium dioxide loading --

16 A. Yes.

17 Q. -- point? Thank you.

18 I just want to confirm that at 10 percent
19 titanium dioxide loading, there is a corresponding
20 decrease in luminous efficiency of about 2 percent?

21 A. Efficacy, but yes.

22 Q. All right. I -- let me rephrase that
23 because that's the second time I made that mistake.

24 So can you please confirm that at
25 10 percent titanium dioxide loading, there's a

1 corresponding decrease in the luminous efficacy of about
2 2 percent?

3 A. Of about 2 percent; slightly larger, but
4 yes, about.

5 Q. Okay. And do you see the 15 percent
6 titanium dioxide loading point?

7 A. Yes.

8 Q. Can you confirm that at 15 percent titanium
9 dioxide loading, there is a corresponding decrease in
10 luminous efficacy of about 5 percent?

11 A. In that ballpark, yes.

12 Q. And can you further confirm that at the
13 20 percent titanium dioxide loading, there's a
14 corresponding decrease in luminous efficacy of about
15 9 percent?

16 A. It's closer to 9 -- yeah, 8 to 9. It's
17 closer to 8 than 9, but yes in that ballpark.

18 Q. Okay. One last question, because I want to
19 make sure. I made the mistake a number of times, but
20 can you please explain the difference between efficacy
21 and efficiency as it relates to the '678 patent?

22 A. I would just describe it as they describe
23 basically the same basic idea, which is how much light,
24 basically, what is the -- you can think of it as
25 efficiency, but the term that's used is efficacy. If

1 it's simpler for you to understand it in terms of
2 efficiency, I'm fine with that explanation.

3 Q. So is efficacy more of a standard industry
4 term, but it means the same thing as efficiency or --

5 A. More or less. There are some subtleties
6 that I think, for the purposes of this proceeding,
7 that's a fair statement to say.

8 MR. DAMARIO: Okay. Thank you. All right.
9 I am pretty close to finished right now so I'm going to
10 take a quick break. But -- and I will keep it to quick
11 this time. So let's go off the record.

12 (A break was taken.)

13 BY MR. DAMARIO:

14 Q. Professor Doolittle, thank you so much for
15 your testimony today.

16 Two quick questions for you: During any of
17 the breaks, did you have any discussions with counsel
18 regarding the substance of your testimony?

19 A. No discussions at all.

20 Q. And during your testimony, did you have any
21 communications with anyone?

22 A. No.

23 MR. DAMARIO: All right. Thank you very
24 much. I'll pass the witness.

25 MR. BROWN: No redirect. So we're all

1 good.

2 THE REPORTER: For transcript orders, I
3 think I have a note for an expedite for --

4 MR. DAMARIO: Yes, we had an expedite and
5 would like a rough draft.

6 MR. BROWN: I don't need an expedite for
7 mine.

8 (The deposition concluded at 12:58.)
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CERTIFICATE OF REPORTER

I, Celena D. Davis, Registered Professional Reporter and Certified Shorthand Reporter within and for the State of Illinois do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was taken by me to the best of my ability and thereafter reduced to typewriting under my direction; that I am neither counsel for, related to, nor employed by any of the parties of the action in which this deposition was taken, and further, that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of the action.



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CERTIFICATE OF SHORTHAND REPORTER - NOTARY PUBLIC

I, CELENA D. DAVIS, Certified Reporter and Notary Public within and for the State of Illinois do hereby certify:

That WILLIAM A. DOOLITTLE, Ph.D., the witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken before me and is a true record of the testimony given by such witness.

I further certify that the adverse party, Savant Technologies, was represented by counsel at the deposition.

I further certify that the deposition of WILLIAM A. DOOLITTLE, Ph.D. occurred via Zoom videoconference on Friday, July 18, 2025 commencing at 10:01 a.m. to 12:58.

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

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of July, 2025.
My commission expires:
May 31, 2027.



Notary Public