



Planet Depos®
We Make It *Happen™*

Transcript of Dr. Marc Sims

Date: July 31, 2025

Case: Samsung Display Co., Ltd. -v- Pictiva Displays International Ltd. (PTAB)

Planet Depos

Phone: 888.433.3767 | **Email:** transcripts@planetdepos.com

www.planetdepos.com

Michigan #8598 | Nevada #089F | New Mexico #566

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

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

SAMSUNG DISPLAY CO., LTD.,	)	
	)	
Petitioner,	)	
	)	CASE NO. IPR2024-01093
v.	)	PATENT NO. 8,723,64
	)	
PICTIVA DISPLAYS INTERNATIONAL	)	
LTD.,	)	
	)	PAGES 1 - 113
Patent Owner.	)	
	)	
	)	

DEPOSITION OF DR. MARC SIMS
Thursday, July 31, 2025
NEWPORT BEACH, CALIFORNIA

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

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

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

SAMSUNG DISPLAY CO., LTD.,)
)
Petitioner,)
) CASE NO. IPR2024-01093
v.) PATENT NO. 8,723,64
)
PICTIVA DISPLAYS INTERNATIONAL)
LTD.,)
) PAGES 1 - 113
Patent Owner.)
)
)
_____)

Deposition of Dr. Marc Sims, taken on behalf of the
Petitioner Pursuant to Notice at 840 Newport Center
Drive, Suite 400, Newport Beach, California, commencing
at 9:34 a.m., on Thursday, July 31, 2025, before Lindsay
Anne Stoker, an NCRA Registered Diplomate Reporter,
Registered Merit Reporter, Certified Realtime Reporter,
Certified Realtime Captioner, and Certified Shorthand
Reporter No. 14373 in and for the State of California.

A P P E A R A N C E S

--oOo--

APPEARING ON BEHALF OF THE PETITIONER SAMSUNG DISPLAY
CO., LTD.:

COVINGTON & BURLING LLP

BY: HYUN S. BYUN, ESQ.

BY: SCOTT C. WEIDENFELLER, ESQ.

3000 El Camino Real

5 Palo Alto Square

10th Floor

Palo Alto, CA 94306

Telephone: 650.632.4707

Email: Hbyun@cov.com, sweidenfeller@cov.com

APPEARING ON BEHALF OF THE DEFENDANT PICTIVA DISPLAYS
INTERNATIONAL LTD.:

IRELL & MANELLA LLP

BY: HONG (ANNITA) ZHONG, ESQ.

1800 Avenue of the Stars

Los Angeles, CA 90067

Telephone: 310.203.7183

Facsimile: 310.203.7199

Email: Hzhong@irell.com

IRELL & MANELLA LLP

BY: JONATHAN M. LINDSAY, ESQ.

840 Newport Center Drive

Newport Beach, CA 92660

Telephone: 949.760.5220

Facsimile: 949.760.5200

Email: Jlindsay@irell.com

APPEARANCES CONTINUED:

ALSO PRESENT:

Dr. Russell Holmes

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

INDEX

WITNESS: DR. MARC SIMS

PAGE

EXAMINATION BY MR. BYUN	6
EXAMINATION BY MS. ZHONG	87
EXAMINATION BY MR. BYUN	102

EXHIBITS

NUMBER	DESCRIPTION	PAGE
EXHIBIT 1001	U.S. Patent No. 8,723,164 B2 (filed May 18, 2009) (issued May 13, 2014).	8
EXHIBIT 1101	Yingjie Zhang et al., Triplet-Induced Degradation: An Important Consideration in the Design of Solution-Processed Hole Injection Materials for Organic Light-Emitting Devices, 48 Organic Electronics 217 (2017).	67
EXHIBIT 1102	The interchain origin of the green emission band in oxidized poly.	80
EXHIBIT 2019	Declaration of Dr. Marc Sims, Samsung Display Co. V. Pictiva Displays Int'l Ltd., IPR2024-01093 (P.T.A.B. filed under seal).	7

1	PREVIOUSLY MARKED EXHIBITS	
2	NUMBER	PAGE
3	EXHIBIT 1004	93
4	EXHIBIT 1006	61
5	EXHIBIT 1007	79
6	EXHIBIT 2001	58
7	EXHIBIT 2029	77
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

1 NEWPORT BEACH, CALIFORNIA

2 Thursday, July 31, 2025, 9:34 a.m.

3 THE REPORTER: Let's go ahead and go on the
4 record, and we will begin with appearances.

5 MR. BYUN: Okay. I am Hyun Byun, representing
6 Petitioner Sampson display, and joining me is my
7 colleague, Scott Weidenfeller, also from Covington,
8 and Dr. Russell Holmes.

9 MS. ZHONG: This is Anita Zhong representing the
10 patent owner. Together with me online is
11 Mr. Jonathan Lindsay, also representing the patent
12 owner.

13 THE REPORTER: With that, my name is Lindsay
14 Stoker. My CSR number is 14373.

15 Will you please raise your right hand?

16 THE WITNESS: Yes.

17 DR. MARC SIMS,
18 called as a witness, having been first duly sworn,
19 was examined and testified as follows:

20 BY MR. BYUN:

21 Q. Dr. Sims, have you been deposed before?

22 A. I have not.

23 Q. Okay. So today, I'll ask you a series of
24 questions. You can provide answers. When you
25 provide your answers, please provide a verbal

1 response so that we can have a clear transcript.

2 Would that be okay?

3 A. Yes, that's fine.

4 Q. And during your questioning, let me know if
5 you need a break, and I'll try to accommodate you.
6 I'll just ask that when there's a pending question,
7 please give that answer, and then we can take a
8 break.

9 A. Okay.

10 Q. You were just sworn in. You understand
11 that you are obligated to tell the truth the same as
12 if you were testifying in a courtroom?

13 A. Yes, I understand that.

14 Q. Is there any reason you cannot give
15 truthful answers today?

16 A. There's no reason I can't give truthful
17 answers. I will certainly try to answer, you know,
18 to the best of my ability, interpreting the
19 questions in the way that they were intended.

20 MR. BYUN: I am handing you Exhibit 2019,
21 declaration of Dr. Marc Sims, dated May 5th, 2025.
22 I note that the stamp provided by the patent owner
23 contains a typographical error shown as EX219, but
24 this is a copy of Exhibit 2019.

25 (Exhibit 2019 was marked for

1 identification.)

2 BY MR. BYUN:

3 Q. Do you recognize Exhibit 2019?

4 A. Yes, I do.

5 Q. What is it?

6 A. This is my declaration.

7 Q. You signed this document; correct?

8 A. Yes.

9 Q. Are you aware of any errors in
10 Exhibit 2019?

11 A. I am not, beyond -- beyond typographical
12 errors or something like that, beyond, you know,
13 potential spelling mistakes or things like that,
14 there's no errors that I'm aware of.

15 (Exhibit 1001 was marked for
16 identification.)

17 MR. BYUN: I am handing you Exhibit 1001, which
18 is U.S. Patent Number 8,723,164.

19 BY MR. BYUN:

20 Q. Do you recognize Exhibit 1001?

21 A. Yes, I do.

22 Q. You refer to Exhibit 1001 as the '164
23 patent in your declaration; correct?

24 A. That's right.

25 Q. I will also refer to Exhibit 1001 as the

1 '164 patent.

2 In the context of the '164 patent, what does the
3 term "organic functional layer" refer to?

4 A. It's a layer inside an electronic device.

5 Q. Any electronic device?

6 A. Could be an OLED device.

7 Q. Is any layer inside an OLED device an
8 organic functional layer?

9 A. It can be, yes. Any layer can -- can be
10 one of those inside an OLED device.

11 Q. What do the terms "organic functional"
12 indicate in the term "organic functional layer"?

13 MS. ZHONG: Objection; form.

14 THE WITNESS: Can you repeat that?

15 BY MR. BYUN:

16 Q. So in the phrase "organic functional
17 layer," what do the terms "organic functional"
18 indicate?

19 A. They indicate that the layer comprises of
20 organic compounds and that they have an electronic
21 function in the device.

22 Q. What is a layer in this context?

23 A. A layer is -- so within the context of an
24 OLED, OLEDs are typically -- they typically comprise
25 of multilayer structures. So several layers stacked

1 on top of one another to give desired functionality.

2 Q. How do you tell whether something is a
3 layer or not in an OLED that comprises
4 multilayer components?

5 MS. ZHONG: Objection; scope.

6 THE WITNESS: Are you able to be more specific?

7 BY MR. BYUN:

8 Q. So OLEDs can contain multiple layers;
9 correct?

10 A. Yes.

11 Q. What is a layer in that context?

12 A. It's a, like I mentioned before, if -- they
13 are normally made of a stack of materials, of a
14 stack of layers, and those layers comprise the
15 materials. And, overall, the -- the stack has some
16 sort of desirable functional property output. So --
17 yeah.

18 Q. Uh-huh. So when you look at an OLED
19 device, how do you tell what is one layer?

20 MS. ZHONG: Objection; form, scope.

21 THE WITNESS: Well, you know, are you able to
22 specify -- it is very, very complicated. There's
23 very many ways you can make an OLED. So, you know,
24 if it's solution process, if it's evaporated, those
25 are all different processes that can be used, and

1 the layers can be -- can be more discrete in some
2 cases than others. There can be, you know, mixing
3 involved and stuff, and sometimes layers can merge.
4 And so it really depends on exactly what type of
5 structure you are talking about.

6 BY MR. BYUN:

7 Q. Got it. Let's start with
8 "Solution-Processed OLED Device." In a
9 solution-processed OLED device, how can you
10 determine what is a single layer?

11 A. You -- in the end, you might be able to,
12 but you might not. It really depends on the
13 specific details of how it is processed. Your best
14 guess can be that -- you know, you would do a
15 step-by-step deposition process. So you'd say,
16 like, the first step may constitute one layer, the
17 second step may constitute another layer, the third
18 step, etc., etc.

19 But you cannot tell afterwards necessarily that
20 those end up being discrete layers, just depending
21 on what -- how the thing was processed. You know,
22 there's many, many steps that go into it -- into
23 the -- into the formation of the final device.

24 So, nominally, I mean, I could say -- I think I
25 could say, nominally, you think you have a, like, a

1 whole injection layer, followed by a whole transport
2 layer --

3 (Reporter Clarification.)

4 THE WITNESS: A whole transport layer, and then,
5 you know, you can have emissive layer, an ETL layer.
6 But whether they end up as a discrete ensemble of
7 each of those layers is not necessarily something
8 that's -- that's clear.

9 MS. ZHONG: You might want to speak slowly
10 because it's very technical and the court
11 reporter --

12 (Reporter Clarification.)

13 BY MR. BYUN:

14 Q. So in a solution-processed OLED, each
15 deposition step corresponds to a layer, but that may
16 not be obvious when you look at the final product?

17 A. That's --

18 MS. ZHONG: Objection; misstates the testimony.

19 THE WITNESS: Well, like I said, basically,
20 it's -- it can end up -- depending on exactly how it
21 was handled, how the device was made. Some people
22 may do it in one way; other people may do it in
23 another way. It really depends on the specific
24 process.

25 MR. BYUN: Counsel, I would ask you that you

1 limit your objections to form. I don't think that
2 is responsive.

3 BY MR. BYUN:

4 Q. I don't think that is responsive. Let me
5 restate the question.

6 So in a solution-processed OLED, each deposition
7 step corresponds to a layer, but it may not be
8 obvious when you look at the final product?

9 MS. ZHONG: Objection; form, scope, asked and
10 answered.

11 MR. BYUN: Counsel, I -- again, I would ask you
12 to limit your objections to form.

13 MS. ZHONG: Well, scope, asked and answered are
14 also appropriate.

15 THE WITNESS: Can you point to something inside
16 my declaration that -- that discusses
17 solution-processed OLEDs in detail?

18 MR. BYUN: I am asking you a general question
19 based on your knowledge.

20 MS. ZHONG: Well, this is supposed to be
21 cross-examination related to his declaration. So he
22 asked you to clarify what is related to his
23 declaration.

24 MR. BYUN: Well, his declaration is related to
25 the '164 patent, and the '164 patent uses the term

1 "organic functional layer," and I am entitled to ask
2 him questions about what that means.

3 MS. ZHONG: Okay. So you want him to construe
4 the term, right, which is not something he did in
5 his declaration?

6 MR. BYUN: No. I'm just asking him what his
7 understanding is of the term "organic functional
8 layer."

9 MS. ZHONG: Okay.

10 MR. BYUN: And --

11 MS. ZHONG: He already answered that question
12 earlier on when you asked what the organic
13 functional layer means. But go ahead, you can ask
14 the question.

15 BY MR. BYUN:

16 Q. Okay. So in a solution-processed OLED,
17 each deposition step refers to a layer, but it may
18 not be obvious when you look at the final product;
19 is that correct?

20 MS. ZHONG: Objection; form, scope, and asked
21 and answered.

22 THE WITNESS: Yeah, I -- I'm -- are you -- are
23 you able to give me some context from my -- from my
24 declaration? You know, which part of my declaration
25 deals with -- with solution-processed OLEDs?

1 BY MR. BYUN:

2 Q. Can you go to Exhibit 2019, Paragraph 9?

3 A. That one was my declaration, yep.

4 Q. Yep.

5 A. Okay, yes.

6 MS. ZHONG: Hold on one minute. Which exhibit?

7 MR. BYUN: Exhibit 2019.

8 MS. ZHONG: You said paragraph 9?

9 MR. BYUN: Yep.

10 MS. ZHONG: Hold on one minute. Where does
11 "organic functional layer" appear in this paragraph?

12 MR. BYUN: Well, I'll be asking the questions.

13 BY MR. BYUN:

14 Q. So you worked at DuPont?

15 A. I did, yeah.

16 Q. Okay. And at DuPont, you developed
17 solution-processed OLEDs?

18 A. Yes, solution-processed OLED materials,
19 yep.

20 Q. Okay. And the last sentence in paragraph
21 9, you mentioned emissive layer.

22 Do you see that?

23 A. Uh-huh.

24 Q. What is an emissive layer?

25 A. An emissive layer is where excitons are

1 formed and, ultimately, radiate light from the
2 device.

3 (Reporter Clarification.)

4 BY MR. BYUN:

5 Q. And how do you determine what is an
6 emissive layer in a solution-processed OLED?

7 A. Well, that's determined before the fact,
8 during the deposition step. So you -- you design
9 one and you deposit it on top of your XTL layer.

10 Q. You're familiar with evaporation-processed
11 OLEDs also?

12 A. Yes, I am.

13 Q. And how do you determine what is an
14 emissive layer in an evaporation-processed OLED?

15 MS. ZHONG: Objection; scope and form.

16 Counsel, can you explain how that is related to
17 his declaration, and to the extent you are trying to
18 get some sound bites for infringement purposes, that
19 is totally inappropriate.

20 MR. BYUN: I am entitled to ask my questions. I
21 would ask your counsel to limit your objections to
22 form.

23 MS. ZHONG: Yeah, and I am entitled to know what
24 it is related to. When I say "scope," it is
25 irrelevant. Can you explain?

1 MR. BYUN: I don't need to argue with you.

2 MS. ZHONG: Well, I asked you, so you need to
3 respond to me.

4 MR. BYUN: I am the one asking the questions
5 here, Counsel.

6 MS. ZHONG: I think the guide provides that if
7 I -- if the opposing counsel asks you to explain the
8 relevance, the question and answer is supposed to
9 provide a response.

10 MR. BYUN: The term "organic functional layer"
11 is a term that the expert, Dr. Sims, contests in
12 terms of what's included and whether that's met by
13 the reference. So it is relevant to the IPR.

14 MS. ZHONG: Okay. You are completely
15 misrepresenting the declaration. The dispute is
16 what constitutes matrix materials.

17 MR. BYUN: And I disagree with you.

18 MS. ZHONG: Okay.

19 MR. BYUN: Matrix material is part of the matrix
20 and the layer, so they are part of the dispute.

21 MS. ZHONG: Okay. And did he provide any claim
22 construction for organic functional layer in his
23 declaration?

24 MR. BYUN: He has opined on the meaning of
25 "layer" and "matrix," and I'm entitled to know that.

1 MS. ZHONG: Okay. Where did he opine the
2 meaning of the term "layer"? That's my scope
3 objection, if you can let me know. And I think that
4 will also direct Dr. Sims as to the relevance to his
5 declaration.

6 BY MR. BYUN:

7 Q. As an example, paragraph 40 of
8 Exhibit 2019.

9 A. I have it, yep.

10 Q. And the second sentence, Dr. Sims, states
11 that, for example, the '164 patent states that
12 emission layers thereby have a matrix material --

13 MS. ZHONG: Uh-huh.

14 MR. BYUN: -- which is doped with meter
15 molecules.

16 And I am entitled to understand Dr. Sims'
17 understanding of the terms "emission layers," as
18 well as "matrix materials," and also "matrix."

19 MS. ZHONG: Okay. But that's "emission layer,"
20 right, not "organic functional layer" or "layer" in
21 general; correct?

22 Go ahead and ask the question. I am just
23 pointing out you're going outside of the declaration
24 scope, but go ahead. In the interest of time, I
25 will let it go forward.

1 BY MR. BYUN:

2 Q. Dr. Sims, let me restate the question or
3 repeat the question.

4 A. Sure.

5 Q. How do you determine what is an emissive
6 layer in an evaporation-processed OLED?

7 MS. ZHONG: Objection; form, scope.

8 THE WITNESS: What does it mean to determine --
9 what does "determine" mean?

10 BY MR. BYUN:

11 Q. How do you identify -- how do you know what
12 is an emissive layer in an evaporation-processed
13 OLED?

14 MS. ZHONG: Objection; form, scope.

15 THE WITNESS: I mean, I think that -- it's the
16 same -- I don't understand what it is to determine.
17 You actually -- you put down an emissive layer, so,
18 you know, that's part of the -- that's a process
19 step. So there's no determination of it. It's
20 just -- it is what it is.

21 BY MR. BYUN:

22 Q. Is an emission layer an organic functional
23 layer?

24 A. I think, largely, yes, it can be.

25 Q. In the context of the '164 patent, what

1 does the term "matrix" refer to?

2 A. It refers to materials that are not the --
3 an emitter material that are in the emissive layer.

4 Q. In the context of the '164 patent, what
5 does the term "matrix" material refer to?

6 A. I believe I just answered that question.

7 Q. The previous question was regarding the
8 term "matrix," as opposed to a matrix material. Are
9 you saying that those two terms are synonymous?

10 A. Let me check. So I -- I thought you had
11 said "matrix material." That's why I said -- that's
12 why I excluded emitter material from that
13 definition.

14 Q. Got it. So the -- just so the record is
15 clear, I can ask you -- ask you the question again.

16 A. Yes, you can ask it again.

17 Q. In the context of the '164 patent, what
18 does the term "matrix" refer to?

19 MS. ZHONG: Objection; form, scope.

20 THE WITNESS: A matrix is -- is interchangeably
21 used as a host in the emissive layer in the context
22 of '164. And, you know --

23 BY MR. BYUN:

24 Q. What is a host?

25 A. A host is also a matrix material. It

1 comprises part of the emissive layer, and it's not
2 an emitter, one of the emitter materials. It forms
3 the bulk material in the emissive layer, the bulk of
4 the -- the content of the emissive layer. It can be
5 used interchangeably with "matrix material."

6 Q. So what is a matrix, then?

7 A. It's the surrounding medium of an emitter
8 molecule, and it's there to ensure that the emitter
9 molecules are separate from one another, and it can
10 participate in charged transport.

11 Q. Okay. In the context of the '164 patent,
12 what does the term "matrix material" refer to?

13 A. It refers to a material in a more or less
14 continuous phase and into which other materials can
15 be embedded.

16 Q. What do you mean by "continuous phase"?

17 A. It's not discontinuous, so it can -- it's
18 continuous.

19 Q. Does that mean that the molecules are
20 adjacent to each other?

21 MS. ZHONG: Objection; form.

22 THE WITNESS: Can you potentially rephrase that,
23 please? It can -- I mean, it can do. It's not --
24 it can mean that they are in close proximity to one
25 another.

1 BY MR. BYUN:

2 Q. Can a material be both in continuous phase
3 and also have its molecules be separated from each
4 other?

5 MS. ZHONG: Objection; form.

6 THE WITNESS: Can you repeat that, please?

7 BY MR. BYUN:

8 Q. Suppose you have a material that is in
9 continuous phase. You look at the molecules of the
10 material. Are they touching each other, or are they
11 separated from each other?

12 MS. ZHONG: Objection; form.

13 THE WITNESS: I mean, I think that -- I mean,
14 that's -- I mean, how could they be separate from
15 one another? Would they be in space, in a vacuum,
16 or -- I mean, there's a certain -- you know, there's
17 a cohesion to any material system. So a continuous
18 layer is one in which, you know, you are limited by
19 Van der Waals interactions between each of the
20 interactions, and they will be continuous throughout
21 some element in space, you know.

22 So you wouldn't say an emitter or a dopant is
23 continuous. You would say that that's more likely
24 discontinuous. The same goes for host and a
25 dopant -- or a host and a guest, sorry.

1 BY MR. BYUN:

2 Q. So in a continuous-phase material, you
3 would expect there to be distances between its
4 molecules, correct?

5 A. Hopping distances, yes, a very close, a
6 matter of angstroms.

7 Q. Okay. So if the molecules are close to
8 each other, it is continuous; if they're not, it is
9 discontinuous?

10 A. What does "close" mean? Can you give me
11 some --

12 Q. I'm just trying to understand what you mean
13 by "continuous phase" and how a continuous phase is
14 different from a discontinuous phase. Can you
15 explain?

16 A. Well, this -- I thought I did.

17 So, yeah, continuous is that, you know, it is
18 some -- like molecules might be, sort of, angstroms
19 apart, all the way through some element of space.

20 And so discontinuous phase would be that, let's
21 say, for the sake of the argument, it is more than a
22 whole molecular spacing in between the discontinuous
23 elements.

24 Q. What do you mean by "more or less
25 continuous phase"?

1 A. Well, it's not -- we're not talking about a
2 crystal. We're talking about amorphous material.
3 So there's actually a range of intermolecular
4 distances between those molecules. So --

5 Q. What does it range?

6 A. It depends on the system, really. You
7 know, the polymer system, it's probably a broader
8 range than in a small molecule system, but still,
9 it's not a -- neither of the systems I'm talking
10 about are crystals.

11 Q. Can you give me a range in terms of order
12 of magnitudes?

13 A. It would depend on the system. Yeah, I
14 mean, you would have to tell me what kind of
15 molecules you're thinking about.

16 Q. How about in a solution-processed OLED
17 system?

18 A. So would that be a polymer or a small
19 molecule?

20 Q. Polymer.

21 A. Okay. Sort of intermolecular hopping
22 distances can be on the order of, sort of -- maybe
23 three, four angstroms would be an average distance,
24 and then there would be some sort of Gaussian wings
25 to that intermolecular hopping distance.

1 And the width of that Gaussian depends on the
2 process, the specific processing of the polymer. So
3 different enabling steps and what have you,
4 different temperatures, can induce more or less
5 order, which will change the width of that Gaussian
6 distribution of hopping distances.

7 Q. How about solution-processed small-molecule
8 systems?

9 A. Well, I don't want to, you know, speak
10 generally about that, but -- because it is a little
11 difficult, but I would say that usually the spread
12 of hopping distances is reduced compared to the
13 polymer systems.

14 And if they're solution-processed, which is why
15 I asked that before, they may be -- you know, that
16 spread of distances may be greater than in an
17 evaporated case, where they tend to order themselves
18 a little more, but not to the extent they are
19 crystallizing.

20 Q. How about evaporation-processed polymer
21 OLED systems?

22 A. That's something that a POSITA wouldn't
23 attempt to do.

24 Q. How about evaporation-processed
25 small-molecule OLEDs?

1 A. What's the question? How about -- with
2 respect to what?

3 Q. What would be the distance between
4 molecules in an evaporation-processed small-molecule
5 OLED device when they're in a continuous phase?

6 A. Well, that's very, very --

7 MS. ZHONG: Objection.

8 Just slow down a little bit and let me put in my
9 objection before you answer.

10 Objection; form and scope.

11 THE WITNESS: I can't give a specific number on
12 that. It is too vague a question. But, like I
13 mentioned before, compared to the solution-processed
14 small-molecule system, I would say, to the best of
15 my judgment, that when you evaporate these things,
16 they will tend to be a little closer together than
17 when you solution process the same molecule, same
18 molecular systems. But, you know, we're talking
19 angstroms' matter of something, but I can't commit
20 to a number.

21 BY MR. BYUN:

22 Q. So when you evaporation process small
23 molecules, would you expect them to be in a
24 continuous phase?

25 A. If it's -- are you talking about a single

1 material, evaporating a single modular entity?

2 Q. Yes.

3 A. Yes, I would.

4 Q. How about if you're evaporating multiple
5 materials at the same time?

6 A. That really depends on the evaporation
7 rates that each of those different molecular
8 entities are deposited at. So you need to provide
9 me with that information.

10 Q. Can you turn to the '164 patent, please?

11 A. Yeah.

12 Q. Please go to column 7, lines 21 to 30.

13 MS. ZHONG: Which lines?

14 THE WITNESS: 21 to 30, was it?

15 MR. BYUN: Correct. I will give you a moment to
16 read that passage. Let me know when you're done.

17 THE WITNESS: Yeah, thanks.

18 MS. ZHONG: Which column?

19 THE WITNESS: Column 7; is that right?

20 MR. BYUN: Correct.

21 THE WITNESS: So I've read from 21 to 30.

22 BY MR. BYUN:

23 Q. This passage discloses an example emission
24 layer with three matrix materials; correct?

25 A. Yes, it does.

1 Q. And in this example, the first matrix
2 material is mCP, correct?

3 A. Yep.

4 Q. And at lines 24 and 25, it states, "The
5 second matrix material, the whole transport
6 material, can be TCTA"; correct?

7 A. Yes.

8 Q. At lines 27 and 28, it states, "The third
9 matrix material, the electron transport material,
10 can be, for example, TBPI"; correct?

11 A. Yeah, that's what it states.

12 Q. And turn to column 3, lines 17 to 34,
13 please.

14 A. Read that?

15 Q. Yeah. Please take a moment to read it, and
16 let me know when you're done.

17 A. Sorry, 17 to 25, did you say?

18 Q. 17 to 34, line 34.

19 A. Yep, I read that.

20 Q. So this passage explains that there are
21 distances between charge carrier transporting
22 molecules; correct?

23 A. Yes, it does.

24 Q. And it's talking about adjusting the
25 distances using the host material; is that right?

1 A. Matrix materials, yes.

2 Q. So in this passage, there are three matrix
3 materials: The first, second, and third matrix
4 materials; correct?

5 A. Yes, that's right.

6 Q. And the second and the third matrix
7 materials are the charge transport materials;
8 correct?

9 MS. ZHONG: Objection; form.

10 THE WITNESS: They are involved with charged
11 transport. They are involved with charged
12 transport.

13 BY MR. BYUN:

14 Q. Are any of these three matrix materials
15 host materials?

16 A. They could be called host materials.

17 Q. All three?

18 A. They can be, yes.

19 Q. Are they in this passage?

20 A. Sorry, can you repeat the question?

21 Q. Are all three matrix materials in this
22 passage host materials?

23 A. Well, it doesn't say anything about host
24 materials.

25 Q. Okay.

1 A. I think it's fair, in this example, to use
2 the terms fairly interchangeably.

3 Q. So you interpret this passage as saying
4 that there are three host materials?

5 A. I don't think I need to. I think it's okay
6 to say there's three matrix materials, like it says
7 in the text.

8 Q. So you don't interpret this passage as
9 saying that there are three host materials?

10 A. I don't think it needs to be interpreted
11 that way. It is quite plainly written to be three
12 matrix materials, but it could be, you know, if you
13 want, you know. I don't think it helps or hinders
14 the understanding of what they're doing.

15 Q. What's the difference between a matrix
16 material and a host material?

17 A. I don't believe there is necessarily a
18 difference.

19 Q. So your testimony is that they're the same?

20 A. They normally could be used
21 interchangeably, those terms.

22 Q. So then, in this passage, you would
23 interpret this passage as meaning that there are
24 three host materials; correct?

25 A. I'm comfortable with using either of those

1 terms. I don't need to interpret it into being
2 something that it doesn't say. But it -- I would be
3 comfortable with calling them host materials.

4 Q. So this passage talks about there being
5 distances between the molecules of the second and
6 third matrix materials; correct?

7 MS. ZHONG: Objection; form.

8 THE WITNESS: Sorry. Which specific line is
9 that? I'm just reading it. I know it talks about
10 distance. Which line are you referring to?

11 BY MR. BYUN:

12 Q. I'm referring to the whole passage, column
13 3, lines 17 through 34.

14 A. Yeah, it talks about molecular distance
15 between charge-carrying transport molecules.

16 Q. And that's referring to the molecular
17 distances for the second and third matrix materials;
18 correct?

19 MS. ZHONG: Objection; form.

20 THE WITNESS: I think -- if you just give me one
21 more second, please. I want to just -- I am just
22 not sure it specifically talks about those two. I'm
23 not sure of that as well, or the first -- yes. It
24 talks about distance between the second and third
25 matrix materials.

1 BY MR. BYUN:

2 Q. The distance between the molecules of the
3 second and third matrix materials; correct?

4 A. Uh-huh.

5 Q. And specifically, from lines 21 through 26,
6 it talks about how the first matrix material really
7 can be used to control the distances of the
8 molecules of the second and third matrix materials?

9 A. That's correct.

10 Q. Okay. Will there be distances between the
11 molecules of the first matrix material as well or
12 no?

13 A. Will there be distances between the
14 molecules --

15 Q. The molecules of the first. Correct.

16 A. There will be, of course, distances between
17 it, yes. You are saying between the actual first --
18 the first matrix molecules themselves, not with the
19 second and third?

20 Q. Correct.

21 A. That's right.

22 Q. Let's turn back to column 7, lines 21 to
23 30.

24 So this is the example matrix with three matrix
25 materials?

1 A. Uh-huh.

2 Q. mCP, TCTA, and TPBi?

3 A. Uh-huh.

4 Q. In this example, is mCP in a continuous
5 phase?

6 A. I can't -- I can't say, because I don't
7 know the -- I don't know the molecular distances. I
8 can't just guess that from the rates that are given
9 here. But the whole system is a continuous phase.
10 The three-part matrix system is in a continuous
11 phase.

12 Q. So you're saying that mCP, TCTA, and TPBi
13 together are in a continuous phase?

14 A. Everything apart from any emitter, yep.

15 Q. But mCP alone, you are not sure whether it
16 is in a continuous phase or not?

17 A. I can't -- I can't comment on that, because
18 I don't know the molecular -- I don't know the
19 interhopping distances between those particular
20 molecules, so the hopping distances aren't clear.

21 Q. Can you determine it one way or the other
22 by looking at the entirety of the '164 patent?

23 A. I can't get the numbers, but I'd say a more
24 or less continuous phase. So I think that stands as
25 a reasonable statement.

1 Q. So mCP -- let me get this straight. So
2 you're saying you are not sure whether mCP is in a
3 continuous phase, but it's your testimony that mCP
4 is in a more or less continuous phase?

5 A. Yes, I think that's fair.

6 Q. How do you know that?

7 A. How do I know that? Because -- well, in
8 this example -- well, more or less is -- okay, I
9 will stick to that.

10 It is not necessarily in a purely continuous
11 phase because it is a blend of three different
12 materials, so it is more or less continuous as a
13 result of that.

14 If it was evaporated by itself, I would say
15 it's -- it's individually in a continuous phase;
16 right?

17 Q. Do you say more or less because the
18 molecular distances of mCP is expected to be
19 somewhat larger than what they would be in a
20 continuous phase?

21 A. What they would be if they were evaporated
22 by themselves without any other components in the
23 evaporation.

24 Q. I see. Because mCP is evaporated together
25 with other materials, TCTA and TPBi, they're not

1 strictly -- strike that.

2 Because mCP is evaporated together with TCTA and
3 TPBi, mCP is not in a strictly continuous phase, but
4 you're saying they're close?

5 A. I think so, yeah.

6 Q. Okay. In this example, mCP, TCTA, TPBi,
7 the three materials together make up a matrix. Is
8 that a correct understanding?

9 A. Yes. I can -- I would say that.

10 Q. In this example, mCP, TCTA, and TPBi also
11 make up an emission layer; correct?

12 A. In the claim -- yeah. The last part, it
13 says that an emitter can be added to it, and in that
14 case, it is an emissive layer.

15 Q. I am referring to the specific example.

16 A. I don't see any mention of an emitter in
17 that paragraph.

18 Q. Well, line 21 -- column 7, line 21, states
19 that one can pre use an emission layer which
20 contains a first matrix material, which comprises
21 mCP, and it goes on to describe second and third
22 matrix materials.

23 A. Yeah, and then it mentions rubrene on line
24 31, which in that case, it is an emissive layer.

25 Q. Okay. So you're saying the four materials

1 together constitute an emission layer; that is, mCP,
2 TCTA, TPBi, and rubrene; is that correct?

3 A. Yes, that's correct.

4 Q. But you're saying that just three of those
5 materials constitute a matrix; that is, mCP, TCTA,
6 and TPBi.

7 A. Yeah. But, normally, a matrix is a
8 surrounding medium, which implies something is being
9 embedded in it.

10 Q. Uh-huh.

11 A. So it is slightly blurry, because without
12 the emitter, it doesn't necessarily have that matrix
13 attribute in how it is often described.

14 So those are just materials that are deposited
15 together to form a film.

16 Q. So you're saying that the three materials
17 do not constitute a matrix, the three materials
18 being mCP, TCTA, and TPBi?

19 A. There are three matrix materials nominally
20 called matrix materials in this patent, but they are
21 not really acting as a matrix unless you have an
22 emitter in there. So --

23 Q. Well, we have an emitter here in this
24 example, rubrene?

25 A. Yeah, I think you -- but I think you said

1 without rubrene. So, yeah, I just wanted to make
2 that distinction. When rubrene is in there, there's
3 certainly a matrix for rubrene.

4 Q. Oh, yeah. Okay. So -- sorry for the
5 confusion.

6 I'm talking about the example on column 7, which
7 describes an emission layer.

8 A. Uh-huh.

9 Q. The emission layer contains four materials
10 that we just discussed?

11 A. Yes.

12 Q. And I am trying to isolate which of those
13 materials constitute the matrix.

14 A. Okay. So it's mCP, TCTA, TPBi. Those
15 constitute the matrix.

16 Q. Those three materials constitute the
17 matrix?

18 A. Yes.

19 Q. Okay. Which of those three matrix
20 materials is a host in this example?

21 A. They all can be described as host
22 materials. I don't see any reason why not.

23 Q. Okay. Turn to column 9, lines 10 to 13,
24 please.

25 A. Lines 10 to 13, you say?

1 Q. Yep.

2 A. Okay.

3 Q. Claim 1 requires at least one organic
4 functional layer has at least a first matrix
5 material, a second matrix material, and a third
6 matrix material; correct?

7 A. It says that, yep.

8 Q. This means that the first, second, and
9 third matrix material belonged to the same organic
10 functional layer; correct?

11 A. Yes -- yes.

12 Q. Turn to column 4, lines 24, 26, please.

13 A. Sorry, lines --

14 Q. Lines 24 through 26.

15 A. Okay.

16 Q. It states, "Each of these layers can have a
17 matrix, which has at least a first, a second, and a
18 third matrix material."

19 Do you see that?

20 A. Yes, I see that.

21 Q. So here, a layer has a matrix, which in
22 turn has a first and a second and a third matrix
23 material; correct?

24 MS. ZHONG: Objection; form.

25 THE WITNESS: Yeah, I think it says that.

1 BY MR. BYUN:

2 Q. Turn to column 2, lines 46 to 47, please.

3 It states, "To create a hole in the matrix,
4 which is composed of the three matrix materials."

5 Do you see that?

6 A. Yes, I see that.

7 Q. This is describing a matrix composed of the
8 three matrix materials; correct?

9 A. Yes, it is.

10 Q. And that's similar to the example that we
11 looked at on column 7; correct?

12 A. Yes.

13 Q. Please turn back to column 9, lines 10
14 through 14.

15 A. Okay, I'm reading that. Yep.

16 Q. Strike that.

17 Actually, please turn to column 7, line 62, to
18 column 8, line 20.

19 A. What was the range, 62?

20 Q. Column 7, line 62, to column 8, line 20.

21 A. Okay. I'll just read that.

22 Yep, I've read that.

23 Q. This passage provides other examples of
24 matrix materials; correct?

25 MS. ZHONG: Objection; form.

1 THE WITNESS: Yes. I mean, it does do that.

2 MR. BYUN: Let's take a break.

3 THE REPORTER: Going off the record at
4 10:40 a.m.

5 (Recess.)

6 THE REPORTER: Going back on the record at
7 10:55 a.m.

8 BY MR. BYUN:

9 Q. Dr. Sims, what is a dopant?

10 A. A dopant is a material that is housed in a
11 matrix.

12 Q. What is doping?

13 A. Doping can mean a number of things. It
14 really depends on -- you know, they are basically
15 different things. It depends on what -- there are
16 different things a dopant can do. But, in general,
17 they are doped into a matrix, but for different
18 purposes.

19 Q. What does it mean for a material to be
20 doped into a matrix?

21 A. It would be disbursed at a low
22 concentration.

23 Q. What do you mean by "low concentration"?

24 A. I can't put a number on that, but it's a
25 guest of a majority host system. So you can think

1 of it in those terms. It's -- certainly, it's a
2 lower quantity than the host material.

3 Q. If a matrix has a host material with a
4 concentration of 60 percent, and the other material
5 takes up 40 percent, is the other material a dopant?

6 MS. ZHONG: Objection; form.

7 THE WITNESS: I wouldn't really like to really
8 comment on specific numbers. I can't do that
9 because, again, it depends on the specific
10 situation, like, again, how it's processed. And,
11 you know, it can mean different things at those
12 compositional levels, depending on what -- how the
13 thing is processed, for what function is that system
14 being designed for.

15 And so it's -- the best I can do is my original
16 description. It's just a lower quantity of
17 something in a host or a matrix.

18 BY MR. BYUN:

19 Q. What is co-doping?

20 A. Co-doping would be when you have two
21 distinct molecular species that are doped into a
22 matrix material.

23 Q. So when you're doping two different
24 materials, you refer to that as co-doping?

25 A. It could be two or more. It doesn't need

1 to be two.

2 Q. Turn to the '164 patent, please, column 8,
3 lines 56 to 65.

4 A. Column 8 --

5 Q. Lines 56 to 65.

6 A. Okay.

7 Q. Please take a moment to read it, and let me
8 know when you're done.

9 A. Okay.

10 Q. This passage discloses an example matrix
11 composed of NPB, BCP, and UGH4; correct?

12 MS. ZHONG: Objection; form, misstating the
13 document.

14 MR. BYUN: Again, Counsel, please limit your
15 objection to form.

16 THE WITNESS: Can you please restate the
17 question?

18 BY MR. BYUN:

19 Q. This passage discloses an example matrix
20 comprised of NPB, BCP, and UGH4; correct?

21 MS. ZHONG: Objection; form.

22 THE WITNESS: I think that's okay.

23 BY MR. BYUN:

24 Q. At lines 62 to 63, the '164 patent
25 describes doping and BCP to adjust the relative

1 transport characteristics of the matrix; correct?

2 A. Yes, that's what it says.

3 Q. So the '164 patent describes BCP as a
4 dopant; correct?

5 MS. ZHONG: Objection; form.

6 THE WITNESS: It uses the word "doping" with
7 BCP. So it's used as a verb, to dope, so it's at a
8 lower level than -- yeah, that's okay.

9 BY MR. BYUN:

10 Q. So you agree that the '164 patent describes
11 BCP as a dopant; correct?

12 MS. ZHONG: Objection; form.

13 THE WITNESS: Well, BCP is certainly a matrix
14 material in this case, and NPB is, as well as UGH4.

15 BY MR. BYUN:

16 Q. My question was a different one. The '164
17 patent describes BCP as a dopant; correct?

18 A. It says, "By doping in an electric
19 transport material, for example, BCP."

20 Q. So you agree that the '164 patent describes
21 BCP as a dopant; yes?

22 MS. ZHONG: Objection; form.

23 THE WITNESS: Yes. I mean, that's what it's --
24 according to the language that was used, yes.

25 ///

1 BY MR. BYUN:

2 Q. In this example, is BCP in a continuous
3 phase?

4 A. I can't say because it doesn't give -- it
5 doesn't give anything about the relative
6 concentration.

7 Q. In this example, is BCP in a more or less
8 continuous phase?

9 A. I can't say that either, because it doesn't
10 give that level of specificity.

11 Q. In this example, is BCP a host?

12 A. Since it's a -- since it's a matrix, then I
13 think it is okay to use that interchangeably.

14 Q. So is BCP a host?

15 MS. ZHONG: Objection; form.

16 THE WITNESS: Can you -- yeah. Can you please
17 restate that? You know, in -- are we talking about
18 an evaporated system here, or are we talking about
19 solution processes system? It can make a
20 difference. It can have a bearing.

21 BY MR. BYUN:

22 Q. I am just talking about the system as
23 described here in column 8?

24 MS. ZHONG: Objection; form.

25 THE WITNESS: Can you just repeat the question,

1 please, one more time?

2 BY MR. BYUN:

3 Q. The question is: Is BCP a host in this
4 example?

5 A. It doesn't need to be described as one.
6 Like I say, it says it's an electron transport
7 material. But you could -- I wouldn't have a big
8 problem necessarily describing it that way.

9 Q. Is NPB a host in this example?

10 A. In the same way as you could describe BCP
11 for the same reason, it could be described as that,
12 but it doesn't need to be.

13 Q. Is UGH4 a host?

14 MS. ZHONG: Objection; form.

15 THE WITNESS: It's a matrix material.

16 BY MR. BYUN:

17 Q. Well, the question was: Is UGH4 a host?

18 A. Like I say, it's -- often, those terms can
19 be used interchangeably. So I don't really have an
20 issue with using either of those terms.

21 Q. Turn to Exhibit 2019, please. That's your
22 declaration.

23 A. Yep.

24 Q. Turn to page 26, please.

25 You use a term "dispersed agglomerations" here.

1 Do you see that?

2 A. Yes, I do.

3 Q. What are dispersed agglomerations?

4 A. Well, they are materials in a discontinuous
5 phase, and they can be embedded in a matrix
6 material. So they are disconnected from one another
7 inside a matrix material. They can be larger
8 entities. They don't need to be, you know, an
9 individual molecule. They can be an ensemble of
10 molecules.

11 Q. Is that why you used the term
12 "agglomerations," to indicate that they could be a
13 lump of molecules that are disconnected?

14 A. It could be, yes.

15 Q. Are dispersed agglomerations dopants?

16 A. They can be. They can be. They don't have
17 to be.

18 Q. Conversely, are dopants dispersed
19 agglomerations?

20 A. I think the same, that they can be. They
21 don't have to be.

22 Q. So I can represent to you that Pictiva's
23 patent owner responds, it states on page 5,
24 "dispersed agglomerations, which would be understood
25 to be dopants."

1 MS. ZHONG: Can you please provide the context
2 and provide the document so it is not just out of
3 context?

4 MR. BYUN: Sure. I am handing the witness the
5 patent owner response.

6 (Discussion held off the record.)

7 MR. BYUN: Counsel, let me know whenever you
8 need a copy.

9 MS. ZHONG: Yeah, whatever is easier.

10 MR. BYUN: Turn to page 5, please, second line.

11 THE WITNESS: Uh-huh.

12 BY MR. BYUN:

13 Q. Do you agree with Pictiva's position that
14 dispersed agglomerations are dopants?

15 A. Like, they can be. I don't think it needs
16 to be a one-to-one absolute definition. They can
17 be. Or a guest, as it also says.

18 Q. Okay. Turn back to Exhibit 2019, please.

19 A. Okay.

20 Q. And go to paragraph 58, please.

21 A. Yep.

22 Q. You state that "the three matrix materials
23 formed by joint evaporation would be continuous, and
24 not as a mixture of dispersed agglomerations."

25 Do you see that?

1 A. One second.

2 Yes, it is towards the end of the paragraph.

3 Q. Correct.

4 A. Uh-huh.

5 Q. Can you elaborate what you mean here?

6 A. Well, it's sort of like a counterpoint to
7 solution-based processes, so it would be a much more
8 even distribution. So it would be a homogenous
9 distribution of materials, compared to a
10 solution-based approach, so those molecules will be
11 continuous as a result of that.

12 So homogenous, continuous, uniformly
13 distributed, as opposed to agglomerations, which
14 would be discontinuous.

15 Q. Can you turn to the '164 patent?

16 A. Yep.

17 Q. Column 7, lines 11 to 15.

18 A. Uh-huh.

19 Q. So the '164 patent describes jointly
20 evaporating four materials; correct?

21 A. Yes.

22 Q. Three matrix materials and an emitter
23 material?

24 A. That's correct.

25 Q. Is the emitter material also continuous and

1 not a mixture of dispersed agglomerations because it
2 is jointly evaporated?

3 A. It's -- they do not specify here, but no,
4 it would not be, because it is -- by definition, it
5 is an emitter, and, therefore, it must be -- those
6 molecules must be kept separately from one another.
7 So, therefore, not continuous.

8 Q. But I thought you said that the three
9 matrix materials would be continuous because they
10 are formed by joint evaporation?

11 A. Yeah, but when they start talking about an
12 emitter, then, immediately, part of the design is
13 that they have to be kept separate from one another
14 and they have to be discontinuous.

15 Q. So just because a material was jointly
16 evaporated doesn't mean that it's in continuous
17 phase; correct?

18 A. Yes. It depends on the compositional
19 ratio, the relative evaporation rates.

20 Q. How do you know the three matrix materials
21 are continuous?

22 A. They are more or less continuous, like we
23 discussed earlier.

24 Q. How do you know that they are more or less
25 continuous? Do you know their compositional ratio?

1 A. That's how it would be designed, because we
2 talked about rubrene, and there are -- in this
3 particular paragraph you cite, there is no mention
4 of the specific ones, but if you want to make a
5 device, that's the design rule that you have to
6 adhere to.

7 So the dopant would be at a lower concentration,
8 or you wouldn't have a functioning device. When I
9 say "a lower concentration," a concentration at
10 which they are separated from one another and
11 discontinuous.

12 Q. Well, I was asking more about the matrix
13 materials than the emitter.

14 A. Okay.

15 Q. So let me restate the question or repeat
16 the question.

17 How do you know the three matrix materials are
18 continuous here?

19 A. They would have to be the majority system.
20 And you can't talk about -- without the emitter --
21 that's the thing that underpins all of this. It
22 needs to be separate, and everything else is
23 continuous if it is a single emitter that you are
24 forming excitons on.

25 Q. Why do the three matrix materials have to

1 be continuous?

2 A. In order to facilitate -- in many examples,
3 in order to facilitate charged transport and to keep
4 the emitters separate from one another.

5 Q. If a material is discontinuous, is it still
6 capable of charged transport or not?

7 MS. ZHONG: Objection; form.

8 THE WITNESS: Yeah, can I have a bit more detail
9 there? Because that's a very delicate bit of
10 technicality. There's a lot of technicality.
11 Basically, like, I can say a little bit, that there
12 might be, like, a point where it -- a discontinuous
13 phase becomes a continuous phase, and all of a
14 sudden, the transport properties will change very
15 rapidly and your device will just not work anymore;
16 okay?

17 But I don't know what those -- I don't have
18 numbers for that here. I don't know what that
19 concentration would be. So if you -- yeah.

20 The way I'm describing discontinuous is that
21 they wouldn't be talking to one another. You know,
22 i.e., there wouldn't be any electronic coupling
23 between the emitter material. So, therefore, the
24 way I'm talking about this is that they're not
25 participating in transport, if they are functioning

1 well as an emitter material.

2 But there is a gray area. You know, it's not
3 like -- there's no numbers I can put on that. It is
4 something that needs to be optimized as a study.

5 BY MR. BYUN:

6 Q. So what I'm trying to understand is,
7 specifically with regards to the example given by
8 the '164 patent at column 7, specifically with
9 regards to Figure 5 embodiment, you testified that
10 the three matrix materials in this example are more
11 or less continuous; is that correct?

12 A. I said -- yes, because they are matrix
13 material.

14 Q. Okay. And I asked you how do you know
15 that, and I believe your answer was you know that
16 because, otherwise, the device wouldn't work. Is
17 that a correct understanding?

18 A. That is one way to know it, but if you
19 actually knew the evaporation rates of the materials
20 that you were depositing, you would also know from
21 that, and I am lacking of that particular bit of
22 information.

23 So it is very important to, you know, know what
24 the compositional ratio of the final film would be.
25 And I don't know that, but in order for a device to

1 work, it has to be that it is a continuous -- that
2 those three materials form -- amongst themselves
3 form a continuous phase.

4 Q. Well, you have the '164 patent in front of
5 you.

6 A. Uh-huh.

7 Q. Do you have any other support for your
8 statement that the three matrix materials in this
9 example are in continuous phase?

10 A. They have to be, because it is a -- it is a
11 design rule for a device, for a functioning device.

12 Q. Are you saying that each of the three
13 matrix materials has to be in a continuous phase, or
14 that the three matrix materials together have to be
15 in a continuous phase?

16 A. The three of them together have to be in a
17 continuous phase, and you can maybe say the
18 constituents are in more or less a continuous phase.
19 And that really depends on the details of the
20 relative evaporation rates, which I don't know.

21 Q. Okay. And you are saying that because if a
22 matrix material was discontinuous, then it would not
23 perform charged transport properly, and that's why
24 you're saying that the device wouldn't work. Is
25 that a correct understanding?

1 MS. ZHONG: Objection; form.

2 THE WITNESS: I think there are other reasons
3 why the device might not work. You know, you have
4 to consider the triplet energies, for example, or
5 the -- if it is a phosphorescent device. But, yes,
6 the transport properties would need to be there in
7 order to populate emitter molecules with charge
8 where they ultimately recombine with counter
9 charges.

10 BY MR. BYUN:

11 Q. So you know that the matrix materials in
12 this example are in a continuous phase because,
13 otherwise, there won't be a proper charged
14 transport?

15 A. Yes. That's one of the major functions of
16 those materials, and in order to function properly,
17 they need to be continuous.

18 Q. So each matrix material in this example has
19 to be in a continuous phase because, otherwise,
20 there won't be a proper charge transport?

21 A. Well, each of them need to be in a more or
22 less continuous phase, but the -- collectively, they
23 need to be in a continuous phase.

24 Q. Got it. And each matrix material in this
25 example has to be in a more or less continuous phase

1 because, otherwise, there won't be a proper charged
2 transport?

3 A. "Proper" is maybe not the right word. But,
4 you know, again, these are optimized systems, but
5 the way you will reach an optimal performance is to
6 tweak those relative ratios of each of those matrix
7 materials.

8 Depending on what the target is, you want to
9 preserve the luminance of the device, the efficiency
10 of the device. You know, there's aspects that
11 people might be looking for, including stability of
12 the device, and all of these are affected by the
13 compositional ratio.

14 Q. So each matrix material has to be in a more
15 or less continuous phase because, otherwise, there
16 won't be any charged transport?

17 MS. ZHONG: Objection; form.

18 THE WITNESS: That's too strong a -- no, charged
19 transport will always be there. It is about
20 optimizing the balance of charged transport in the
21 device in order to get some sort of desirable
22 properties.

23 BY MR. BYUN:

24 Q. I see. So each matrix material has to be
25 in a more or less continuous phase because,

1 otherwise, there won't be a desired level of charged
2 transport?

3 MS. ZHONG: Objection; form.

4 THE WITNESS: Well, it depends on what the
5 desired level of charged transport, what exactly
6 that means, but I think it is good to say -- you
7 know, it's probably more accurate to say those
8 ratios can be -- can be optimized to give some sort
9 of optimal output of the device, right? So they are
10 the ones that are involved with charged transport.

11 BY MR. BYUN:

12 Q. So maybe "optimized" is the word?

13 A. I think so. Say "proper" or, I think,
14 "optimal."

15 Q. So each matrix material has to be in a more
16 or less continuous phase because, otherwise, there
17 won't be an optimal level of charged transport?

18 A. That's -- that's reasonable.

19 Q. Turn back to the '164 patent, please, at
20 column 8, lines 56 to 65.

21 A. Okay.

22 Q. Does BCP in this example form dispersed
23 agglomerations?

24 MS. ZHONG: Objection; form.

25 THE WITNESS: I would not describe BCP to be an

1 agglomeration.

2 BY MR. BYUN:

3 Q. Because you think that the BCP is in a more
4 or less continuous phase?

5 MS. ZHONG: Objection; form, misstating the
6 document.

7 THE WITNESS: I think -- if it is
8 solution-processed, that would be an issue. But I
9 think as an evaporated system, it really depends on
10 the level, and it doesn't give that detail here of
11 what the -- what the ratio is, the molar ratio,
12 specifically, of this, to be able to comment on its
13 continuity.

14 BY MR. BYUN:

15 Q. So you don't know one way or the other
16 whether BCP is in a more or less continuous phase?

17 A. I think it's part of the matrix, and by
18 that definition --

19 MS. ZHONG: Objection; form.

20 BY MR. BYUN:

21 Q. Do you know one way or the other whether
22 BCP is a more or less continuous phase?

23 A. I would describe it as such because I think
24 it is part of the matrix.

25 MR. BYUN: I am handing you Exhibit 2001, the

1 declaration of Dr. Marc Sims, dated October 28th,
2 2024.

3 (Exhibit No. 2001 identified.)

4 BY MR. BYUN:

5 Q. Do you recognize Exhibit 2001?

6 A. I do.

7 Q. What is it?

8 A. It is my declaration.

9 Q. You signed this document?

10 A. Yes.

11 Q. Are you aware of any errors in
12 Exhibit 2019?

13 A. I'm not aware of any, no.

14 Q. Okay. Please turn to paragraph 49, which
15 is towards the end.

16 A. Okay.

17 Q. So please turn to the last sentence in this
18 paragraph, please.

19 Here, you state, "For example, Sugiura's
20 structure, where hole transport and electron
21 transport materials are shown as separate particles
22 from each other and the emitter, could be achieved
23 with a carefully tailored solution-based process,
24 but would not be practical in an evaporated process
25 where the molecules are co-deposited in a commingled

1 fashion throughout the organic layer."

2 Can you elaborate on what you mean by this?

3 A. Give me a second. I want to --

4 Q. Sorry?

5 A. It has been a little while since I wrote
6 this.

7 Q. Please.

8 A. It is a granularity point. So it is --
9 there's homogeneity in an evaporated process that
10 you do not get in a solution where -- or excuse
11 me -- a phase separation is a likely outcome.

12 So that's -- and so your structure, it is -- the
13 way it is depicted is that it is a, you know, quite
14 a strong phase separation. In a co-deposited
15 system, that is not what you would get. There's a
16 much finer mixing of all of the elements at a
17 molecular level.

18 Q. So there's a much finer mixing of all the
19 elements at a molecular level in an evaporation
20 process or in a solution process?

21 A. In evaporated process.

22 Q. In an evaporated process, okay.

23 But aren't you saying here that the separate
24 particles could be achieved with a carefully
25 tailored solution-based process?

1 A. Uh-huh.

2 Q. What do you mean by a carefully tailored
3 solution-based process?

4 A. Well, it would have to be very carefully
5 tailored. I don't have the answer for what that
6 would be at this moment, but I just know that in
7 general when you solution process multicomponent
8 systems from a solvent, that depending on all the
9 details, which we don't know here, of how that was
10 deposited, you normally end up with not a fine
11 mixture in the end product.

12 So there will be a degree of phase separation,
13 like I mentioned before, where individual components
14 like to stick to one another in the final film. So
15 you end up with some discontinuous phases and -- you
16 know, depending on the specific system.

17 Q. Are you saying that Sugiura's structure is
18 in a continuous phase?

19 A. 3D and 3E are in a discontinuous phase, but
20 they are embedded within a matrix.

21 Q. I see. In order to get that, you need a
22 carefully-tailored solution-based process? Is that
23 what you are saying here, or are you saying
24 something else?

25 A. It doesn't need to be carefully tailored --

1 Q. Got it.

2 A. -- in that instance.

3 Q. Then why do you need the carefully-tailored
4 solution process, in order to get what?

5 A. Well, it is kind of -- it's the way I have
6 written it. Normally, you have to consider a lot of
7 things to do it. That's why I say a
8 carefully-tailored solution processing is very
9 difficult to do in a predictable and repeatable
10 manner.

11 Q. Uh-huh.

12 A. And there's lots of steps. So you might
13 need to consider what solvent mixtures are used or
14 what solvent -- how the thing is -- post-deposition,
15 how the thing is annealed. There's a lot of
16 different steps that are essentially tailoring to
17 get the desired functional outcome of the film,
18 so...

19 Whereas, evaporation is -- your only control in
20 the evaporative process is the relative rates beyond
21 the choice of materials that you put in there.

22 MR. BYUN: I am handing you Exhibit 1006, which
23 is a certified translation of Japanese Published
24 Application Number JP2001 -110568.

25 (Exhibit No. 1006 identified.)

1 BY MR. BYUN:

2 Q. Do you recognize Exhibit 1006?

3 A. This is Sugiura, yep.

4 Q. I'll also refer to Exhibit 1006 as Sugiura.

5 A. Okay.

6 Q. Please turn to Figure 4 of Sugiura.

7 A. Yep.

8 Q. It depicts a light-emitting layer three
9 containing hole transporting material, 3D, and
10 electric transporting material, 3E; correct?

11 A. That's right.

12 Q. Sugiura doesn't use the term "dispersed
13 agglomerations" anywhere; correct?

14 A. I would need to double-check that, but I
15 don't think so.

16 Q. What is the basis of your opinion that
17 Sugiura's hole transporting material, 3D, and
18 electron transporting material, 3E, are dispersed
19 agglomerations?

20 A. Well, it is clearly shown in Figure 4 that
21 they are dispersed agglomerations.

22 Q. Do you agree that Figure 4 of Sugiura is
23 not drawn to scale?

24 A. Of course. It's a schematic.

25 Q. Then, why is it clear that Figure 4 depicts

1 dispersed agglomerations?

2 A. That's what the -- that's what they have
3 shown them to be. I mean, there's a -- they are
4 showing it, a continuous matrix, in the background,
5 and there is disconnected hole electron transporting
6 materials in that matrix.

7 Q. But you testified earlier that there are
8 distances between molecules of a matrix material.
9 So that's consistent with Figure 4 of Sugiura, no?

10 A. Could you repeat that one, please?

11 Q. But you testified earlier that there are
12 distances between molecules of a matrix material?

13 A. Distances between molecules of a matrix
14 material? I mean, there's very short distances
15 between the molecules of the matrix material,
16 extremely short distances.

17 Q. And -- strike that.

18 Other than Figure 4, do you have any other basis
19 of your opinion that Sugiura's hole transporting
20 material, 3D, and electron transporting material,
21 3E, are dispersed agglomerations?

22 A. Like I mentioned before, a solution
23 processing very often leads to a degree of phase
24 separation. So it wouldn't surprise me that these
25 do not exist as a fine mixture throughout the

1 emissive layer.

2 Q. You testified earlier that the device
3 wouldn't work with the phase separation, no?

4 A. No, that's -- no, I didn't say that. I'd
5 say there's a risk that it would not work. It
6 really depends on the specific situation.

7 But what I do say, and I stand by, is that phase
8 separation is something that happens in
9 solution-processed systems, and the degree to which
10 is something that can't be -- it's not like a -- it
11 is very case-by-case. So many -- so many variables
12 that go into it.

13 Q. Can you turn to paragraph 62 of Sugiura,
14 please?

15 A. Yes. Okay.

16 Q. Paragraph 62 describes the manufacturing
17 steps of the embodiment shown in Figure 4 of
18 Sugiura. Could you view it and let me know whether
19 that gives you a clue as to whether the Figure 4
20 embodiment contains dispersed agglomerations or not?

21 A. Okay, I'll read it.

22 So I've read that. It's clear that they've made
23 an attempt to get a good mixture of the materials by
24 their steering solution for one day, but that
25 certainly does not mean they will have achieved that

1 result.

2 So just from my own experience, there is -- like
3 I said before, there is a very high chance that
4 after you ultimately anneal these things -- they do
5 not mention annealling.

6 They do mention spin coating, and spin coating
7 is a process which is very turbulent, and when you
8 have lots of different materials with different
9 vapor pressures inside solvent, each of these
10 materials will crash out at different rates.

11 So it is really hard to get a fine mixture, and
12 by reading this, I can see they've made an attempt,
13 but I really doubt they would have been able to get
14 the granularity that you can get with an evaporative
15 process; hence, I think that the -- they were
16 probably aware of this, and that's why they drew the
17 schematic the way they did.

18 Q. Do you agree that Sugiura's hole
19 transporting material transports holes?

20 A. Just checking.

21 TPD? I agree.

22 Q. So you agree that the molecules of
23 Sugiura's hole transporting material are
24 sufficiently close to each other to be able to
25 transport holes; correct?

1 MS. ZHONG: Objection; form, misstated the
2 testimony.

3 THE WITNESS: It is difficult to say, but, you
4 know, they've given the weight ratio here, which is
5 not really the critical thing. We need to know what
6 the equivalent molar ratio is for this. But I
7 believe the direction you would go is such that TPD
8 would be able to transport holes in that system, and
9 that's from an ability point of view.

10 So there's -- you know, the ionization potential
11 is certainly the right kind of value that they
12 quoted for hole transport to occur. But I'm
13 thinking from the mobility perspective, which has
14 got to do with the composition.

15 BY MR. BYUN:

16 Q. Do you agree Sugiura's electron
17 transporting material transports electrons?

18 A. That is ALq3. Yes, that's what it is
19 intended to do.

20 Q. So you agree that the molecules of
21 Sugiura's electron transporting material are
22 sufficiently close to each other to be able to
23 transport electrons; correct?

24 MS. ZHONG: Objection; form.

25 THE WITNESS: So there's -- we don't know how --

1 to be able to transport electrons is one thing, but
2 how effectively it does is another thing. And I
3 don't know, but if there is anything that is going
4 to be transporting electrons in that system, it
5 would be designed to do that with ALq3.

6 (Discussion held off the record.)

7 MR. BYUN: Can you mark this as 1101?

8 (Exhibit 1101 was marked for
9 identification.)

10 MS. ZHONG: I am going to object to this
11 document as irrelevant hearsay.

12 BY MR. BYUN:

13 Q. 1101 is an article entitled
14 "Triplet-Induced Degradation."

15 Do you recognize Exhibit 1101?

16 A. I do.

17 Q. What is it?

18 A. It is an article that I co-authored.

19 Q. Turn to page 218, please.

20 A. Yep.

21 Q. Under the heading "Experimental," about 10
22 lines down, there's a sentence that starts with
23 "Both materials have good transparency."

24 Do you see that?

25 A. Yes.

1 Q. It goes on to say, "good transparency over
2 the visible spectrum in a deep work function."

3 Do you see that?

4 A. Yes.

5 Q. Can you explain what you mean by "a deep
6 work function"?

7 MS. ZHONG: Objection; form, scope, relevancy.

8 THE WITNESS: I don't know whether I should veer
9 away from my declaration. What bearing does this
10 have on my declaration? Of course, I understand it,
11 but what is -- what bearing does it have on my
12 declaration?

13 BY MR. BYUN:

14 Q. I am trying to understand your
15 understanding of the term "org function" --

16 A. Okay.

17 Q. -- with regards to energy levels.

18 A. Okay. Well, I suppose we talked about HOMO
19 LUMO levels, etc.

20 (Reporter Clarification.)

21 THE WITNESS: Yes. So the work function is
22 basically the energy that you need to impinge on a
23 material in order to get electrons to be ejected
24 from the surface. So it's the threshold energy at
25 which that occurs.

1 So in these instances, it is 5.5 electron volts
2 in one of those HIL materials. That's the energy of
3 the light that's required to eject electrons from
4 the surface of that material.

5 BY MR. BYUN:

6 Q. What is a relationship between work
7 function and HOMO and LUMO levels?

8 A. Well, "work function" is a term that's used
9 for, you know, more like metallic materials. So you
10 don't think of work function for semiconductors, or
11 at least intrinsic semiconductors. So HOMO and LUMO
12 levels are characteristics of intrinsic
13 semiconductors, not metals.

14 Q. So there's no relationship between work
15 function and HOMO and LUMO levels?

16 A. Well, there is, and it's -- a HOMO level is
17 the energy required to essentially ionize that
18 material. So in a sense, it is similar, and they
19 can be measured with the same equipment, but we just
20 call them different things.

21 Q. Here, the work function was measured with
22 AC-2?

23 A. Yes.

24 Q. What is AC-2?

25 A. It is a photoemission spectrometer.

1 Q. What does it measure?

2 A. It measures the threshold of electron
3 emission from a material by scouting, you know, UV
4 light.

5 Q. Okay. Turn to Figure 6(b), please, which
6 is an energy level diagram for NPB and DCJTb?

7 A. Yep.

8 Q. Can you explain what this diagram shows?

9 MS. ZHONG: Again, I'm going to object to the
10 scope. How does that relate to his declaration or
11 any of the systems that he analyzed? Can you
12 explain?

13 MR. BYUN: Counsel, again, I would ask you to
14 limit your objections to form.

15 MS. ZHONG: I am not objecting. I am asking you
16 to explain it, and you need to explain to me how
17 it's relevant to his declaration.

18 MR. BYUN: Dr. Sims contested Dr. Holmes's
19 interpretation of energy levels and energy level
20 diagrams, and I'm entitled to ask him questions
21 about his interpretation of energy level diagrams.

22 MS. ZHONG: Well, I am thinking you are
23 misstating his testimony. He contested the fact
24 that there is, instead of HOMO and LUMO in Sugiura,
25 it said IP and EA. So --

1 MR. BYUN: I disagree with you. Again, please
2 limit your objections to form.

3 MS. ZHONG: I'm going to object as appropriate,
4 and I am going to point out you are exceeding the
5 scope of his declaration when appropriate.

6 MR. BYUN: I disagree.

7 MS. ZHONG: Okay. So I will repeat on the
8 record, we consider this to be outside the scope.

9 But you can go ahead and answer the question.

10 THE WITNESS: Can you repeat the question,
11 please? Was it what does it mean?

12 BY MR. BYUN:

13 Q. So turn to Figure 6(b), please.

14 A. Yep. I'm there.

15 Q. Can you explain in your own words what this
16 figure shows?

17 A. Yeah. It shows the -- two materials, the
18 schematic of their HOMO and LUMO levels. And those
19 materials are NPB and DCJTB.

20 Q. For NPB, what is NPB's HOMO level?

21 A. It's 5.5 electron volts.

22 Q. How do you know that that's the HOMO level
23 and not the 2.4 eV?

24 A. Because the 2.4 eV is a LUMO level.

25 Q. And you know that NPB's LUMO level is 2.4

1 because it is shown at the top of that rectangle?

2 A. Not because it is shown there, but because,
3 you know, that is the LUMO level of the material,
4 yeah.

5 Q. Oh, you just know the LUMO level of NPB?

6 A. Yes.

7 Q. And you just know by heart the HOMO level
8 of NPB?

9 A. I do, but -- yeah. Yeah.

10 Q. Is this how an energy level diagram is
11 usually drawn?

12 MS. ZHONG: Objection; form.

13 THE WITNESS: It can be. It doesn't really
14 matter. It can be written in a sentence, or it
15 could be drawn in a schematic, yeah.

16 BY MR. BYUN:

17 Q. Is it common to depict energy level
18 diagrams like this with rectangles?

19 A. It can be. I'd say it's common.

20 Q. With the LUMO level indicated by the top
21 edge of the rectangle?

22 A. Uh-huh.

23 Q. And the HOMO level indicated by the bottom
24 edge of the rectangle?

25 A. It can be. There's many ways to do that,

1 yeah.

2 Q. But that's the way you chose in this paper?

3 A. Right.

4 Q. And you would say that that's commonly
5 done; you're not doing anything atypical here?

6 MS. ZHONG: Objection; form.

7 THE WITNESS: I mean, I don't -- you know, there
8 could be other ways to do it, but I see no reason to
9 doubt this. It is just a schematic to show -- to
10 show the HOMO and LUMO levels. I don't see
11 anything.

12 BY MR. BYUN:

13 Q. And just to be clear, for convenience,
14 you've omitted the negative sign for the LUMO and
15 HOMO levels; right?

16 A. Sorry, can you repeat that?

17 Q. Just to be clear, for convenience, you
18 omitted the negative sign for the LUMO and HOMO
19 levels; right?

20 A. Yes, that's often -- that is often done in
21 the literature.

22 Q. So how did you get the LUMO and HOMO values
23 of NPB here?

24 A. I don't believe we measured them in this,
25 but I -- yeah, it is a while ago. I don't believe

1 we did. As is often done in literature, the numbers
2 are known. But the way it is done, typically, is
3 either again with, like, an AC-2-type system or with
4 cyclic voltammetry would be the two -- certainly the
5 most commonly used ways.

6 I mean, that would not give you a LUMO level,
7 but it would give you -- sorry. The CV would give
8 you both levels, but PS would not give you a LUMO
9 level.

10 Q. But you don't recall, sitting here today,
11 exactly how you obtained these LUMO and HOMO levels?

12 A. I don't recall. I don't think we did that
13 ourselves. These are, like, archetypal materials,
14 and it is very well documented in the literature.
15 So it's sort of unnecessary to have gone back to
16 measure those levels ourselves.

17 Q. Turn to page 220, please.

18 A. Okay.

19 Q. In the right column, 12 lines down, there's
20 a sentence that begins with "Furthermore, since
21 DCJTB."

22 Do you see that?

23 A. Yes.

24 Q. Can you explain what this sentence means?

25 A. Yes. Give me a moment.

1 MS. ZHONG: Objection; form.

2 I am going to object also on the scope.

3 THE WITNESS: It is quite straightforward. It's
4 just that there's a very minor hole injection layer
5 between those two materials. So it's, according to
6 the HOMO levels that we've printed here, it is only
7 0.2 electric volts.

8 So that's a relatively small energy barrier,
9 and, therefore, transport wouldn't be significantly
10 hindered. It will be slightly, but not -- wouldn't
11 be a very resisted interface.

12 BY MR. BYUN:

13 Q. Would you consider a 0.5 eV difference
14 minor?

15 MS. ZHONG: Objection; form, relevance.

16 THE WITNESS: Right. So can you give me
17 specific material systems? If it was -- if we used
18 that cartoon in the same setup, in the same device,
19 everything else is same, but there's a -- there's a
20 0.5 electric volt barrier, exactly the same
21 geometric properties of the device, then, yes, I
22 would. I would say 0.5 is a significantly more
23 resistive barrier to holes.

24 But the reason why I wanted to describe it in
25 that way is because it has to be exactly that

1 system, because if you start mixing materials,
2 compositions, blending, these sorts of things, it's
3 a whole different scenario. So it is not just -- I
4 need to know those details.

5 MS. ZHONG: Counsel, are you trying to get
6 testimony for the 2/23 IPR? That is inappropriate
7 and it is outside the scope.

8 MR. BYUN: Counsel, like I said, please limit
9 your objections to form.

10 Let's take a break.

11 MS. ZHONG: I am just pointing out to you, it is
12 inappropriate if you are trying to get testimony.

13 MR. BYUN: And it is inappropriate for you to
14 accuse me of doing something that's not proper.

15 MS. ZHONG: Okay. Then, are you going to -- can
16 you state on the record that you are not going to
17 use this testimony in the IPR proceedings?

18 MR. BYUN: I'm not going to state anything
19 because I am not required to provide you with any
20 answers. I am just here to ask questions.

21 MS. ZHONG: Okay, that's fine.

22 THE REPORTER: Going off the record at
23 12:02 p.m.

24 (Luncheon recess taken at 12:02
25 p.m.)

1 A F T E R N O O N S E S S I O N

2 Commenced at 12:49 p.m.

3 EXAMINATION (Resumed).

4 THE REPORTER: Going back on the record. It's
5 12:49 p.m.

6 MR. BYUN: I'm handing you Exhibit 2029, which
7 is U.S. Patent Application Publication 2008/011536.

8 (Exhibit No. 2029 identified.)

9 BY MR. BYUN:

10 Q. Do you recognize Exhibit 2029?

11 A. Yes, I do.

12 Q. And you refer to Exhibit 2029 as Forrest in
13 your declaration; correct?

14 A. That's right.

15 Q. I will also refer to Exhibit 2029 as
16 Forrest.

17 A. Okay.

18 Q. Turn to paragraph 11 of Exhibit 2029,
19 please.

20 MS. ZHONG: Paragraph 11?

21 MR. BYUN: Paragraph 11.

22 THE WITNESS: Okay.

23 BY MR. BYUN:

24 Q. In the second sentence of this paragraph,
25 it says, A higher HOMO level -- strike that.

1 In the second sentence of this paragraph, it
2 states, "A higher HOMO energy level corresponds to
3 an ionization potential ("IP") having a smaller
4 absolute energy relative to a vacuum level."

5 Do you agree with this statement?

6 A. Yes.

7 Q. It also states, "Similarly, a higher LUMO
8 energy level corresponds to an electron affinity
9 ("EA") having a smaller absolute energy relative to
10 vacuum level."

11 Do you agree with this statement?

12 A. Yes.

13 Q. Turn to paragraph 103, please.

14 A. Okay.

15 Q. It states, "As is known in the art, the
16 error in measurement of HOMOs and LUMOs can be
17 significant." And further down, it says, "It is
18 recommended that candidate materials for a cascade
19 arrangement be selected from the literature, and
20 then the LUMOs and HOMOs of each of the candidate
21 materials be measured under the same conditions on
22 the same equipment to minimize experimental error."

23 Do you agree with these statements?

24 A. Yes --

25 MS. ZHONG: Objection; scope.

1 THE WITNESS: -- that's reasonable.

2 MR. BYUN: I am handing you Exhibit 1007, which
3 is U.S. Patent Application Publication 2004/0155238.

4 (Exhibit No. 1007 identified.)

5 MS. ZHONG: Which exhibit is it?

6 MR. BYUN: Exhibit 1007.

7 MS. ZHONG: 1007? Okay.

8 BY MR. BYUN:

9 Q. Do you recognize Exhibit 1007?

10 A. Yes, I do.

11 Q. You refer to Exhibit 1007 as Thompson in
12 your declaration; correct?

13 A. I do, yep.

14 Q. I will also refer to Exhibit 1007 as
15 Thompson. And I will turn to paragraph 42 of
16 Thompson, please.

17 A. Okay.

18 Q. Okay. The second-to-last sentence in this
19 paragraph, it states, "As would be understood by one
20 skilled in the art, a material that has a lower HOMO
21 level as compared with another material with one
22 that has a higher ionization potential (IP) as
23 compared with the IP of the other material."

24 MS. ZHONG: Which paragraph is that?

25 MR. BYUN: Paragraph 42, second-to-the-last

1 sentence.

2 BY MR. BYUN:

3 Q. Do you agree with this statement?

4 A. Can I read it a moment, please?

5 Q. Absolutely.

6 A. Yeah, I agree with that statement.

7 Q. Okay. In the next sentence, it says,
8 "Similarly, also as would be understood by one
9 skilled in the art, a material that has a higher
10 LUMO level as compared with another material is one
11 that has a lower electron affinity as compared with
12 the electron affinity of the other material."

13 Do you agree with this statement?

14 A. I do, yeah.

15 (Exhibit 1102 was marked for
16 identification.)

17 MR. BYUN: I am marking as Exhibit 1102 an
18 article titled "The interchain origin of the green
19 emission band in oxidized poly."

20 MS. ZHONG: So I am going to object on the
21 ground of relevance, hearsay.

22 BY MR. BYUN:

23 Q. Do you recognize Exhibit 1102?

24 A. I do.

25 Q. What is it?

1 A. It is a paper that I authored.

2 Q. Turn to page 218, please.

3 A. Okay.

4 Q. Under the heading "Experimental," five
5 lines down --

6 A. Uh-huh.

7 Q. It states, "PFO/polystyrene, PS, blended
8 foams were made with 0.06 percent PFO by spin
9 coating."

10 Do you see that?

11 A. I see that.

12 Q. So here, you have a layer composed of two
13 materials, PFO and PS, correct?

14 A. That's correct.

15 Q. The concentration of PFO is 0.06 percent;
16 correct?

17 A. Yes.

18 Q. And that means that the concentration of PS
19 is 99.94 percent; correct?

20 A. Yes.

21 Q. Here, is PFO a dopant?

22 A. It's doped into polystyrene, but I really
23 think that that's not been in context of an OLED
24 device, so I don't think I would use that
25 terminology, and I did not use that terminology

1 here.

2 Q. So is PFO a dopant or not?

3 A. PFO, you could say, was doped into
4 polystyrene, but this is not an OLED device. So,
5 you know, it is a very different context.

6 Q. So you are saying PFO is a dopant, but the
7 context is not that of an OLED device.

8 Is that a fair statement?

9 A. It is a fair statement, yeah.

10 Q. Is PFO a host?

11 A. I wouldn't say a host, no. "Host" is very
12 specific to an OLED, the terminology. I wouldn't
13 call that a host, just from a contextual point of
14 view.

15 Q. Is PS a dopant in this example?

16 A. It is not.

17 Q. Is PS a host?

18 A. No, again, because this is not an OLED
19 device.

20 Q. In this paper, why did you mix PFO and PS?

21 A. Well, I did that in order to isolate
22 polyfluorene chains from one another.

23 Q. Can you explain that further as to a
24 layperson?

25 A. So these are long-chain polymeric

1 molecules, both polystyrene and polyfluorene, and we
2 wanted to make a solid-state film in which the
3 polyfluorene chains are not in contact with one
4 another, and they would be separated by the presence
5 of polystyrene.

6 Q. What was the reason for selecting
7 polystyrene for that purpose?

8 A. Because it mixes reasonably well. And this
9 is going back to what I was talking about earlier,
10 that you have to be very selective in -- very
11 judicious in how you do these things.

12 For example, if we were to repeat this with a
13 different polymer, for example, PMMA, it would never
14 get to a point of having isolated chains. So this
15 is something very specific to the miscibility
16 between polyfluorene and polystyrene that enabled us
17 to separate those chains, which we couldn't
18 otherwise do because these are from a solution
19 process with something like PMMA.

20 Q. Earlier in the day, didn't you say that a
21 difference between a host and an emitter material is
22 that a host isolates the emitter materials from each
23 other?

24 A. In an OLED device, yes, that's one of the
25 rules.

1 Q. And then, in this context, why is PS not a
2 host, even though it similarly isolates PFO?

3 A. Simply because it is not an OLED device. I
4 only consider host-guest systems to be terminology
5 used in OLED. I don't see the need to bridge these
6 two -- the concept to this study.

7 Q. Okay. In this context, is PFO a matrix
8 material?

9 MS. ZHONG: Objection; form.

10 THE WITNESS: It could be. I would be more
11 comfortable in allowing that to be a way to describe
12 it, but it doesn't have to be. I mean, again,
13 matrix, in the context of my declaration, has been
14 in OLED devices, so the ability for it to separate
15 some guest material. But I don't want to
16 over-generalize.

17 BY MR. BYUN:

18 Q. Can you go to page 218, please?

19 A. Yeah.

20 Q. So right after the sentence that we just
21 looked at, there's a sentence that begins with "Such
22 a low concentration."

23 A. Uh-huh.

24 Q. So I'll just read it in full.

25 It states, "Such a low concentration was used to

1 ensure that the PFO chains were well dispersed
2 within the PS host in order to avoid interchain
3 contact in accordance with previous guidelines set
4 out by Grell, et al."

5 Can you explain what this means?

6 A. It means just what it says, that there's a
7 well dispersed and there's an isolation of the
8 chains. And, yes, it has been a while since I read
9 this. I see that the word "host" is used there.
10 You know, so it -- I don't think, you know, it
11 matters a whole lot. But yeah, I didn't remember
12 using that word.

13 When was this? 2004. But "matrix" and "hosts"
14 are interchangeable terms set out in my declaration
15 in the context of OLEDs. So it was based on a study
16 by Martin Grell where he established that these are
17 the concentrations that you need to go down to in
18 order to separate the polyfluorene chains. So
19 highly, highly, dilute.

20 BY MR. BYUN:

21 Q. Why were you interested in separating the
22 PFO chains again?

23 A. Well, this particular study was to -- so
24 this is a blue-emitting material that was, you know,
25 used for polymer LEDs. One of the problems with it

1 is that the color changes with degradation very
2 quickly, from blue to green, and the study sort of
3 set out to understand why it becomes green whenever
4 you've oxidized it or something similar.

5 So the way to -- the suspicion at the time was
6 these polyfluorene chains needed to be in contact
7 with one another in order for the green emission to
8 occur. And so it was really important to sort of
9 find a way to separate them out in a film form and
10 purposefully degrade the device and then see what
11 happens.

12 And when you do that, what you find is the green
13 emission disappears. So it kind of proved the fact
14 that the polyfluorene chains needed to be in contact
15 with one another so that it would be aggregated in
16 order for this green emission to form after
17 degradation. So that was the reason.

18 MR. BYUN: I pass the witness.

19 MS. ZHONG: Let's take a 45-minute break.
20 Sorry.

21 (Reporter Clarification.)

22 MS. ZHONG: Let's take 30 minutes.

23 (Recess.)

24 ///

25 ///

1 EXAMINATION

2 BY MS. ZHONG:

3 Q. Dr. Sims, can you pull up 1102, which is
4 the second article of yours, "The interchain origin
5 of the green emission band in oxidized poly
6 (9,9-dioctylfluorene)"?

7 A. Yep, I have it here.

8 Q. Okay. Can you please open to page 218?

9 A. Yep.

10 Q. The "Experiments" section?

11 Do you recall the discussion with Counsel
12 regarding whether PFO is a dopant within the PS
13 host?

14 A. Yes, I do.

15 Q. Okay. And do you recall that you also
16 testified that the PFO is a matrix material in that
17 system?

18 A. I do not recall that.

19 Q. Okay. So Counsel did ask you whether PFO
20 is a matrix material in the PFO/polystyrene blended
21 film system?

22 A. Uh-huh. Yeah, so I obviously misheard. I
23 obviously thought he had said polystyrene or PS
24 instead of PFO.

25 Q. Okay.

1 A. That is -- yeah.

2 Q. So is PFO a matrix material in the
3 PFO/polystyrene blend?

4 A. No, it is not.

5 Q. Can you pull up Exhibit 1001, which is the
6 '164 patent?

7 A. Yep. Do I have --

8 Q. I think you have a separate one. Let me
9 see.

10 A. There it is, yeah.

11 Q. Yes. Can you please turn to column 8?

12 A. Yep.

13 Q. Read to yourself column 8, lines 56 to 65.

14 A. Okay. Uh-huh.

15 Q. Do you recall the discussion with Counsel
16 about this paragraph?

17 A. Yes.

18 Q. Do you recall being asked whether BCP is a
19 matrix material or not in this composition?

20 A. Yes.

21 Q. Okay. And my understanding is that you
22 said BCP is a matrix material, correct?

23 A. I did, yes.

24 Q. Okay. Do you see that BCP is described as
25 being doped into the NBP matrix?

1 A. I do. That's what it says in that
2 sentence, that's right.

3 Q. Okay. Can you pull up your declaration,
4 Exhibit 2019? I believe it's here. You can leave
5 it at the table of contents.

6 Do you see that in the table of contents, at
7 Section V(B), the heading is "The Term 'Matrix
8 Material' Does Not Encompass Dopants"?

9 A. I do, yes.

10 Q. Okay. Do you stand by that testimony or
11 opinion?

12 A. I do.

13 Q. Okay. So here, the BCP is described as
14 being doped into the NPB matrix?

15 A. Uh-huh.

16 Q. So why do you consider that to be a matrix
17 material?

18 A. I think that when we were discussing this,
19 my mind just fixed on the -- other aspects of the
20 '164 patents. So the table, the example table of
21 mCP, TCTA, TBPI, they are more or less evaporated to
22 a -- sort of in an even proportion of one another.

23 So that's where -- that's what I was thinking at
24 the time, that you had a sort of similar percentage
25 of each of those within the -- within the matrix in

1 that case.

2 So that formed a, you know, a continuous or a
3 more or less continuous phase of those materials,
4 and that -- in this case, it actually does not state
5 any kind of evaporation rates or any kind of
6 compositional ratios of these various materials.

7 So that was a -- the reasoning why I thought it
8 was a matrix material, which is erroneous.

9 Q. Okay. And unlike the example in column 7,
10 does the example in column 8 mention that those
11 three materials are simultaneously vaporized?

12 A. It does not say that either, and I was
13 assuming that it did.

14 Q. Okay. And when someone says "doping a
15 component into a matrix," does that usually imply
16 that the matrix already exists and the -- and the
17 dopant is then added to it?

18 MR. BYUN: Objection; leading.

19 THE WITNESS: I mean, it definitely -- I mean, I
20 think in most cases, that's how you would interpret
21 that, yes. I mean -- yeah.

22 BY MS. ZHONG:

23 Q. And also, in this paragraph, the only
24 matrix that's mentioned is the NPB matrix, correct?

25 A. That's the only one that is mentioned

1 explicitly as a matrix, yep.

2 Q. It does not mention a matrix composed of
3 NPB, BCP, or UGH4; correct?

4 A. Yes, that's correct.

5 Q. Can you please take a look at column 7,
6 line 62, to column 8, line 20?

7 A. Yes.

8 Q. Do you recall a discussion with Counsel
9 about this list of materials before the lunch break?

10 A. I do.

11 Q. Okay. Do you recall questions by Counsel
12 as to whether these are the matrix materials?

13 A. Yes.

14 Q. Okay. So let's pick NPB, the first one in
15 the list as an example. Is it the case that NPB, by
16 virtue -- like, if a material is NPB, does that
17 necessarily mean that it is a matrix material in any
18 emissive layer of an OLED?

19 A. It does not. It depends on what the
20 composition of that particular material is.

21 Q. Does it also depend on the processing
22 conditions and other materials --

23 MR. BYUN: Objection; leading.

24 THE WITNESS: That's what I mean, really. Yeah.

25 ///

1 BY MS. ZHONG:

2 Q. Okay. And let's look at TCTA. Does the
3 material TCTA necessarily become a matrix material
4 when it is used in an emissive layer of an OLED?

5 A. For the same reason, no, it does not.

6 Q. And what factors determine whether it is a
7 matrix material or not?

8 A. Its compositional ratio compared to the
9 other materials. That's really what's -- that is
10 what decides whether it is or not.

11 Q. Okay. So if the material does not form a
12 more or less continuous phase into which an emitter
13 or a dopant can be embedded, do the materials on
14 this list become a matrix material?

15 A. Can you repeat that question, please?

16 Q. Sorry. So if a material in this list does
17 not form a more or less continuous phase --

18 A. Okay.

19 Q. -- into which a dopant can be embedded, is
20 that material a matrix material?

21 MR. BYUN: Objection; form.

22 BY MS. ZHONG:

23 Q. So if it does not form a more or less
24 continuous phase?

25 A. If it does not form a more or less

1 continuous phase and then?

2 Q. So if the material in this list does not
3 form a more or less continuous phase --

4 A. Uh-huh.

5 Q. -- is it still a matrix material?

6 A. I think no, by my definition.

7 Q. Okay. So under that definition, for
8 example, under -- so under that definition, aluminum
9 q3, ALq3, and BCP are not necessarily matrix
10 materials?

11 A. Not unless they are in a continuous phase.

12 Q. Do you recall in the beginning of the day,
13 Counsel asked you what is a matrix material, and I
14 think you testified matrix materials are materials
15 that are not emitter material and that are in an
16 emissive layer.

17 Do you recall your answer to that?

18 A. I do, yeah.

19 Q. Okay. Can you pull up Exhibit 1004, which
20 is Choulis? I have opened an electronic copy on
21 this computer.

22 (Exhibit No. 1004 identified.)

23 A. Yeah, I know it.

24 MR. BYUN: Objection; scope.

25 Counsel, I didn't ask any questions about this

1 exhibit.

2 MS. ZHONG: I think it is relevant to clarify
3 certain of his answers.

4 MR. BYUN: You need to limit your questions to
5 the scope of my cross.

6 MS. ZHONG: It is. It is going to become clear.

7 MR. BYUN: Well, I didn't -- like I said, I
8 didn't ask him any questions about this exhibit.

9 MS. ZHONG: Well, it is related to what a matrix
10 material is and a matrix material is. So it's
11 relevant to that. And you can move to strike it if
12 you don't like it, as we will for some of your
13 answers.

14 BY MS. ZHONG:

15 Q. So in this list, how many materials are
16 there in the emissive layer? If it's any easier,
17 take a look at paragraph 54, for example.

18 A. There's four listed.

19 Q. Okay. So there is PVK. There is PBD --
20 Paul, boy, David -- TPD -- Tom, Paul, David -- and
21 an emitter material; correct?

22 A. That's right.

23 MR. BYUN: Objection; outside the scope.

24 Counsel, I'm going to have a running objection,
25 outside the scope, on your questions regarding

1 Exhibit 1004, which I didn't ask any questions
2 about.

3 MS. ZHONG: That's fine. Okay.

4 BY MS. ZHONG:

5 Q. So in that emission layer, there are three
6 non-emitter materials; correct?

7 A. That's correct.

8 Q. Okay. TB -- PBD, TPD, and TPK; correct?

9 A. That's correct.

10 Q. So of those three -- is it your testimony
11 that all three of them are matrix materials?

12 A. No. Given the very low percentage of TPD
13 in this case, I mean, that's at a level which I
14 would consider to be a discontinuous phase from my
15 own experience.

16 That's not to say -- my hunch would be that
17 9 percent is too low to be considered a continuous
18 phase, right? So it's like something that's a
19 little bit anomalous about this system.

20 Q. Okay. So --

21 MR. BYUN: Counsel, can you explain how this
22 line of questioning is related to my questions?

23 MS. ZHONG: It is related to his answer when he
24 said that the non-emitting materials are matrix
25 materials, so that's -- I want him to explain his

1 reasoning.

2 BY MS. ZHONG:

3 Q. And so -- but TBD is --

4 MR. BYUN: Okay. I maintain my objection.

5 MS. ZHONG: Okay.

6 BY MS. ZHONG:

7 Q. So TBD is a not an emitter material?

8 A. Not in this device, rather.

9 Q. Okay. But you also say it's not a matrix
10 material or a matrix?

11 A. It probably is not at 9 percent weight,
12 yeah.

13 Q. Okay. So how do you reconcile that with
14 your previous answer that a matrix or matrix
15 materials are materials that are not emitter
16 materials in an emissive layer?

17 A. I wasn't thinking of these percentages.
18 Like I said, it was -- the percentage would have to
19 be more equal for all the other materials to be
20 somewhat -- somewhat continuous.

21 Q. Okay. So when you answered Counsel's
22 question, what you had in mind is the examples in
23 the '164 patent; is that correct?

24 A. Right, yes.

25 Q. Okay. And so your answers do not apply,

1 except to the Choulis systems, the Sugiura
2 systems --

3 (Reporter Clarification.)

4 BY MS. ZHONG:

5 Q. So your answers do not extend to the
6 Choulis systems, the Sugiura system, or the Thompson
7 system; is that correct?

8 MR. BYUN: Objection; leading.

9 THE WITNESS: It is correct.

10 BY MS. ZHONG:

11 Q. Can you please pull up the Sugiura systems?
12 I believe it is Exhibit 1006.

13 A. Yes, I believe I have it.

14 Q. Can you please just go to the last page
15 where all the figures are?

16 A. Uh-huh.

17 Q. Do you recall discussions with Counsel
18 about the Figure 4 configuration?

19 A. I do, yes.

20 Q. Where the 3D, 3E, and emitters are shown as
21 kind of in a discontinuous phase embedded in the PVK
22 phase?

23 A. Yes.

24 MR. BYUN: Objection; form.

25 BY MS. ZHONG:

1 Q. Okay. The corresponding energy diagram is
2 Figure 8 for Figure 4; correct?

3 You can take a look. It's at page 62?

4 A. That's right.

5 Q. Okay. And what is shown in Figure 8?

6 A. Well, it is showing -- there's a box and
7 that -- the top and bottom lines confining that box
8 are denoting the HOMO and LUMO level of PVK.

9 So that's the matrix, the overall matrix. And
10 then within that, you see some other energy levels,
11 again, HOMO and LUMO levels, of constituent
12 molecules; in this case, electron transport, hole
13 transport, and emitter material that are doped into
14 the PVK, which is the overall host matrix material.

15 Q. Okay. So let me see what I can understand
16 it.

17 So you said the box corresponds to PVK?

18 A. Yes.

19 Q. Okay. And what is the significance of the
20 box?

21 A. It's -- it's a matrix.

22 Q. Okay. So it is a conventional way to show
23 this is a matrix?

24 A. Yeah. I've seen this quite a lot --

25 Q. Okay.

1 A. -- as a way to describe it.

2 Q. And so the three materials are hole
3 transporting materials, light emitting material, and
4 the electron transport materials, as depicted here,
5 intend to be shown as dopants into that matrix?

6 A. Yes.

7 Q. Okay. You said that these energy levels
8 are HOMO and LUMO levels just now; correct?

9 A. Uh-huh.

10 Q. Does Sugiura mention HOMO and LUMO, as
11 opposed to ionization potential and the electron
12 affinity?

13 A. I don't think so. It's described as
14 ionization potential and electron affinity.

15 Q. Okay. So do the energy levels actually
16 correspond to HOMO and LUMO or correspond to
17 electron affinity and IP?

18 A. Those terms are often used interchangeably,
19 and it is not a big deal to do that. They are not
20 always the same, but you find in the literature that
21 often they are used interchangeably.

22 Ionization potential and electron affinity are
23 experimentally-determined values, like I touched
24 upon earlier, whereas HOMO and LUMO levels are
25 really derived from quantum mechanical calculations.

1 So it's -- they are orbital levels.

2 So they are often the same. I think it is
3 Koopmans' theorem that discusses the similarity
4 between them. But they are not always the same. It
5 depends on the quality of the calculation, and it
6 depends also on the quality of the experimentation.

7 Q. Okay. So if the HOMO level of Material A
8 is measured to be higher than the HOMO level of
9 Material B --

10 A. Uh-huh.

11 Q. -- does that necessarily follow that the
12 IP, the ionization potential, follows the same
13 trend?

14 MR. BYUN: Objection; form.

15 BY MS. ZHONG:

16 Q. Necessarily?

17 A. Not necessarily. There's so many factors
18 that could -- you know, theoretically, it should be.
19 They should be, like I mentioned before, but it
20 depends on how the experiment was done, it depends
21 on the quality of calculation, etc., etc. was it
22 done in a film form, was it done in a solution?
23 These things all have effects. But, usually, these
24 terms are interchangeable.

25 Q. Now, can you please take a look at

1 paragraph 62 of Sugiura, which is Exhibit 1006?

2 A. Yes.

3 Q. And the weight ratio stated here is PVK to
4 aluminum q3 to TPD to Nile Red is 100:60:80:0.2;
5 correct?

6 A. Yeah, I see that.

7 Q. So are these three materials in more or
8 less the same ratio, then?

9 A. In terms of weight, they are close. But,
10 you know, if you looked at their molar ratio, that
11 would be probably significantly different.

12 Q. Okay. That's because their molecular
13 weight are different?

14 A. Yeah, they can be quite a lot different. I
15 think PVK, the monomer of PVK would be quite a bit
16 less than the molecular weights of the other two
17 materials.

18 Q. Okay. So in this system, the PVK will
19 still be the majority phase, as depicted in Figure 8
20 and Figure 4; correct?

21 A. Yes, yeah.

22 MS. ZHONG: Pass the witness.

23 MR. BYUN: Let's take a break.

24 MS. ZHONG: Sure.

25 THE REPORTER: Going off the record at 2:56 p.m.

1 (Recess.)

2 THE REPORTER: Back on the record at 3:12 p.m.

3 MR. BYUN: For the record, after I passed the
4 witness after my initial questions, Counsel asked
5 for a 30- to 45-minute break and then ended up
6 taking about one and a half hours.

7 EXAMINATION

8 BY MR. BYUN:

9 Q. Dr. Sims, during the break, did you discuss
10 with Counsel anything relating to the substance of
11 your testimony?

12 MS. ZHONG: It's a yes-or-no question.

13 THE WITNESS: Oh, yes.

14 BY MR. BYUN:

15 Q. What did you discuss?

16 MS. ZHONG: I instruct you not to answer the
17 question.

18 MR. BYUN: What is the basis of your
19 instruction, Counsel?

20 MS. ZHONG: It is privileged conversation. You
21 can ask him the specific questions that's exchanged
22 here. Anything else, that will be privileged.

23 BY MR. BYUN:

24 Q. Are you going to follow your counsel's
25 instruction?

1 A. I have been instructed to.

2 Q. So you are going to follow her instruction?

3 A. Yes.

4 Q. Did you discuss with Counsel any questions
5 that Counsel was going to ask you?

6 A. Discuss any questions that Counsel was
7 going to ask --

8 MS. ZHONG: Objection; form.

9 THE WITNESS: We discussed my answers, some of
10 my answers to earlier parts of the discussion and
11 some -- yeah -- aspects of --

12 BY MS. ZHONG:

13 Q. Can you tell me what aspects you discussed
14 with Counsel?

15 MS. ZHONG: I instruct you not to answer.

16 THE WITNESS: Yeah, okay.

17 MS. ZHONG: You may ask specific questions
18 regarding the questions -- regarding the answers he
19 did give. Your question is way too broad, and it
20 could cover information that's not part of the
21 redirect. It could cover information that's not
22 even necessarily related to --

23 (Reporter Clarification.)

24 MS. ZHONG: That's not even necessarily related
25 to this deposition, but other technical questions.

1 So you need to be a little more specific.

2 THE WITNESS: I mean, I can offer the
3 polyfluorene question. That was clearly, like, a --
4 you know, it wasn't something that I -- I misheard
5 what you said, and it was really important that I
6 was able to clear that answer, because it is obvious
7 that I did not mean what I said or I misinterpreted
8 your question.

9 So that was something that was -- you know, we
10 discussed. And that was useful because I -- it was
11 an unintentional answer. It was not what I meant to
12 say, or I misheard what you had asked me.

13 BY MR. BYUN:

14 Q. Was it -- was it Counsel or you that
15 suggested that you discuss that specific point
16 during the break?

17 MS. ZHONG: I instruct you not to answer.

18 THE WITNESS: Okay.

19 MR. BYUN: And, again, what is the basis of the
20 instruction?

21 MS. ZHONG: Privilege.

22 MR. BYUN: That is an improper instruction. We
23 reserve the right to hold the deposition open.

24 MS. ZHONG: Well, we disagree.

25 BY MR. BYUN:

1 Q. Did you discuss any questions that Counsel
2 was going to ask you with Counsel?

3 MS. ZHONG: Objection; form.

4 And I also instruct you, to the extent you can
5 answer the question without revealing confidential
6 and privileged conversations, you may answer.

7 THE WITNESS: Okay. We did not discuss specific
8 questions. We reviewed some -- some of the topics
9 that were discussed, and, you know, just -- like,
10 some of my responses, just on a conversational
11 level.

12 BY MR. BYUN:

13 Q. You testified earlier that whether or not a
14 material is a matrix material depends on the
15 compositional ratio.

16 Do you recall that?

17 A. Yes.

18 Q. What do you mean by "the compositional
19 ratio"?

20 A. Well, if you have a multi-component system,
21 let's say, several materials that aren't an emitter
22 material specifically, then the composition -- let's
23 say you had a 10 percent emitter, right. Then, you
24 have a 90 percent of something else. The
25 compositional ratio, that could be 30, 30, 30, or it

1 could be -- it could be, you know, 10, 40, 40.

2 That's compositional ratio.

3 MR. BYUN: Can we take a break?

4 MS. ZHONG: Sure.

5 THE REPORTER: Going off the record at 3:18 p.m.

6 (Recess.)

7 THE REPORTER: Going back on the record at

8 3:19 p.m.

9 BY MR. BYUN:

10 Q. So if the compositional ratio of a material
11 is 10 percent, that's not a matrix material. Is
12 that what you are saying?

13 A. It doesn't have to be. I'm not saying that
14 that is the case. That was just an example of what
15 a compositional ratio means.

16 Q. So what is the composition ratio at which a
17 matrix -- strike that.

18 So what is the composition ratio at which a
19 material is a matrix material?

20 A. I don't think that there is one. It
21 depends on the process. There's no hard number to
22 say that. But based on my experience, when you get
23 to something in the single digits in terms of
24 composition percentage, you may be starting to see
25 discontinuous behavior, discontinuous phase of that

1 component, similar to what I discussed with Choulis
2 and TPD example.

3 And any kind of emitter, like a phosphorous
4 emitter or even a fluorescent emitter, would
5 typically be in single digit percentages and in an
6 emissive layer, and they are, by design, separated.
7 So they are discontinuous, and they are not matrix
8 materials.

9 Q. If the compositional ratio of a material is
10 over 20 percent, is that a matrix material?

11 MS. ZHONG: Objection; form.

12 THE WITNESS: I can't say. I can't say.

13 BY MR. BYUN:

14 Q. Why not?

15 A. Because we need to know what the materials
16 are. So that's like, their molecular weight is
17 important, how they were processed. So that could
18 be evaporated or it could be solution-processed.
19 There's many, many factors.

20 Q. Can you turn to Sugiura, please? That is
21 Exhibit 1006.

22 A. I had it earlier.

23 MS. ZHONG: No, that's mine.

24 THE WITNESS: Oh, maybe this is it.

25 Yeah, this is it.

1 MR. BYUN: Turn to paragraph 61, please.

2 MS. ZHONG: Which paragraph?

3 MR. BYUN: I'm sorry. Paragraph 62, please.

4 THE WITNESS: Uh-huh.

5 BY MR. BYUN:

6 Q. In this paragraph, Sugiura provides the
7 compositional ratio of various materials; correct?

8 A. Yes, it does.

9 Q. Does PVK have sufficiently high
10 compositional ratio for it to be a matrix material?

11 A. Yes, in this case. And like I mentioned
12 before, these would need to be converted -- to be
13 more physically meaningful, they need to be
14 converted into a -- into a molar percent, you know,
15 a molar percent, rather than a weight ratio. But
16 that would probably make the differences greater.
17 So, therefore, absolutely, PVK would be the matrix
18 material in this sense, yep.

19 Q. Does TPD have sufficiently high
20 compositional ratio for it to be a matrix material
21 here?

22 A. I don't know. And one of the reasons
23 why -- ratio again is -- or compositional ratio is
24 one aspect. The other issue is how it was
25 processed.

1 So I cannot say, based on these numbers alone,
2 because this is a spin-coated material. And like I
3 mentioned a few times before, spin coating can --
4 not even can. I can say stronger than that. It
5 will likely not give you a fine blend of those
6 components.

7 So how it ends up in the final film is
8 absolutely unclear, and more so, some of these
9 materials may end up in -- in islands and
10 discontinuous, even if they are at high ratios,
11 because of that process and type.

12 Q. So you're sure in this case that PVK is a
13 matrix material, but you don't know whether TPD is a
14 matrix material?

15 A. I don't think it is. Because of the way
16 they've drawn it, actually, you know, they've given
17 us a hint in their schematics that those are not
18 matrix materials, that TPD is not a matrix material.
19 So maybe they know something they are not disclosing
20 here in terms of how the morphology of the film is.
21 But they're giving clues that suggest that those
22 materials are being doped into PVK.

23 Q. Does paragraph 62 indicate that TPD is
24 doped?

25 A. It doesn't explicitly state that, but it

1 indicates it from the compositional ratio, the
2 weight ratio, as it is described.

3 Q. Well, didn't you say earlier that paragraph
4 62 describes the fabrication method?

5 A. Okay. I've just turned the page now.
6 Sorry. I see where you refer.

7 Yeah, it's spin-coated. Sorry, what was your
8 question again, exactly? Does it -- it leads you to
9 think that PVK is a matrix material, based on the
10 description in the text?

11 Q. Does paragraph 62 of Sugiura indicate that
12 TPD is doped?

13 A. Indicate that --

14 Q. TPD.

15 A. -- TPD is doped?

16 I don't understand. Something is inside TPD?
17 TPD itself is being doped or it's a dopant?

18 Q. Is TPD a dopant here?

19 A. Okay. It is -- it is at a lower -- it is a
20 lower weight ratio than the other materials. And
21 the -- going to the schematic that they provide,
22 that's what really gives the clue that they consider
23 it to be a dopant.

24 Q. So it's your testimony here today that TPD
25 is a dopant; correct?

1 A. Yes. I believe so, based on the
2 information that they give us. But I really am very
3 unsure about the final film that they're creating
4 here. I can only go by what they're saying. But in
5 my experience, I will say it again, you spin coat,
6 you know, a blend of materials from a solvent. This
7 is a mixed solvent in this case.

8 The properties of the final film, in terms of
9 the distribution of the materials, is far from
10 clear, and I think it would be erroneous to think
11 that they are finely blended.

12 (Reporter Clarification.)

13 THE WITNESS: Or finely mixed, blended.

14 MR. BYUN: Pass the witness.

15 MS. ZHONG: I think that's the end of the
16 deposition.

17 Thank you so much, Dr. Sims, and thank you so
18 much, Court Reporter.

19 THE REPORTER: Thank you.

20 We're going off the record at 3:28 p.m.

21 (The deposition was concluded
22 at 3:28 p.m.)

23
24
25

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

I certify or declare under declaration
under penalty of perjury that the foregoing testimony is
true and correct.

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

Dr. Marc Sims

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

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

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

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

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

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

21 In witness whereof, I have subscribed my name,
22 this 4th day of August, 2025.

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

A			
ability	accordance	41:10, 42:14,	allowing
7:18, 66:9,	85:3	55:4, 70:9,	84:11
84:14	according	70:13, 71:1,	alone
able	43:24, 75:5	74:3, 82:18,	33:15, 109:1
10:6, 10:21,	accurate	84:12, 85:22,	alq3
11:11, 14:23,	56:7	98:11, 104:19,	66:18, 67:5,
57:12, 65:13,	accuse	108:23, 110:8,	93:9
65:24, 66:8,	76:14	111:5	already
66:22, 67:1,	achieved	agglomeration	14:11, 90:16
104:6	58:22, 59:24,	57:1	also
about	64:25	agglomerations	3:39, 6:7,
11:5, 14:2,	acting	45:25, 46:3,	6:11, 8:25,
24:1, 24:2,	36:21	46:12, 46:15,	13:14, 16:11,
24:10, 24:15,	action	46:19, 46:24,	18:4, 18:18,
24:16, 25:7,	113:15	47:14, 47:24,	20:25, 22:3,
25:10, 25:20,	actual	48:13, 49:1,	35:10, 47:17,
25:24, 26:1,	32:17	56:23, 62:13,	48:25, 52:20,
26:25, 27:4,	actually	62:19, 62:21,	62:4, 75:2,
28:24, 29:23,	19:17, 24:3,	63:1, 63:21,	77:15, 78:7,
31:4, 31:9,	39:17, 52:19,	64:20	79:14, 80:8,
31:14, 31:22,	90:4, 99:15,	aggregated	87:15, 90:23,
31:24, 32:6,	109:16	86:15	91:21, 96:9,
37:6, 44:5,	added	ago	100:6, 105:4
44:17, 44:18,	35:13, 90:17	73:25	alto
44:22, 49:11,	adhere	agree	3:11, 3:13
50:2, 50:12,	50:6	43:10, 43:20,	aluminum
50:20, 51:24,	adjacent	47:13, 62:22,	93:8, 101:4
55:19, 67:21,	21:20	65:18, 65:21,	always
68:18, 70:21,	adjust	65:22, 66:16,	55:19, 99:20,
83:9, 88:16,	42:25	66:20, 78:5,	100:4
91:9, 93:25,	adjusting	78:11, 78:23,	amongst
94:8, 95:2,	28:24	80:3, 80:6,	53:2
95:19, 97:18,	affected	80:13	amorphous
102:6, 111:3	55:12	ahead	24:2
absolute	affinity	6:3, 14:13,	analyzed
47:16, 78:4,	78:8, 80:11,	18:22, 18:24,	70:11
78:9	80:12, 99:12,	71:9	angeles
absolutely	99:14, 99:17,	al	3:23
80:5, 108:17,	99:22	4:15, 85:4	angstroms
109:8	after	all	23:6, 23:18,
ac-2	65:4, 84:20,	10:25, 23:19,	24:23, 26:19
69:22, 69:24	86:16, 102:3,	29:17, 29:21,	anita
ac-2-type	102:4	37:21, 50:21,	6:9
74:3	afterwards	51:13, 55:12,	anne
accommodate	11:19	59:16, 59:18,	2:24, 113:4
7:5	again	60:8, 95:11,	anneal
	13:11, 20:15,	96:19, 97:15,	65:4
	20:16, 41:9,	100:23	annealed
			61:15

annealling 65:5 annita 3:21 anomalous 95:19 another 10:1, 11:17, 12:23, 21:9, 21:25, 22:15, 46:6, 49:6, 49:13, 50:10, 51:4, 51:21, 60:14, 67:2, 79:21, 80:10, 82:22, 83:4, 86:7, 86:15, 89:22 answer 7:7, 7:17, 17:8, 26:9, 52:15, 60:5, 71:9, 93:17, 95:23, 96:14, 102:16, 103:15, 104:6, 104:11, 104:17, 105:5, 105:6 answered 13:10, 13:13, 14:11, 14:21, 20:6, 96:21 answers 6:24, 6:25, 7:15, 7:17, 76:20, 94:3, 94:13, 96:25, 97:5, 103:9, 103:10, 103:18 any 7:14, 8:9, 9:5, 9:7, 9:9, 17:21, 22:17, 29:14, 33:14, 34:22, 35:16, 37:22, 51:22, 53:7, 55:16, 58:11, 58:13, 63:18,	70:11, 76:19, 90:5, 91:17, 93:25, 94:8, 94:16, 95:1, 103:4, 103:6, 105:1, 107:3, 113:15 anymore 51:15 anything 29:23, 44:5, 67:3, 73:5, 73:11, 76:18, 102:10, 102:22 anywhere 62:13 apart 23:19, 33:14 appeal 1:2, 2:2 appear 15:11 appearances 3:37, 6:4 appearing 3:4, 3:17 application 61:24, 77:7, 79:3 apply 96:25 approach 48:10 appropriate 13:14, 71:3, 71:5 archetypal 74:13 area 52:2 aren't 33:20, 59:23, 105:21 argue 17:1 argument 23:21 arrangement 78:19	art 78:15, 79:20, 80:9 article 67:13, 67:18, 80:18, 87:4 asked 13:9, 13:13, 13:22, 14:12, 14:20, 17:2, 25:15, 52:14, 88:18, 93:13, 102:4, 104:12 asking 13:18, 14:6, 15:12, 17:4, 50:12, 70:15 asks 17:7 aspect 108:24 aspects 55:10, 89:19, 103:11, 103:13 assuming 90:13 attempt 25:23, 64:23, 65:12 attribute 36:13 atypical 73:5 august 113:22 authored 81:1 avenue 3:22 average 24:23 avoid 85:2 aware 8:9, 8:14, 58:11, 58:13, 65:16 away 68:9	B b2 4:12 back 32:22, 39:13, 40:6, 47:18, 56:19, 74:15, 77:4, 83:9, 102:2, 106:7 background 63:4 balance 55:20 band 4:24, 80:19, 87:5 barrier 75:8, 75:20, 75:23 based 13:19, 85:15, 106:22, 109:1, 110:9, 111:1 basically 12:19, 40:14, 51:11, 68:22 basis 62:16, 63:18, 102:18, 104:19 bcp 42:11, 42:20, 42:25, 43:3, 43:7, 43:11, 43:13, 43:17, 43:19, 43:21, 44:2, 44:7, 44:11, 44:14, 45:3, 45:10, 56:22, 56:25, 57:3, 57:16, 57:22, 88:18, 88:22, 88:24, 89:13, 91:3, 93:9 beach 1:25, 2:22, 3:31, 6:1
--	--	---	---

bearing 44:20, 68:9, 68:11 because 12:10, 25:10, 33:6, 33:17, 34:7, 34:11, 34:17, 34:24, 35:2, 36:11, 41:9, 44:4, 44:9, 49:1, 49:4, 49:9, 49:15, 50:1, 51:9, 52:12, 52:16, 53:10, 53:21, 54:12, 54:19, 55:1, 55:15, 55:25, 56:16, 57:3, 57:23, 71:24, 72:1, 72:2, 75:25, 76:1, 76:19, 82:18, 83:8, 83:18, 84:3, 101:12, 104:6, 104:10, 107:15, 109:2, 109:11, 109:15 become 92:3, 92:14, 94:6 becomes 51:13, 86:3 been 6:18, 6:21, 59:5, 65:13, 81:23, 84:13, 85:8, 103:1 before 1:2, 2:2, 2:23, 6:21, 10:12, 16:7, 25:15, 26:9, 26:13, 60:13, 63:22, 65:3, 91:9, 100:19, 108:12, 109:3, 113:8, 113:19	begin 6:4 beginning 93:12 begins 74:20, 84:21 behalf 2:20, 3:4, 3:17 behavior 106:25 being 11:20, 31:1, 31:4, 36:8, 36:18, 41:14, 88:18, 88:25, 89:14, 109:22, 110:17, 113:12 believe 20:6, 30:17, 52:15, 66:7, 73:24, 73:25, 89:4, 97:12, 97:13, 111:1 belonged 38:9 best 7:18, 11:13, 26:14, 41:15 between 22:19, 23:3, 23:22, 24:4, 26:3, 28:21, 30:15, 31:5, 31:15, 31:24, 32:2, 32:10, 32:13, 32:16, 32:17, 33:19, 51:23, 63:8, 63:12, 63:13, 63:15, 69:6, 69:14, 75:5, 83:16, 83:21, 100:4 beyond 8:11, 8:12, 61:20 big 45:7, 99:19	bit 26:8, 51:8, 51:9, 51:11, 52:21, 95:19, 101:15 bites 16:18 blend 34:11, 88:3, 109:5, 111:6 blended 81:7, 87:20, 111:11, 111:13 blending 76:2 blue 86:2 blue-emitting 85:24 blurry 36:11 board 1:2, 2:2 both 22:2, 67:23, 74:8, 83:1 bottom 72:23, 98:7 box 98:6, 98:7, 98:17, 98:20 boy 94:20 break 7:5, 7:8, 40:2, 76:10, 86:19, 91:9, 101:23, 102:5, 102:9, 104:16, 106:3 bridge 84:5 broad 103:19 broader 24:7 bulk 21:3 curling 3:7	C ca 1:34, 3:13, 3:23, 3:31, 113:26 calculation 100:5, 100:21 calculations 99:25 california 1:25, 2:22, 2:27, 6:1, 112:6, 113:1, 113:6 call 69:20, 82:13 called 6:18, 29:16, 36:20 calling 31:3 camino 3:10 can't 7:16, 26:11, 26:19, 33:6, 33:8, 33:17, 33:23, 40:24, 41:8, 44:4, 44:9, 50:20, 64:10, 107:12 candidate 78:18, 78:20 cannot 7:14, 11:19, 109:1 capable 51:6 captioner 2:26 carefully 58:23, 59:24, 60:2, 60:4, 60:25 carefully-tailor- ed 60:22, 61:3,
---	--	---	---

61:8 carrier 28:21 cartoon 75:18 cascade 78:18 case 1:7, 2:7, 25:17, 35:14, 35:24, 43:14, 90:1, 90:4, 91:15, 95:13, 98:12, 106:14, 108:11, 109:12, 111:7, 113:18 case-by-case 64:11 cases 11:2, 90:20 center 2:21, 3:30 certain 22:16, 94:3 certainly 7:17, 37:3, 41:1, 43:13, 64:25, 66:11, 74:4 certified 2:25, 2:26, 61:23, 113:5 certify 112:1, 113:6, 113:14 chains 82:22, 83:3, 83:14, 83:17, 85:1, 85:8, 85:18, 85:22, 86:6, 86:14 chance 65:3 change 25:5, 51:14 changes 86:1 characteristics 43:1, 69:12	charge 28:21, 29:7, 54:7, 54:20 charge-carrying 31:15 charged 21:10, 29:10, 29:11, 51:3, 51:6, 53:23, 54:13, 55:1, 55:16, 55:18, 55:20, 56:1, 56:5, 56:10, 56:17 charges 54:9 check 20:10 checking 65:20 choice 61:21 chose 73:2 choulis 93:20, 97:1, 97:6, 107:1 cite 50:3 claim 17:21, 35:12, 38:3 clarification 12:3, 12:12, 16:3, 68:20, 86:21, 97:3, 103:23, 111:12 clarify 13:22, 94:2 clear 7:1, 12:8, 20:15, 33:20, 62:25, 64:22, 73:13, 73:17, 94:6, 104:6, 111:10 clearly 62:20, 104:3	close 21:24, 23:5, 23:7, 23:10, 35:4, 65:24, 66:22, 101:9 closer 26:16 clue 64:19, 110:22 clues 109:21 co-authored 67:18 co-deposited 58:25, 59:14 co-doping 41:19, 41:20, 41:24 coat 111:5 coating 65:6, 81:9, 109:3 cohesion 22:17 colleague 6:7 collectively 54:22 color 86:1 column 27:12, 27:18, 27:19, 28:12, 31:12, 32:22, 35:18, 37:6, 37:23, 38:12, 39:2, 39:11, 39:13, 39:17, 39:18, 39:20, 42:2, 42:4, 44:23, 48:17, 52:8, 56:20, 74:19, 88:11, 88:13, 90:9, 90:10, 91:5, 91:6 com 3:15, 3:26,	3:34 comfortable 30:25, 31:3, 84:11 commenced 77:2 commencing 2:22 comment 33:17, 41:8, 57:12 commingled 58:25 commit 26:19 common 72:17, 72:19 commonly 73:4, 74:5 compared 25:12, 26:13, 48:9, 79:21, 79:23, 80:10, 80:11, 92:8 completely 17:14 completion 113:19 complicated 10:22 component 90:15, 107:1 components 10:4, 34:22, 60:13, 109:6 composed 39:4, 39:7, 42:11, 81:12, 91:2 composition 66:14, 88:19, 91:20, 105:22, 106:16, 106:18, 106:24 compositional 41:12, 49:18, 49:25, 52:24, 55:13, 90:6,
---	--	--	---

92:8, 105:15, 105:18, 105:25, 106:2, 106:10, 106:15, 107:9, 108:7, 108:10, 108:20, 108:23, 110:1 compositions 76:2 compounds 9:20 comprise 9:24, 10:14 comprised 42:20 comprises 9:19, 10:3, 21:1, 35:20 computer 93:21 concentration 40:22, 40:23, 41:4, 44:6, 50:7, 50:9, 51:19, 81:15, 81:18, 84:22, 84:25 concentrations 85:17 concept 84:6 concluded 111:21 conditions 78:21, 91:22 confidential 105:5 configuration 97:18 confining 98:7 confusion 37:5 consider 54:4, 61:6, 61:13, 71:8, 75:13, 84:4, 89:16, 95:14,	110:22 consideration 4:17 considered 95:17 consistent 63:9 constituent 98:11 constituents 53:18 constitute 11:16, 11:17, 36:1, 36:5, 36:17, 37:13, 37:15, 37:16 constitutes 17:16 construction 17:22 construe 14:3 contact 83:3, 85:3, 86:6, 86:14 contain 10:8 containing 62:9 contains 7:23, 35:20, 37:9, 64:20 content 21:4 contents 89:5, 89:6 contested 70:18, 70:23 contests 17:11 context 9:2, 9:22, 9:23, 10:11, 14:23, 19:25, 20:4, 20:17, 20:21, 21:11, 47:1, 47:3, 81:23, 82:5,	82:7, 84:1, 84:7, 84:13, 85:15 contextual 82:13 continued 3:37 continuity 57:13 continuous 21:14, 21:16, 21:18, 22:2, 22:9, 22:17, 22:20, 22:23, 23:8, 23:13, 23:17, 23:25, 26:5, 26:24, 33:4, 33:9, 33:10, 33:13, 33:16, 33:24, 34:3, 34:4, 34:10, 34:12, 34:15, 34:20, 35:3, 44:2, 44:8, 47:23, 48:11, 48:12, 48:25, 49:7, 49:9, 49:16, 49:21, 49:22, 49:25, 50:18, 50:23, 51:1, 51:13, 52:11, 53:1, 53:3, 53:9, 53:13, 53:15, 53:17, 53:18, 54:12, 54:17, 54:19, 54:22, 54:23, 54:25, 55:15, 55:25, 56:16, 57:4, 57:16, 57:22, 60:18, 63:4, 90:2, 90:3, 92:12, 92:17, 92:24, 93:1, 93:3, 93:11, 95:17, 96:20	continuous-phase 23:2 control 32:7, 61:19 convenience 73:13, 73:17 conventional 98:22 conversation 102:20 conversational 105:10 conversations 105:6 conversely 46:18 converted 108:12, 108:14 copy 7:24, 47:8, 93:20, 113:13 correct 8:7, 8:23, 10:9, 14:19, 18:21, 23:4, 27:15, 27:20, 27:24, 28:2, 28:6, 28:10, 28:22, 29:4, 29:8, 30:24, 31:6, 31:18, 32:3, 32:9, 32:15, 32:20, 35:8, 35:11, 36:2, 36:3, 38:6, 38:10, 38:23, 39:8, 39:11, 39:24, 42:11, 42:20, 43:1, 43:4, 43:11, 43:17, 48:3, 48:20, 48:24, 49:17, 52:11, 52:17, 53:25, 62:10, 62:13, 65:25, 66:23, 77:13, 79:12, 81:13,
---	---	--	--

81:14, 81:16, 81:19, 88:22, 90:24, 91:3, 91:4, 94:21, 95:6, 95:7, 95:8, 95:9, 96:23, 97:7, 97:9, 98:2, 99:8, 101:5, 101:20, 108:7, 110:25, 112:3, 113:12 correspond 99:16 corresponding 98:1 corresponds 12:15, 13:7, 78:2, 78:8, 98:17 could 9:6, 11:24, 11:25, 22:14, 29:16, 30:12, 30:20, 41:25, 45:7, 45:10, 45:11, 46:12, 46:14, 58:22, 59:24, 63:10, 64:18, 72:15, 73:8, 82:3, 84:10, 100:18, 103:20, 103:21, 105:25, 106:1, 107:17, 107:18 couldn't 83:17 counsel 12:25, 13:11, 16:16, 16:21, 17:5, 17:7, 42:14, 47:7, 70:13, 76:5, 76:8, 87:11, 87:19, 88:15, 91:8, 91:11, 93:13, 93:25, 94:24, 95:21,	97:17, 102:4, 102:10, 102:19, 103:4, 103:5, 103:6, 103:14, 104:14, 105:1, 105:2, 113:14 counsel's 96:21, 102:24 counter 54:8 counterpoint 48:6 county 113:3 coupling 51:22 course 32:16, 62:24, 68:10 court 12:10, 111:18 courtroom 7:12 cover 103:20, 103:21 covington 3:7, 6:7 crash 65:10 crc 1:33, 113:4, 113:25 create 39:3 creating 111:3 critical 66:5 cross 94:5 cross-examination 13:21 crr 1:33, 113:4, 113:25 crystal 24:2 crystalline 25:19	crystals 24:10 csr 1:34, 6:14, 113:26 cv 74:7 cyclic 74:4 D dated 7:21, 58:1 david 94:20 day 64:24, 83:20, 93:12, 112:5, 113:22 dcjtb 70:6, 71:19, 74:21 deal 99:19 deals 14:25 decides 92:10 declaration 4:25, 7:21, 8:6, 8:23, 13:16, 13:21, 13:23, 13:24, 14:5, 14:24, 15:3, 16:17, 17:15, 17:23, 18:5, 18:23, 45:22, 58:1, 58:8, 68:9, 68:10, 68:12, 70:10, 70:17, 71:5, 77:13, 79:12, 84:13, 85:14, 89:3, 112:1 declare 112:1 deep 68:2, 68:5	defendant 3:17 definitely 90:19 definition 20:13, 47:16, 49:4, 57:18, 93:6, 93:7, 93:8 degradation 4:16, 67:14, 86:1, 86:17 degrade 86:10 degree 60:12, 63:23, 64:9 delicate 51:9 denoting 98:8 depend 24:13, 91:21 depending 11:20, 12:20, 41:12, 55:8, 60:8, 60:16 depends 11:4, 11:12, 12:23, 24:6, 25:1, 27:6, 40:14, 40:15, 41:9, 49:18, 53:19, 56:4, 57:9, 64:6, 91:19, 100:5, 100:6, 100:20, 105:14, 106:21 depict 72:17 depicted 59:13, 99:4, 101:19 depicts 62:8, 62:25 deposed 6:21 deposit 16:9
---	---	---	---

deposited 27:8, 36:14, 60:10 depositing 52:20 deposition 1:21, 2:20, 11:15, 12:15, 13:6, 14:17, 16:8, 103:25, 104:23, 111:16, 111:21, 113:7, 113:18 der 22:19 derived 99:25 describe 35:21, 45:10, 56:25, 57:23, 75:24, 84:11, 99:1 described 36:13, 37:21, 44:23, 45:5, 45:11, 88:24, 89:13, 99:13, 110:2 describes 37:7, 42:25, 43:3, 43:10, 43:17, 43:20, 48:19, 64:16, 110:4 describing 39:7, 45:8, 51:20 description 4:11, 41:16, 110:10 design 4:17, 16:8, 49:12, 50:5, 53:11, 107:6 designed 41:14, 50:1, 67:5 desirable 10:16, 55:21	desired 10:1, 56:1, 56:5, 61:17 detail 13:17, 51:8, 57:10 details 11:13, 53:19, 60:9, 76:4 determination 19:19 determine 11:10, 16:5, 16:13, 19:5, 19:8, 19:9, 19:16, 33:21, 92:6 determined 16:7 developed 15:16 device 9:4, 9:5, 9:6, 9:7, 9:10, 9:21, 10:19, 11:8, 11:9, 11:23, 12:21, 16:2, 26:5, 50:5, 50:8, 51:15, 52:16, 52:25, 53:11, 53:24, 54:3, 54:5, 55:9, 55:10, 55:12, 55:21, 56:9, 64:2, 75:18, 75:21, 81:24, 82:4, 82:7, 82:19, 83:24, 84:3, 86:10, 96:8 devices 4:20, 84:14 diagram 70:6, 70:8, 72:10, 98:1 diagrams 70:20, 70:21, 72:18	difference 30:15, 30:18, 44:20, 75:13, 83:21 differences 108:16 different 10:25, 23:14, 25:3, 25:4, 27:7, 34:11, 40:15, 40:16, 40:17, 41:11, 41:23, 43:16, 61:16, 65:8, 65:10, 69:20, 76:3, 82:5, 83:13, 101:11, 101:13, 101:14 difficult 25:11, 61:9, 66:3 digit 107:5 digits 106:23 dilute 85:19 dioctylfluorene 87:6 diplomate 2:24 direct 18:4 direction 66:7 disagree 17:17, 71:1, 71:6, 104:24 disappears 86:13 disbursed 40:21 discloses 27:23, 42:10, 42:19 disclosing 109:19 disconnected 46:6, 46:13,	63:5 discontinuous 21:17, 22:24, 23:9, 23:14, 23:20, 23:22, 46:4, 48:14, 49:14, 50:11, 51:5, 51:12, 51:20, 53:22, 60:15, 60:19, 95:14, 97:21, 106:25, 107:7, 109:10 discrete 11:1, 11:20, 12:6 discuss 102:9, 102:15, 103:4, 103:6, 104:15, 105:1, 105:7 discussed 37:10, 49:23, 103:9, 103:13, 104:10, 105:9, 107:1 discusses 13:16, 100:3 discussing 89:18 discussion 47:6, 67:6, 87:11, 88:15, 91:8, 103:10 discussions 97:17 dispersed 45:25, 46:3, 46:15, 46:18, 46:24, 47:14, 47:24, 49:1, 56:22, 62:12, 62:18, 62:21, 63:1, 63:21, 64:20, 85:1, 85:7 display 1:4, 2:4, 3:4,
---	---	--	---

4:26, 6:6 displays 1:10, 2:10, 3:17, 4:26 dispute 17:15, 17:20 distance 24:23, 24:25, 26:3, 31:10, 31:14, 31:24, 32:2 distances 23:3, 23:5, 24:4, 24:22, 25:6, 25:12, 25:16, 28:21, 28:25, 31:5, 31:17, 32:7, 32:10, 32:13, 32:16, 33:7, 33:19, 33:20, 34:18, 63:8, 63:12, 63:13, 63:14, 63:16 distinct 41:21 distinction 37:2 distributed 48:13 distribution 25:6, 48:8, 48:9, 111:9 document 8:7, 42:13, 47:2, 57:6, 58:9, 67:11 documented 74:14 doing 30:14, 73:5, 76:14 done 27:16, 28:16, 42:8, 73:5, 73:20, 74:1, 74:2, 100:20, 100:22	dopant 22:22, 22:25, 40:9, 40:10, 40:16, 41:5, 43:4, 43:11, 43:17, 43:21, 50:7, 81:21, 82:2, 82:6, 82:15, 87:12, 90:17, 92:13, 92:19, 110:17, 110:18, 110:23, 110:25 dopants 46:15, 46:18, 46:25, 47:14, 89:8, 99:5 dope 43:7 doped 18:14, 40:17, 40:20, 41:21, 81:22, 82:3, 88:25, 89:14, 98:13, 109:22, 109:24, 110:12, 110:15, 110:17 doping 40:12, 40:13, 41:23, 42:25, 43:6, 43:18, 90:14 double-check 62:14 doubt 65:13, 73:9 down 19:17, 26:8, 67:22, 74:19, 78:17, 81:5, 85:17 dr 1:21, 2:20, 3:40, 4:2, 4:25, 6:8, 6:17, 6:21, 7:21, 17:11, 18:4, 18:10, 18:16, 19:2,	40:9, 58:1, 70:18, 87:3, 102:9, 111:17, 112:11 drawn 62:23, 72:11, 72:15, 109:16 drew 65:16 drive 2:22, 3:30 duly 6:18, 113:9 dupont 15:14, 15:16 during 7:4, 16:8, 102:9, 104:16 E ea 70:25 each 12:7, 12:14, 13:6, 14:17, 21:20, 22:3, 22:10, 22:11, 22:19, 23:8, 27:7, 38:16, 53:12, 54:18, 54:21, 54:24, 55:6, 55:14, 55:24, 56:15, 58:22, 65:9, 65:24, 66:22, 78:20, 83:22, 89:25 earlier 14:12, 49:23, 63:7, 63:11, 64:2, 83:9, 83:20, 99:24, 103:10, 105:13, 107:22, 110:3 easier 47:9, 94:16 edge 72:21, 72:24	effectively 67:2 effects 100:23 efficiency 55:9 either 30:25, 44:9, 45:20, 74:3, 90:12 eject 69:3 ejected 68:23 el 3:10 elaborate 48:5, 59:2 electric 43:18, 62:10, 75:7, 75:20 electron 28:9, 45:6, 58:20, 62:18, 63:5, 63:20, 66:16, 66:21, 69:1, 70:2, 71:21, 78:8, 80:11, 80:12, 98:12, 99:4, 99:11, 99:14, 99:17, 99:22 electronic 9:4, 9:5, 9:20, 51:22, 93:20 electronics 4:20 electrons 66:17, 66:23, 67:1, 67:4, 68:23, 69:3 element 22:21, 23:19 elements 23:23, 59:16, 59:19 else 50:22, 60:24,
--	--	---	---

75:19, 102:22, 105:24 email 3:15, 3:26, 3:34 embedded 21:15, 36:9, 46:5, 60:20, 92:13, 92:19, 97:21 embodiment 52:9, 64:17, 64:20 emission 4:24, 18:12, 18:17, 18:19, 19:22, 27:23, 35:11, 35:19, 36:1, 37:7, 37:9, 70:3, 80:19, 86:7, 86:13, 86:16, 87:5, 95:5 emissive 12:5, 15:21, 15:24, 15:25, 16:6, 16:14, 19:5, 19:12, 19:17, 20:3, 20:21, 21:1, 21:3, 21:4, 35:14, 35:24, 64:1, 91:18, 92:4, 93:16, 94:16, 96:16, 107:6 emitter 20:3, 20:12, 21:2, 21:7, 21:8, 22:22, 33:14, 35:13, 35:16, 36:12, 36:22, 36:23, 48:22, 48:25, 49:5, 49:12, 50:13, 50:20, 50:23, 51:23, 52:1, 54:7,	58:22, 83:21, 83:22, 92:12, 93:15, 94:21, 96:7, 96:15, 98:13, 105:21, 105:23, 107:3, 107:4 emitters 51:4, 97:20 emitting 99:3 enabled 83:16 enabling 25:3 encompass 89:8 end 11:11, 11:20, 12:6, 12:20, 48:2, 58:15, 60:10, 60:11, 60:15, 109:9, 111:15 ended 102:5 ends 109:7 energies 54:4 energy 68:17, 68:22, 68:24, 69:2, 69:17, 70:6, 70:19, 70:21, 72:10, 72:17, 75:8, 78:2, 78:4, 78:8, 78:9, 98:1, 98:10, 99:7, 99:15 ensemble 12:6, 46:9 ensure 21:8, 85:1 entirety 33:22 entities 27:8, 46:8	entitled 14:1, 16:20, 16:23, 17:25, 18:16, 67:13, 70:20 entity 27:1 equal 96:19 equipment 69:19, 78:22 equivalent 66:6 erroneous 90:8, 111:10 error 7:23, 78:16, 78:22 errors 8:9, 8:12, 8:14, 58:11 esq 3:8, 3:9, 3:21, 3:29 essentially 61:16, 69:17 established 85:16 et 4:15, 85:4 etc 11:18, 68:19, 100:21 etl 12:5 ev 71:23, 71:24, 75:13 evaporate 26:15 evaporated 10:24, 25:17, 34:14, 34:21, 34:24, 35:2, 44:18, 49:2, 49:16, 57:9, 58:24, 59:9, 59:21, 59:22,	89:21, 107:18 evaporating 27:1, 27:4, 48:20 evaporation 26:22, 27:6, 34:23, 47:23, 49:10, 49:19, 52:19, 53:20, 59:19, 61:19, 90:5 evaporation-proc- essed 16:10, 16:14, 19:6, 19:12, 25:20, 25:24, 26:4 evaporative 61:20, 65:14 even 48:8, 84:2, 89:22, 103:22, 103:24, 107:4, 109:4, 109:10 everything 33:14, 50:22, 75:19 ex 7:23 exactly 11:4, 12:20, 56:5, 74:11, 75:20, 75:25, 110:8 examination 4:4, 4:5, 4:6, 77:3, 87:1, 102:7 examined 6:19 example 18:7, 18:11, 27:23, 28:1, 28:10, 30:1, 32:24, 33:4, 34:8, 35:6, 35:10, 35:15, 36:24, 37:6,
---	--	--	--

37:20, 39:10, 42:10, 42:19, 43:19, 44:2, 44:7, 44:11, 45:4, 45:9, 52:7, 52:10, 53:9, 54:4, 54:12, 54:18, 54:25, 56:22, 58:19, 82:15, 83:12, 83:13, 89:20, 90:9, 90:10, 91:15, 93:8, 94:17, 106:14, 107:2 examples 39:23, 51:2, 96:22 exceeding 71:4 except 97:1 exchanged 102:21 excitons 15:25, 50:24 excluded 20:12 excuse 59:10 executed 112:5 exhibit 4:12, 4:15, 4:23, 4:25, 5:3, 5:4, 5:5, 5:6, 5:7, 7:20, 7:24, 7:25, 8:3, 8:10, 8:15, 8:17, 8:20, 8:22, 8:25, 15:2, 15:6, 15:7, 18:8, 45:21, 47:18, 57:25, 58:3, 58:5, 58:12, 61:22, 61:25, 62:2, 62:4, 67:8,	67:15, 77:6, 77:8, 77:10, 77:12, 77:15, 77:18, 79:2, 79:4, 79:5, 79:6, 79:9, 79:11, 79:14, 80:15, 80:17, 80:23, 88:5, 89:4, 93:19, 93:22, 94:1, 94:8, 95:1, 97:12, 101:1, 107:21 exhibits 4:9, 5:1 exist 63:25 exists 90:16 expect 23:3, 26:23 expected 34:18 experience 65:2, 95:15, 106:22, 111:5 experiment 100:20 experimental 67:21, 78:22, 81:4 experimentally-d- etermined 99:23 experimentation 100:6 experiments 87:10 expert 17:11 explain 16:16, 16:25, 17:7, 23:15, 68:5, 70:8, 70:12, 70:16, 71:15, 74:24, 82:23, 85:5,	95:21, 95:25 explains 28:20 explicitly 91:1, 109:25 extend 97:5 extent 16:17, 25:18, 105:4 extremely 63:16 F fabrication 110:4 facilitate 51:2, 51:3 facsimile 3:25, 3:33 fact 16:7, 70:23, 86:13 factors 92:6, 100:17, 107:19 fair 30:1, 34:5, 82:8, 82:9 fairly 30:2 familiar 16:10 far 111:9 fashion 59:1 federal 113:18 few 109:3 figure 52:9, 62:6, 62:20, 62:22, 62:25, 63:9, 63:18, 64:17, 64:19, 70:5, 71:13, 71:16,	97:18, 98:2, 98:5, 101:19, 101:20 figures 97:15 filed 4:12, 4:27 film 36:15, 52:24, 60:14, 61:17, 83:2, 86:9, 87:21, 100:22, 109:7, 109:20, 111:3, 111:8 final 11:23, 12:16, 13:8, 14:18, 52:24, 60:14, 109:7, 111:3, 111:8 find 86:9, 86:12, 99:20 fine 7:3, 60:10, 63:25, 65:11, 76:21, 95:3, 109:5 finely 111:11, 111:13 finer 59:16, 59:18 first 6:18, 11:16, 28:1, 29:3, 31:23, 32:6, 32:11, 32:15, 32:17, 32:18, 35:20, 38:4, 38:8, 38:17, 38:22, 91:14 five 81:4 fixed 89:19 floor 3:12 fluorescent 107:4
---	---	--	---

foams 81:8 follow 100:11, 102:24, 103:2 followed 12:1 follows 6:19, 100:12 foregoing 112:2, 113:7, 113:17 form 9:13, 10:20, 13:1, 13:9, 13:12, 14:20, 16:15, 16:22, 19:7, 19:14, 20:19, 21:21, 22:5, 22:12, 26:10, 29:9, 31:7, 31:19, 36:15, 38:24, 39:25, 41:6, 42:12, 42:15, 42:21, 43:5, 43:12, 43:22, 44:15, 44:24, 45:14, 51:7, 53:2, 53:3, 54:1, 55:17, 56:3, 56:22, 56:24, 57:5, 57:19, 66:1, 66:24, 68:7, 70:14, 71:2, 72:12, 73:6, 75:1, 75:15, 76:9, 84:9, 86:9, 86:16, 92:11, 92:17, 92:21, 92:23, 92:25, 93:3, 97:24, 100:14, 100:22, 103:8, 105:3, 107:11 formation 11:23	formed 16:1, 47:23, 49:10, 90:2 forming 50:24 forms 21:2 forrest 77:12, 77:16 forth 113:8 forward 18:25 four 24:23, 35:25, 37:9, 48:20, 94:18 front 53:4 full 84:24 function 9:21, 41:13, 54:16, 68:2, 68:6, 68:15, 68:21, 69:7, 69:8, 69:10, 69:15, 69:21 functional 9:3, 9:8, 9:11, 9:12, 9:16, 9:17, 10:16, 14:1, 14:7, 14:13, 15:11, 17:10, 17:22, 18:20, 19:22, 38:4, 38:10, 61:17 functionality 10:1 functioning 50:8, 51:25, 53:11 functions 54:15 further 78:17, 82:23, 113:14, 113:17	furthermore 74:20 G gaussian 24:24, 25:1, 25:5 general 13:18, 18:21, 40:16, 60:7 generally 25:10 geometric 75:21 give 7:7, 7:14, 7:16, 10:1, 14:23, 23:10, 24:11, 26:11, 27:15, 31:20, 44:4, 44:5, 44:10, 56:8, 57:10, 59:3, 74:6, 74:7, 74:8, 74:25, 75:16, 103:19, 109:5, 111:2 given 33:8, 52:7, 66:4, 95:12, 109:16 gives 64:19, 110:22 giving 109:21 go 6:3, 11:22, 14:13, 15:2, 18:22, 18:24, 18:25, 27:12, 47:20, 64:12, 66:7, 71:9, 84:18, 85:17, 97:14, 111:4 goes 22:24, 35:21, 68:1 going 18:23, 40:3,	40:6, 67:3, 67:10, 70:9, 71:3, 71:4, 75:2, 76:15, 76:16, 76:18, 76:22, 77:4, 80:20, 83:9, 94:6, 94:24, 101:25, 102:24, 103:2, 103:5, 103:7, 105:2, 106:5, 106:7, 110:21, 111:20 gone 74:15 good 56:6, 64:23, 67:23, 68:1 granularity 59:8, 65:14 gray 52:2 greater 25:16, 108:16 green 4:23, 80:18, 86:2, 86:3, 86:7, 86:12, 86:16, 87:5 grell 85:4, 85:16 ground 80:21 guess 11:14, 33:8 guest 22:25, 40:25, 47:17, 84:15 guide 17:6 guidelines 85:3 H half 102:6 hand 6:15
--	--	---	---

handing 7:20, 8:17, 47:4, 57:25, 61:22, 77:6, 79:2 handled 12:21 happens 64:8, 86:11 hard 65:11, 106:21 hbyun@cov 3:15 heading 67:21, 81:4, 89:7 hearsay 67:11, 80:21 heart 72:7 held 47:6, 67:6 helps 30:13 hence 65:15 here 17:5, 33:9, 36:23, 38:21, 44:18, 44:23, 45:25, 48:5, 49:3, 50:18, 51:18, 57:10, 58:19, 59:23, 60:9, 60:23, 66:4, 69:21, 73:5, 73:23, 74:10, 75:6, 76:20, 81:12, 81:21, 82:1, 87:7, 89:4, 89:13, 99:4, 101:3, 102:22, 108:21, 109:20, 110:18, 110:24, 111:4 hereby 113:6	high 65:3, 108:9, 108:19, 109:10 higher 77:25, 78:2, 78:7, 79:22, 80:9, 100:8 highly 85:19 hil 69:2 hindered 75:10 hinders 30:13 hint 109:17 hold 15:6, 15:10, 104:23 hole 4:18, 39:3, 58:20, 62:9, 62:17, 63:5, 63:19, 65:18, 65:23, 66:12, 75:4, 98:12, 99:2 holes 65:19, 65:25, 66:8, 75:23 holmes 3:40, 6:8 holmes's 70:18 homo 68:18, 69:7, 69:11, 69:15, 69:16, 70:24, 71:18, 71:20, 71:22, 72:7, 72:23, 73:10, 73:15, 73:18, 73:22, 74:11, 75:6, 77:25, 78:2, 79:20, 98:8, 98:11, 99:8, 99:10,	99:16, 99:24, 100:7, 100:8 homogeneity 59:9 homogenous 48:8, 48:12 homos 78:16, 78:20 hong 3:21 hopping 23:5, 24:21, 24:25, 25:6, 25:12, 33:20 host 20:21, 20:24, 20:25, 22:24, 22:25, 28:25, 29:15, 29:16, 29:22, 29:23, 30:4, 30:9, 30:16, 30:24, 31:3, 37:20, 37:21, 40:25, 41:2, 41:3, 41:17, 44:11, 44:14, 45:3, 45:9, 45:13, 45:17, 82:10, 82:11, 82:13, 82:17, 83:21, 83:22, 84:2, 85:2, 85:9, 87:13, 98:14 host-guest 84:4 hosts 85:13 hours 102:6 housed 40:10 hunch 95:16 hyun 3:8, 6:5 hzhong@irell 3:26	I identification 8:1, 8:16, 67:9, 80:16 identified 58:3, 61:25, 77:8, 79:4, 93:22 identify 19:11 immediately 49:12 impinge 68:22 implies 36:8 imply 90:15 important 4:16, 52:23, 86:8, 104:5, 107:17 improper 104:22 inappropriate 16:19, 76:6, 76:12, 76:13 included 17:12 including 55:11 index 4:1 indicate 9:12, 9:18, 9:19, 46:12, 109:23, 110:11, 110:13 indicated 72:20, 72:23 indicates 110:1 individual 46:9, 60:13 individually 34:15 induce 25:4
---	---	---	--

information 27:9, 52:22, 103:20, 103:21, 111:2 infringement 16:18 initial 102:4 injection 4:18, 12:1, 75:4 inside 9:4, 9:7, 9:10, 13:15, 46:7, 65:9, 110:16 instance 61:2 instances 69:1 instead 70:24, 87:24 instruct 102:16, 103:15, 104:17, 105:4 instructed 103:1 instruction 102:19, 102:25, 103:2, 104:20, 104:22 int 4:26 intend 99:5 intended 7:19, 66:19 interactions 22:19, 22:20 interchain 4:23, 80:18, 85:2, 87:4 interchangeable 85:14, 100:24 interchangeably 20:20, 21:5, 30:2, 30:21, 44:13, 45:19, 99:18, 99:21	interest 18:24 interested 85:21, 113:16 interface 75:11 interhopping 33:19 intermolecular 24:3, 24:21, 24:25 international 1:10, 2:10, 3:18 interpret 30:3, 30:8, 30:23, 31:1, 90:20 interpretation 70:19, 70:21 interpreted 30:10 interpreting 7:18 intrinsic 69:11, 69:12 involved 11:3, 29:10, 29:11, 56:10 ionization 66:10, 78:3, 79:22, 99:11, 99:14, 99:22, 100:12 ionize 69:17 ip 70:25, 79:22, 79:23, 99:17, 100:12 ipr 1:7, 2:7, 4:27, 17:13, 76:6, 76:17 irell 3:20, 3:28 irrelevant 16:25, 67:11	islands 109:9 isolate 37:12, 82:21 isolated 83:14 isolates 83:22, 84:2 isolation 85:7 issue 45:20, 57:8, 108:24 issued 4:13 itself 34:14, 110:17 J japanese 61:23 jlindsay@irell 3:34 job 1:35 joining 6:6 joint 47:23, 49:10 jointly 48:19, 49:2, 49:15 jonathan 3:29, 6:11 jp 61:24 judgment 26:15 judicious 83:11 july 1:23, 2:23, 6:2 K keep 51:3 kept 49:6, 49:13	kind 24:14, 61:5, 66:11, 86:13, 90:5, 97:21, 107:3 knew 52:19 know 7:4, 7:17, 8:12, 10:21, 10:23, 11:2, 11:14, 11:21, 12:5, 14:24, 16:23, 17:25, 18:3, 19:11, 19:18, 20:22, 22:16, 22:18, 22:21, 23:17, 24:7, 25:9, 25:15, 26:18, 27:16, 28:16, 30:12, 30:13, 31:9, 33:7, 33:18, 34:6, 34:7, 40:14, 41:11, 42:8, 44:17, 46:8, 47:7, 49:20, 49:24, 49:25, 50:17, 51:17, 51:18, 51:21, 52:2, 52:14, 52:15, 52:18, 52:20, 52:23, 52:25, 53:20, 54:3, 54:11, 55:4, 55:10, 56:7, 57:15, 57:21, 59:13, 60:6, 60:9, 60:16, 64:18, 66:4, 66:5, 66:10, 66:25, 67:3, 68:8, 69:9, 70:3, 71:22, 71:25, 72:3, 72:5, 72:7, 73:7,
--	---	--	--

76:4, 82:5, 85:10, 85:24, 90:2, 93:23, 100:18, 101:10, 104:4, 104:9, 105:9, 106:1, 107:15, 108:14, 108:22, 109:13, 109:16, 109:19, 111:6 knowledge 13:19 known 74:2, 78:15 koopmans 100:3	18:19, 18:20, 19:6, 19:12, 19:17, 19:22, 19:23, 20:3, 20:21, 21:1, 21:3, 21:4, 22:18, 27:24, 35:11, 35:14, 35:19, 35:24, 36:1, 37:7, 37:9, 38:4, 38:10, 38:21, 59:1, 62:8, 64:1, 75:4, 81:12, 91:18, 92:4, 93:16, 94:16, 95:5, 96:16, 107:6 layers 9:25, 10:8, 10:14, 11:1, 11:3, 11:20, 12:7, 18:12, 18:17, 38:16 layperson 82:24 leading 90:18, 91:23, 97:8 leads 63:23, 110:8 least 38:3, 38:4, 38:17, 69:11 leave 89:4 leds 85:25 less 21:13, 23:24, 25:4, 33:24, 34:4, 34:8, 34:12, 34:17, 44:7, 49:22, 49:24, 52:11, 53:18, 54:22, 54:25, 55:15, 55:25, 56:16,	57:4, 57:16, 57:22, 89:21, 90:3, 92:12, 92:17, 92:23, 92:25, 93:3, 101:8, 101:16 let's 6:3, 11:7, 23:20, 32:22, 40:2, 76:10, 86:19, 86:22, 91:14, 92:2, 101:23, 105:21, 105:22 level 43:8, 44:10, 56:1, 56:5, 56:17, 57:10, 59:17, 59:19, 69:16, 70:6, 70:19, 70:21, 71:20, 71:22, 71:24, 71:25, 72:3, 72:5, 72:7, 72:10, 72:17, 72:20, 72:23, 74:6, 74:9, 77:25, 78:2, 78:4, 78:8, 78:10, 79:21, 80:10, 95:13, 98:8, 100:7, 100:8, 105:11 levels 41:12, 68:17, 68:19, 69:7, 69:12, 69:15, 70:19, 71:18, 73:10, 73:15, 73:19, 74:8, 74:11, 74:16, 75:6, 98:10, 98:11, 99:7, 99:8, 99:15, 99:24, 100:1 light 16:1, 69:3,	70:4, 99:3 light-emitting 4:19, 62:8 likely 22:23, 59:11, 109:5 limit 13:1, 13:12, 16:21, 42:14, 70:14, 71:2, 76:8, 94:4 limited 22:18 lindsay 1:33, 2:23, 3:29, 6:11, 6:13, 113:4, 113:25 line 28:18, 31:8, 31:10, 35:18, 35:23, 39:17, 39:18, 39:20, 47:10, 91:6, 95:22 lines 27:12, 27:13, 28:4, 28:8, 28:12, 31:13, 32:5, 32:22, 37:23, 37:25, 38:12, 38:13, 38:14, 39:2, 39:13, 42:3, 42:5, 42:24, 48:17, 56:20, 67:22, 74:19, 81:5, 88:13, 98:7 list 91:9, 91:15, 92:14, 92:16, 93:2, 94:15 listed 94:18 literature 73:21, 74:1, 74:14, 78:19,
L			
lacking 52:21 language 43:24 largely 19:24 larger 34:19, 46:7 last 15:20, 35:12, 58:17, 97:14 layer 9:3, 9:4, 9:7, 9:8, 9:9, 9:12, 9:17, 9:19, 9:22, 9:23, 10:3, 10:11, 10:19, 11:10, 11:16, 11:17, 12:1, 12:2, 12:4, 12:5, 12:15, 13:7, 14:1, 14:8, 14:13, 14:17, 15:11, 15:21, 15:24, 15:25, 16:6, 16:9, 16:14, 17:10, 17:20, 17:22, 17:25, 18:2,			

Transcript of Dr. Marc Sims
Conducted on July 31, 2025

128

99:20 little 25:10, 25:18, 26:8, 26:16, 51:11, 59:5, 95:19, 104:1 llp 3:7, 3:20, 3:28 long-chain 82:25 look 10:18, 12:16, 13:8, 14:18, 22:9, 91:5, 92:2, 94:17, 98:3, 100:25 looked 39:11, 84:21, 101:10 looking 33:22, 55:11 los 3:23 lot 51:10, 61:6, 61:15, 85:11, 98:24, 101:14 lots 61:12, 65:8 low 40:21, 40:23, 84:22, 84:25, 95:12, 95:17 lower 41:2, 41:16, 43:8, 50:7, 50:9, 79:20, 80:11, 110:19, 110:20 luminance 55:9 lumo 68:19, 69:7, 69:11, 69:15, 70:24, 71:18, 71:24, 71:25, 72:3, 72:5, 72:20, 73:10,	73:14, 73:18, 73:22, 74:6, 74:8, 74:11, 78:7, 80:10, 98:8, 98:11, 99:8, 99:10, 99:16, 99:24 lumos 78:16, 78:20 lump 46:13 lunch 91:9 luncheon 76:24 M made 10:13, 12:21, 64:22, 65:12, 81:8, 113:10 magnitudes 24:12 maintain 96:4 major 54:15 majority 40:25, 50:19, 101:19 make 10:23, 35:7, 35:11, 37:1, 44:19, 50:4, 83:2, 108:16 manella 3:20, 3:28 manner 61:10 manufacturing 64:16 many 10:23, 11:22, 51:2, 64:11, 72:25, 94:15, 100:17, 107:19 marc 1:21, 2:20,	4:2, 4:25, 6:17, 7:21, 58:1, 112:11 mark 67:7 marked 5:1, 7:25, 8:15, 67:8, 80:15 marking 80:17 martin 85:16 matter 23:6, 26:19, 72:14 matters 85:11 maybe 24:22, 53:17, 55:3, 56:12, 107:24, 109:19 mcp 28:2, 33:2, 33:4, 33:12, 33:15, 34:1, 34:2, 34:3, 34:18, 34:24, 35:2, 35:3, 35:6, 35:10, 35:21, 36:1, 36:5, 36:18, 37:14, 89:21 mean 11:24, 19:8, 19:9, 19:15, 21:16, 21:19, 21:23, 21:24, 22:13, 22:14, 22:16, 23:10, 23:12, 23:24, 24:14, 40:1, 40:13, 40:19, 40:23, 41:11, 43:23, 48:5, 49:16, 59:2, 60:2, 63:3, 63:14, 64:25,	68:5, 71:11, 73:7, 74:6, 84:12, 90:19, 90:21, 91:17, 91:24, 95:13, 104:2, 104:7, 105:18 meaning 17:24, 18:2, 30:23 meaningful 108:13 means 14:2, 14:13, 38:8, 56:6, 74:24, 81:18, 85:5, 85:6, 106:15 meant 104:11 measure 70:1, 74:16 measured 69:19, 69:21, 73:24, 78:21, 100:8 measurement 78:16 measures 70:2 mechanical 99:25 medium 21:7, 36:8 mention 35:16, 50:3, 65:5, 65:6, 90:10, 91:2, 99:10 mentioned 10:12, 15:21, 26:13, 60:13, 63:22, 90:24, 90:25, 100:19, 108:11, 109:3 mentions 35:23 merge 11:3
--	--	--	---

merit 2:25 met 17:12 metallic 69:9 metals 69:13 meter 18:14 method 110:4 might 11:11, 11:12, 12:9, 23:18, 51:12, 54:3, 55:11, 61:12 mind 89:19, 96:22 mine 107:23 minimize 78:22 minor 75:4, 75:14 minute 15:6, 15:10, 86:19, 102:5 minutes 86:22 miscibility 83:15 misheard 87:22, 104:4, 104:12 misinterpreted 104:7 misrepresenting 17:15 misstated 66:1 misstates 12:18 misstating 42:12, 57:5, 70:23 mistakes 8:13	mix 82:20 mixed 111:7, 111:13 mixes 83:8 mixing 11:2, 59:16, 59:18, 76:1 mixture 47:24, 49:1, 60:11, 63:25, 64:23, 65:11 mixtures 61:13 mobility 66:13 modular 27:1 molar 57:11, 66:6, 101:10, 108:14, 108:15 molecular 23:22, 26:18, 27:7, 31:14, 31:16, 33:7, 33:18, 34:18, 41:21, 59:17, 59:19, 101:12, 101:16, 107:16 molecule 21:8, 24:8, 24:19, 26:17, 46:9 molecules 18:15, 21:9, 21:19, 22:3, 22:9, 23:4, 23:7, 23:18, 24:4, 24:15, 26:4, 26:23, 28:22, 31:5, 31:15, 32:2, 32:8, 32:11, 32:14, 32:15, 32:18, 33:20, 46:10, 46:13, 48:10, 49:6, 54:7, 58:25, 63:8, 63:12, 63:13, 63:15, 65:22, 66:20, 83:1, 98:12 moment 27:15, 28:15, 42:7, 60:6, 74:25, 80:4 monomer 101:15 more 10:6, 11:1, 21:13, 22:23, 23:21, 23:24, 25:4, 25:18, 31:21, 33:23, 34:4, 34:8, 34:12, 34:17, 41:25, 44:7, 45:1, 48:7, 49:22, 49:24, 50:12, 51:8, 52:10, 53:18, 54:21, 54:25, 55:14, 55:25, 56:7, 56:15, 57:3, 57:16, 57:22, 69:9, 75:22, 84:10, 89:21, 90:3, 92:12, 92:17, 92:23, 92:25, 93:3, 96:19, 101:7, 104:1, 108:13, 109:8 morphology 109:20 most 74:5, 90:20 move 94:11 much 48:7, 59:16, 59:18, 111:17, 111:18 multi-component 105:20	multicomponent 60:7 multilayer 9:25, 10:4 multiple 10:8, 27:4 must 49:5, 49:6 N name 6:13, 113:21 nbp 88:25 ncra 2:24 necessarily 11:19, 12:7, 30:17, 34:10, 36:12, 45:8, 91:17, 92:3, 93:9, 100:11, 100:16, 100:17, 103:22, 103:24 need 7:5, 17:1, 17:2, 27:8, 30:5, 31:1, 41:25, 45:5, 45:12, 46:8, 47:8, 54:6, 54:17, 54:21, 54:23, 60:21, 60:25, 61:3, 61:13, 62:14, 66:5, 68:22, 70:16, 76:4, 84:5, 85:17, 94:4, 104:1, 107:15, 108:12, 108:13 needed 86:6, 86:14 needs 30:10, 47:15, 50:22, 52:4 negative 73:14, 73:18
---	--	---

neither 24:9, 113:14	O	obvious 12:16, 13:8, 14:18, 104:6	one 9:10, 10:1, 10:19, 11:16,
never 83:13	object 67:10, 70:9, 71:3, 75:2, 80:20	obviously 87:22, 87:23	12:22, 15:3, 15:6, 15:10,
newport 1:25, 2:21, 2:22, 3:30, 3:31, 6:1	objecting 70:15	occur 66:12, 86:8	16:9, 17:4, 21:2, 21:9,
next 80:7	objection 9:13, 10:5, 10:20, 12:18, 13:9, 14:20, 16:15, 18:3, 19:7, 19:14, 20:19, 21:21, 22:5, 22:12, 26:7, 26:9, 26:10, 29:9, 31:7, 31:19, 38:24, 39:25, 41:6, 42:12, 42:15, 42:21, 43:5, 43:12, 43:22, 44:15, 44:24, 45:14, 51:7, 54:1, 55:17, 56:3, 56:24, 57:5, 57:19, 66:1, 66:24, 68:7, 72:12, 73:6, 75:1, 75:15, 78:25, 84:9, 90:18, 91:23, 92:21, 93:24, 94:23, 94:24, 96:4, 97:8, 97:24, 100:14, 103:8, 105:3, 107:11	occurs 68:25	21:24, 22:15, 22:18, 31:20, 33:21, 35:19, 38:3, 43:16, 45:1, 45:5, 46:6, 48:1, 49:6, 49:13, 50:10, 51:4, 51:21, 52:18, 54:15, 57:15, 57:21, 60:14, 63:10, 64:24, 67:1, 69:2, 79:19, 79:21, 80:8, 80:10, 82:22, 83:3, 83:24, 85:25, 86:7, 86:15, 88:8, 89:22, 90:25, 91:14, 102:6, 106:20, 108:22, 108:24
nile 101:4		october 58:1	one-to-one 47:16
nominally 11:24, 11:25, 36:19		offer 104:2	ones 50:4, 56:10
non-emitter 95:6		offered 113:20	online 6:10
non-emitting 95:24		office 1:1, 2:1	only 61:19, 75:6, 84:4, 90:23, 90:25, 111:4
normally 10:13, 30:20, 36:7, 60:10, 61:6		often 36:13, 45:18, 63:23, 73:20, 74:1, 99:18, 99:21, 100:2	open 87:8, 104:23
note 7:22		oh 37:4, 72:5, 102:13, 107:24	opened 93:20
notice 2:21		oled 9:6, 9:7, 9:10, 9:24, 10:3, 10:18, 10:23, 11:8, 11:9, 12:14, 13:6, 14:16, 15:18, 16:6, 16:14, 19:6, 19:13, 24:16, 25:21, 26:5, 81:23, 82:4, 82:7, 82:12, 82:18, 83:24, 84:3, 84:5, 84:14, 91:18, 92:4	opine 18:1
npb 42:11, 42:20, 43:14, 45:9, 70:6, 71:19, 71:20, 72:5, 72:8, 73:23, 89:14, 90:24, 91:3, 91:14, 91:15, 91:16			opined 17:24
npb's 71:20, 71:25			opinion 62:16, 63:19,
number 4:11, 5:2, 6:14, 8:18, 26:11, 26:20, 40:13, 40:24, 61:24, 106:21	objections 13:1, 13:12, 16:21, 70:14, 71:2, 76:9	oleds 9:24, 10:8, 13:17, 14:25, 15:17, 16:11, 25:25, 85:15	
numbers 33:23, 41:8, 51:18, 52:3, 74:1, 109:1	obligated 7:11	omitted 73:14, 73:18	
	obtained 74:11		

89:11 opposed 20:8, 48:13, 99:11 opposing 17:7 optimal 55:5, 56:9, 56:14, 56:17 optimized 52:4, 55:4, 56:8, 56:12 optimizing 55:20 orange 113:3 orbital 100:1 order 24:11, 24:22, 25:5, 25:17, 51:2, 51:3, 52:25, 54:7, 54:16, 55:21, 60:21, 61:4, 68:23, 82:21, 85:2, 85:18, 86:7, 86:16 org 68:15 organic 4:19, 4:20, 9:3, 9:8, 9:11, 9:12, 9:16, 9:17, 9:20, 14:1, 14:7, 14:12, 15:11, 17:10, 17:22, 18:20, 19:22, 38:3, 38:9, 59:1 origin 4:23, 80:18, 87:4 original 41:15, 113:18 other 12:22, 21:14, 21:20, 22:4,	22:10, 22:11, 23:8, 33:21, 34:22, 34:25, 39:23, 41:4, 41:5, 53:7, 54:2, 57:15, 57:21, 58:22, 63:18, 65:24, 66:22, 73:8, 79:23, 80:12, 83:23, 89:19, 91:22, 92:9, 96:19, 98:10, 101:16, 103:25, 108:24, 110:20 others 11:2 otherwise 52:16, 54:13, 54:19, 55:1, 55:15, 56:1, 56:16, 83:18 ourselves 74:13, 74:16 out 18:23, 47:2, 65:10, 71:4, 76:11, 85:4, 85:14, 86:3, 86:9 outcome 59:11, 61:17, 113:16 output 10:16, 56:9 outside 18:23, 71:8, 76:7, 94:23, 94:25 over 68:1, 107:10 over-generalize 84:16 overall 10:15, 98:9, 98:14 own 65:2, 71:15,	95:15 owner 1:13, 2:13, 6:10, 6:12, 7:22, 46:23, 47:5 oxidized 4:24, 80:19, 86:4, 87:5 P p 4:27 page 4:3, 4:11, 5:2, 45:24, 46:23, 47:10, 67:19, 74:17, 81:2, 84:18, 87:8, 97:14, 98:3, 110:5 pages 1:12, 2:12 palo 3:11, 3:13 paper 73:2, 81:1, 82:20 paragraph 15:2, 15:8, 15:11, 15:20, 18:7, 35:17, 47:20, 48:2, 50:3, 58:14, 58:18, 64:13, 64:16, 77:18, 77:20, 77:21, 77:24, 78:1, 78:13, 79:15, 79:19, 79:24, 79:25, 88:16, 90:23, 94:17, 101:1, 108:1, 108:2, 108:3, 108:6, 109:23, 110:3, 110:11 part 14:24, 17:19,	17:20, 19:18, 21:1, 35:12, 49:12, 57:17, 57:24, 103:20 participate 21:10 participating 51:25 particles 58:21, 59:24 particular 33:19, 50:3, 52:21, 85:23, 91:20 parts 103:10 party 113:15 pass 86:18, 101:22, 111:14 passage 27:16, 27:23, 28:20, 29:2, 29:19, 29:22, 30:3, 30:8, 30:22, 30:23, 31:4, 31:12, 39:23, 42:10, 42:19 passed 102:3 patent 1:1, 1:2, 1:8, 1:13, 2:1, 2:2, 2:8, 2:13, 4:12, 6:10, 6:11, 7:22, 8:18, 8:23, 9:1, 9:2, 13:25, 18:11, 19:25, 20:4, 20:17, 21:11, 27:10, 33:22, 36:20, 42:2, 42:24, 43:3, 43:10, 43:17, 43:20, 46:23, 47:5, 48:15,
---	--	--	---

48:19, 52:8, 53:4, 56:19, 77:7, 79:3, 88:6, 96:23 patents 89:20 paul 94:20 pbd 94:19, 95:8 penalty 112:2 pending 7:6 people 12:21, 12:22, 55:11 percent 41:4, 41:5, 81:8, 81:15, 81:19, 95:17, 96:11, 105:23, 105:24, 106:11, 107:10, 108:14, 108:15 percentage 89:24, 95:12, 96:18, 106:24 percentages 96:17, 107:5 perform 53:23 performance 55:5 perjury 112:2 perspective 66:13 pertains 113:17 petitioner 1:6, 2:6, 2:21, 3:4, 6:6 pfo 81:7, 81:8, 81:13, 81:15, 81:21, 82:2, 82:3, 82:6,	82:10, 82:20, 84:2, 84:7, 85:1, 85:22, 87:12, 87:16, 87:19, 87:20, 87:24, 88:2, 88:3 phase 21:14, 21:16, 22:2, 22:9, 23:13, 23:14, 23:20, 23:25, 26:5, 26:24, 33:5, 33:9, 33:11, 33:13, 33:16, 33:24, 34:3, 34:4, 34:11, 34:15, 34:20, 35:3, 44:3, 44:8, 46:5, 49:17, 51:13, 53:3, 53:9, 53:13, 53:15, 53:17, 53:18, 54:12, 54:19, 54:22, 54:23, 54:25, 55:15, 55:25, 56:16, 57:4, 57:16, 57:22, 59:11, 59:14, 60:12, 60:18, 60:19, 63:23, 64:3, 64:7, 90:3, 92:12, 92:17, 92:24, 93:1, 93:3, 93:11, 95:14, 95:18, 97:21, 97:22, 101:19, 106:25 phases 60:15 phosphorescent 54:5 phosphorous 107:3 photoemission 69:25	phrase 9:16 physically 108:13 pick 91:14 pictiva 1:10, 2:10, 3:17, 4:26 pictiva's 46:22, 47:13 place 113:8 plainly 30:11 please 6:15, 6:25, 7:7, 21:23, 22:6, 27:10, 27:12, 28:13, 28:15, 31:21, 37:24, 38:12, 39:2, 39:13, 39:17, 42:2, 42:7, 42:14, 42:16, 44:16, 45:1, 45:21, 45:24, 47:1, 47:10, 47:18, 47:20, 56:19, 58:14, 58:17, 58:18, 59:7, 62:6, 63:10, 64:14, 67:19, 70:5, 71:1, 71:11, 71:13, 74:17, 76:8, 77:19, 78:13, 79:16, 80:4, 81:2, 84:18, 87:8, 88:11, 91:5, 92:15, 97:11, 97:14, 100:25, 107:20, 108:1, 108:3 pmma 83:13, 83:19 point 13:15, 51:12,	59:8, 66:9, 71:4, 82:13, 83:14, 104:15 pointing 18:23, 76:11 poly 4:24, 80:19, 87:5 polyfluorene 82:22, 83:1, 83:3, 83:16, 85:18, 86:6, 86:14, 104:3 polymer 24:7, 24:18, 24:20, 25:2, 25:13, 25:20, 83:13, 85:25 polymeric 82:25 polystyrene 81:7, 81:22, 82:4, 83:1, 83:5, 83:7, 83:16, 87:20, 87:23, 88:3 populate 54:7 posita 25:22 position 47:13 post-deposition 61:14 potential 8:13, 66:10, 78:3, 79:22, 99:11, 99:14, 99:22, 100:12 potentially 21:22 practical 58:24 pre 35:19 predictable 61:9 presence 83:4
---	--	--	--

present 3:39 preserve 55:9 pressures 65:9 previous 20:7, 85:3, 96:14 previously 5:1 printed 75:6 privilege 104:21 privileged 102:20, 102:22, 105:6 probably 24:7, 56:7, 65:16, 96:11, 101:11, 108:16 problem 45:8 problems 85:25 proceedings 76:17, 113:13, 113:19 process 10:24, 11:15, 12:24, 19:18, 25:2, 26:17, 26:22, 58:23, 58:24, 59:9, 59:20, 59:21, 59:22, 59:25, 60:3, 60:7, 60:22, 61:4, 61:20, 65:7, 65:15, 83:19, 106:21, 109:11 processed 11:13, 11:21, 41:10, 41:13, 107:17, 108:25 processes 10:25, 44:19,	48:7 processing 25:2, 61:8, 63:23, 91:21 product 12:16, 13:8, 14:18, 60:11 proper 54:13, 54:20, 55:1, 55:3, 56:13, 76:14 properly 53:23, 54:16 properties 51:14, 54:6, 55:22, 75:21, 111:8 property 10:16 proportion 89:22 proved 86:13 provide 6:24, 6:25, 17:9, 17:21, 27:8, 47:1, 47:2, 76:19, 110:21 provided 7:22 provides 17:6, 39:23, 108:6 proximity 21:24 ps 74:8, 81:7, 81:13, 81:18, 82:15, 82:17, 82:20, 84:1, 85:2, 87:12, 87:23 publication 77:7, 79:3 published 61:23 pull 87:3, 88:5,	89:3, 93:19, 97:11 purely 34:10 purpose 83:7 purposefully 86:10 purposes 16:18, 40:18 pursuant 2:21 put 19:17, 26:8, 40:24, 52:3, 61:21 pvk 94:19, 97:21, 98:8, 98:14, 98:17, 101:3, 101:15, 101:18, 108:9, 108:17, 109:12, 109:22, 110:9 Q q3 93:9, 101:4 quality 100:5, 100:6, 100:21 quantity 41:2, 41:16 quantum 99:25 question 7:6, 13:5, 13:18, 14:11, 14:14, 17:8, 18:22, 19:2, 19:3, 20:6, 20:7, 20:15, 26:1, 26:12, 29:20, 42:17, 43:16, 44:25, 45:3, 45:17, 50:15, 50:16, 71:9, 71:10,	92:15, 96:22, 102:12, 102:17, 103:19, 104:3, 104:8, 105:5, 110:8 questioning 7:4, 95:22 questions 6:24, 7:19, 14:2, 15:12, 16:20, 17:4, 70:20, 76:20, 91:11, 93:25, 94:4, 94:8, 94:25, 95:1, 95:22, 102:4, 102:21, 103:4, 103:6, 103:17, 103:18, 103:25, 105:1, 105:8 quickly 86:2 quite 30:11, 59:13, 75:3, 98:24, 101:14, 101:15 quoted 66:12 R radiate 16:1 raise 6:15 range 24:3, 24:5, 24:8, 24:11, 39:19 rapidly 51:15 rates 27:7, 33:8, 49:19, 52:19, 53:20, 61:20, 65:10, 90:5 rather 96:8, 108:15 ratio 49:19, 49:25,
--	--	--	--

52:24, 55:13, 57:11, 66:4, 66:6, 92:8, 101:3, 101:8, 101:10, 105:15, 105:19, 105:25, 106:2, 106:10, 106:15, 106:16, 106:18, 107:9, 108:7, 108:10, 108:15, 108:20, 108:23, 110:1, 110:2, 110:20 ratios 55:6, 56:8, 90:6, 109:10 rdr 1:33, 113:4, 113:25 reach 55:5 read 27:16, 27:21, 28:14, 28:15, 28:19, 39:21, 39:22, 42:7, 64:21, 64:22, 80:4, 84:24, 85:8, 88:13 reading 31:9, 39:15, 65:12 real 3:10 really 11:4, 11:12, 12:23, 24:6, 27:6, 32:6, 36:21, 40:14, 41:7, 45:19, 53:19, 57:9, 64:6, 65:11, 65:13, 66:5, 72:13, 81:22, 86:8, 91:24, 92:9, 99:25, 104:5, 110:22, 111:2	realtime 2:25, 2:26 reason 7:14, 7:16, 37:22, 45:11, 73:8, 75:24, 83:6, 86:17, 92:5 reasonable 33:25, 56:18, 79:1 reasonably 83:8 reasoning 90:7, 96:1 reasons 54:2, 108:22 recall 74:10, 74:12, 87:11, 87:15, 87:18, 88:15, 88:18, 91:8, 91:11, 93:12, 93:17, 97:17, 105:16 recess 40:5, 76:24, 86:23, 102:1, 106:6 recognize 8:3, 8:20, 58:5, 62:2, 67:15, 77:10, 79:9, 80:23 recombine 54:8 recommended 78:18 reconcile 96:13 record 6:4, 20:14, 40:3, 40:6, 47:6, 67:6, 71:8, 76:16, 76:22, 77:4, 101:25, 102:2, 102:3, 106:5,	106:7, 111:20, 113:10, 113:20 recorded 113:11 rectangle 72:1, 72:21, 72:24 rectangles 72:18 red 101:4 redirect 103:21 reduced 25:12 refer 8:22, 8:25, 9:3, 20:1, 20:5, 20:18, 21:12, 41:24, 62:4, 77:12, 77:15, 79:11, 79:14, 110:6 reference 17:13 referring 31:10, 31:12, 31:16, 35:15 refers 14:17, 20:2, 21:13 regarding 20:7, 87:12, 94:25, 103:18 regards 52:7, 52:9, 68:17 registered 2:24, 2:25 relate 70:10 related 13:21, 13:22, 13:24, 16:16, 16:24, 94:9, 95:22, 95:23, 103:22, 103:24, 113:15	relating 102:10 relationship 69:6, 69:14 relative 42:25, 44:5, 49:19, 53:20, 55:6, 61:20, 78:4, 78:9 relatively 75:8 relevance 17:8, 18:4, 75:15, 80:21 relevancy 68:7 relevant 17:13, 70:17, 94:2, 94:11 remember 85:11 repeat 9:14, 19:3, 22:6, 29:20, 44:25, 50:15, 63:10, 71:7, 71:10, 73:16, 83:12, 92:15 repeatable 61:9 rephrase 21:22 reported 1:32 reporter 2:24, 2:25, 2:27, 6:3, 6:13, 12:3, 12:11, 12:12, 16:3, 40:3, 40:6, 68:20, 76:22, 77:4, 86:21, 97:3, 101:25, 102:2, 103:23, 106:5, 106:7, 111:12, 111:18, 111:19, 113:5 represent 46:22
---	--	--	---

Transcript of Dr. Marc Sims
Conducted on July 31, 2025

135

representing 6:5, 6:9, 6:11 requested 113:20 required 69:3, 69:17, 76:19 requires 38:3 reserve 104:23 resisted 75:11 resistive 75:23 respect 26:2 respond 17:3 responds 46:23 response 7:1, 17:9, 47:5 responses 105:10 responsive 13:2, 13:4 restate 13:5, 19:2, 42:16, 44:17, 50:15 result 34:13, 48:11, 65:1 resumed 77:3 revealing 105:5 review 113:19 reviewed 105:8 right 6:15, 8:24, 14:4, 18:20, 27:19, 28:25, 29:5, 32:21, 34:16, 55:3,	56:9, 62:11, 66:11, 73:3, 73:15, 73:19, 74:19, 75:16, 77:14, 84:20, 89:2, 94:22, 95:18, 96:24, 98:4, 104:23, 105:23 risk 64:5 rmr 1:33, 113:4, 113:25 rubrene 35:23, 36:2, 36:24, 37:1, 37:2, 37:3, 50:2 rule 50:5, 53:11 rules 83:25 running 94:24 russell 3:40, 6:8 S said 12:19, 15:8, 20:11, 36:25, 49:8, 52:12, 65:3, 70:25, 76:8, 87:23, 88:22, 94:7, 95:24, 96:18, 98:17, 99:7, 104:5, 104:7, 113:12, 113:15 sake 23:21 same 7:11, 19:16, 22:24, 26:17, 27:5, 30:19, 38:9, 45:10, 45:11, 46:20, 69:19, 75:18,	75:19, 75:20, 78:21, 78:22, 92:5, 99:20, 100:2, 100:4, 100:12, 101:8 sampson 6:6 samsung 1:4, 2:4, 3:4, 4:25 say 11:15, 11:24, 11:25, 16:24, 22:22, 22:23, 23:21, 25:11, 26:14, 28:17, 29:23, 30:6, 31:2, 33:6, 33:23, 34:14, 34:17, 35:9, 37:25, 44:4, 44:9, 45:6, 45:18, 50:9, 51:11, 53:17, 56:6, 56:7, 56:13, 61:7, 64:4, 64:5, 64:7, 66:3, 68:1, 72:19, 73:4, 75:22, 82:3, 82:11, 83:20, 90:12, 95:16, 96:9, 104:12, 105:21, 105:23, 106:22, 107:12, 109:1, 109:4, 110:3, 111:5 saying 20:9, 30:3, 30:9, 32:17, 33:12, 34:2, 35:4, 35:25, 36:4, 36:16, 53:12, 53:21, 53:24, 59:23, 60:17, 60:23, 82:6, 106:12,	106:13, 111:4 says 30:6, 35:13, 38:7, 38:25, 43:2, 43:18, 45:6, 47:17, 77:25, 78:17, 80:7, 85:6, 89:1, 90:14 scale 62:23 scenario 76:3 schematic 62:24, 65:17, 71:18, 72:15, 73:9, 110:21 schematics 109:17 scope 10:5, 10:20, 13:9, 13:13, 14:20, 16:15, 16:24, 18:2, 18:24, 19:7, 19:14, 20:19, 26:10, 68:7, 70:10, 71:5, 71:8, 75:2, 76:7, 78:25, 93:24, 94:5, 94:23, 94:25 scott 3:9, 6:7 scouting 70:3 seal 4:28 second 11:17, 18:10, 28:5, 29:3, 29:6, 31:5, 31:17, 31:21, 31:24, 32:3, 32:8, 32:19, 35:21, 38:5, 38:8, 38:17, 38:22, 47:10,
---	--	--	---

48:1, 59:3, 77:24, 78:1, 87:4 second-to-last 79:18 second-to-the-la- st 79:25 section 87:10, 89:7 see 15:22, 34:24, 35:16, 37:22, 38:19, 38:20, 39:5, 39:6, 46:1, 47:25, 55:24, 60:21, 65:12, 67:24, 68:3, 73:8, 73:10, 74:22, 81:10, 81:11, 84:5, 85:9, 86:10, 88:9, 88:24, 89:6, 98:10, 98:15, 101:6, 106:24, 110:6 seen 98:24 selected 78:19 selecting 83:6 selective 83:10 semiconductors 69:10, 69:11, 69:13 sense 69:18, 108:18 sentence 15:20, 18:10, 58:17, 67:22, 72:14, 74:20, 74:24, 77:24, 78:1, 79:18, 80:1, 80:7, 84:20, 84:21,	89:2 separate 21:9, 22:14, 49:13, 50:22, 51:4, 58:21, 59:23, 83:17, 84:14, 85:18, 86:9, 88:8 separated 22:3, 22:11, 50:10, 83:4, 107:6 separately 49:6 separating 85:21 separation 59:11, 59:14, 60:12, 63:24, 64:3, 64:8 series 6:23 set 85:3, 85:14, 86:3, 113:8 setup 75:18 several 9:25, 105:21 short 63:14, 63:16 shorthand 2:26, 113:5 should 68:8, 100:18, 100:19 show 73:9, 73:10, 98:22 showing 63:4, 98:6 shown 7:23, 58:21, 62:20, 63:3, 64:17, 72:1, 72:2, 97:20, 98:5, 99:5 shows 70:8, 71:16,	71:17 sign 73:14, 73:18 signature-b7fzp 113:23 signed 8:7, 58:9 significance 98:19 significant 78:17 significantly 75:9, 75:22, 101:11 similar 39:10, 69:18, 86:4, 89:24, 107:1 similarity 100:3 similarly 78:7, 80:8, 84:2 simply 84:3 sims 1:21, 2:20, 4:2, 4:25, 6:17, 6:21, 7:21, 17:11, 18:4, 18:10, 18:16, 19:2, 40:9, 58:1, 70:18, 87:3, 102:9, 111:17, 112:11 simultaneously 90:11 since 44:12, 59:5, 74:20, 85:8 single 11:10, 26:25, 27:1, 50:23, 106:23, 107:5 sitting 74:10 situation 41:10, 64:6	skilled 79:20, 80:9 slightly 36:11, 75:10 slow 26:8 slowly 12:9 small 24:8, 24:18, 26:22, 75:8 small-molecule 25:7, 25:25, 26:4, 26:14 smaller 78:3, 78:9 solid-state 83:2 solution 10:24, 26:17, 44:19, 59:10, 59:20, 60:7, 61:4, 61:8, 63:22, 64:24, 83:18, 100:22 solution-based 48:7, 48:10, 58:23, 59:25, 60:3, 60:22 solution-process- ed 4:18, 11:8, 11:9, 12:14, 13:6, 13:17, 14:16, 14:25, 15:17, 15:18, 16:6, 24:16, 25:7, 25:14, 26:13, 57:8, 64:9, 107:18 solvent 60:8, 61:13, 61:14, 65:9, 111:6, 111:7 some 10:15, 11:1, 12:21, 14:23, 16:18, 22:21,
---	--	--	--

23:11, 23:18, 23:19, 24:24, 55:21, 56:8, 60:15, 84:15, 94:12, 98:10, 103:9, 103:11, 105:8, 105:10, 109:8 someone 90:14 something 8:12, 10:2, 12:7, 13:15, 14:4, 25:22, 26:19, 31:2, 36:8, 41:17, 52:4, 60:24, 64:8, 64:10, 76:14, 83:15, 83:19, 86:4, 95:18, 104:4, 104:9, 105:24, 106:23, 109:19, 110:16 sometimes 11:3 somewhat 34:19, 96:20 sorry 22:25, 28:17, 29:20, 31:8, 37:4, 38:13, 59:4, 73:16, 74:7, 86:20, 92:16, 108:3, 110:6, 110:7 sort 10:16, 23:18, 24:21, 24:22, 24:24, 48:6, 55:21, 56:8, 74:15, 86:2, 86:8, 89:22, 89:24 sorts 76:2 sound 16:18	space 22:15, 22:21, 23:19 spacing 23:22 speak 12:9, 25:9 species 41:21 specific 10:6, 11:13, 12:23, 25:2, 26:11, 31:8, 35:15, 41:8, 41:9, 50:4, 60:16, 64:6, 75:17, 82:12, 83:15, 102:21, 103:17, 104:1, 104:15, 105:7 specifically 31:22, 32:5, 52:7, 52:8, 57:12, 105:22 specificity 44:10 specify 10:22, 49:3 spectrometer 69:25 spectrum 68:2 spelling 8:13 spin 65:6, 81:8, 109:3, 111:5 spin-coated 109:2, 110:7 spread 25:11, 25:16 square 3:11 ss 113:2 stability 55:11 stack 10:13, 10:14,	10:15 stacked 9:25 stamp 7:22 stand 64:7, 89:10 stands 33:24 stars 3:22 start 11:7, 49:11, 76:1 starting 106:24 starts 67:22 state 2:27, 47:22, 58:19, 76:16, 76:18, 90:4, 109:25, 113:1, 113:5 stated 101:3 statement 33:25, 53:8, 78:5, 78:11, 80:3, 80:6, 80:13, 82:8, 82:9 statements 78:23, 113:10 states 1:1, 2:1, 18:10, 18:11, 28:4, 28:8, 28:11, 35:18, 38:16, 39:3, 46:23, 78:2, 78:7, 78:15, 79:19, 81:7, 84:25 steering 64:24 stenographically 1:32, 113:11	step 11:16, 11:17, 11:18, 12:15, 13:7, 14:17, 16:8, 19:19 step-by-step 11:15 steps 11:22, 25:3, 61:12, 61:16, 64:17 stick 34:9, 60:14 still 24:8, 51:5, 93:5, 101:19 stoker 1:33, 2:24, 6:14, 113:4, 113:25 straight 34:1 straightforward 75:3 strictly 35:1, 35:3 strike 35:1, 39:16, 63:17, 77:25, 94:11, 106:17 strong 55:18, 59:14 stronger 109:4 structure 11:5, 58:20, 59:12, 60:17 structures 9:25 study 52:4, 84:6, 85:15, 85:23, 86:2 stuff 11:3 subscribed 113:21 substance 102:10
--	--	---	---

sudden 51:14 sufficiently 65:24, 66:22, 108:9, 108:19 suggest 109:21 suggested 104:15 sugiura 62:3, 62:4, 62:6, 62:12, 62:22, 63:9, 64:13, 64:18, 70:24, 97:1, 97:6, 97:11, 99:10, 101:1, 107:20, 108:6, 110:11 sugiura's 58:19, 60:17, 62:17, 63:19, 65:18, 65:23, 66:16, 66:21 suite 2:22 support 53:7 suppose 22:8, 68:18 supposed 13:20, 17:8 sure 19:4, 31:22, 31:23, 33:15, 34:2, 47:4, 101:24, 106:4, 109:12 surface 68:24, 69:4 surprise 63:24 surrounding 21:7, 36:8 suspicion 86:5 sweidenfeller@cov 3:15	sworn 6:18, 7:10, 113:9 synonymous 20:9 system 22:17, 24:6, 24:7, 24:8, 24:13, 24:17, 26:14, 33:9, 33:10, 40:25, 41:13, 44:18, 44:19, 44:22, 50:19, 57:9, 59:15, 60:16, 66:8, 67:4, 74:3, 76:1, 87:17, 87:21, 95:19, 97:6, 97:7, 101:18, 105:20 systems 24:9, 25:8, 25:13, 25:21, 26:18, 55:4, 60:8, 64:9, 70:11, 75:17, 84:4, 97:1, 97:2, 97:6, 97:11 T table 89:5, 89:6, 89:20 tailored 58:23, 59:25, 60:2, 60:5, 60:25 tailoring 61:16 take 7:7, 28:15, 40:2, 42:7, 76:10, 86:19, 86:22, 91:5, 94:17, 98:3, 100:25, 101:23,	106:3 taken 2:20, 76:24, 113:7 takes 41:5 taking 102:6 talk 50:20 talked 50:2, 68:18 talking 11:5, 24:1, 24:2, 24:9, 26:18, 26:25, 28:24, 37:6, 44:17, 44:18, 44:22, 49:11, 51:21, 51:24, 83:9 talks 31:4, 31:9, 31:14, 31:22, 31:24, 32:6 target 55:8 tb 95:8 tbd 96:3, 96:7 tbpi 89:21 tbpi" 28:10 tcta 33:2, 33:12, 34:25, 35:2, 35:6, 35:10, 36:2, 36:5, 36:18, 37:14, 89:21, 92:2, 92:3 tcta" 28:6 technical 12:10, 103:25 technicality 51:10	telephone 3:14, 3:24, 3:32 tell 7:11, 10:2, 10:19, 11:19, 24:14, 103:13 temperatures 25:4 tend 25:17, 26:16 term 9:3, 9:12, 13:25, 14:4, 14:7, 17:10, 17:11, 18:2, 20:1, 20:5, 20:8, 20:18, 21:12, 45:25, 46:11, 62:12, 68:15, 69:8, 89:7 terminology 81:25, 82:12, 84:4 terms 9:11, 9:17, 17:12, 18:17, 20:9, 24:11, 30:2, 30:21, 31:1, 41:1, 45:18, 45:20, 85:14, 99:18, 100:24, 101:9, 106:23, 109:20, 111:8 testified 6:19, 52:9, 63:7, 63:11, 64:2, 87:16, 93:14, 105:13 testifying 7:12 testimony 12:18, 30:19, 34:3, 66:2, 70:23, 76:6, 76:12, 76:17,
--	--	---	---

89:10, 95:10, 102:11, 110:24, 112:2 text 30:7, 110:10 th 3:12, 58:1 thank 111:17, 111:19 thanks 27:17 themselves 25:17, 32:18, 34:22, 53:2 theorem 100:3 theoretically 100:18 thereafter 113:11 thereby 18:12 therefore 49:5, 49:7, 51:23, 75:9, 108:17 therein 113:8 thereof 113:13, 113:16 thing 11:21, 41:13, 50:21, 61:14, 61:15, 66:5, 67:1, 67:2 things 8:13, 26:15, 40:13, 40:15, 40:16, 41:11, 61:7, 65:4, 69:20, 76:2, 83:11, 100:23 think 11:24, 11:25, 13:1, 13:4, 17:6, 18:3, 19:15, 19:24, 22:13, 30:1,	30:5, 30:10, 30:13, 31:20, 33:24, 34:5, 35:5, 36:25, 38:25, 40:25, 42:22, 44:13, 46:20, 47:15, 54:2, 56:6, 56:13, 57:3, 57:7, 57:9, 57:17, 57:23, 62:15, 65:15, 69:10, 74:12, 81:23, 81:24, 85:10, 88:8, 89:18, 90:20, 93:6, 93:14, 94:2, 99:13, 100:2, 101:15, 106:20, 109:15, 110:9, 111:10, 111:15 thinking 24:15, 66:13, 70:22, 89:23, 96:17 third 11:17, 28:8, 29:3, 29:6, 31:6, 31:17, 31:24, 32:3, 32:8, 32:19, 35:21, 38:5, 38:9, 38:18, 38:22 thompson 79:11, 79:15, 79:16, 97:6 thought 20:10, 23:16, 49:8, 87:23, 90:7 three 24:23, 27:24, 29:2, 29:14, 29:17, 29:21, 30:4, 30:6, 30:9, 30:11,	30:24, 32:24, 34:11, 35:7, 36:4, 36:16, 36:17, 36:19, 37:16, 37:19, 39:4, 39:8, 47:22, 48:22, 49:8, 49:20, 50:17, 50:25, 52:10, 53:2, 53:8, 53:12, 53:14, 53:16, 62:8, 90:11, 95:5, 95:10, 95:11, 99:2, 101:7 three-part 33:10 threshold 68:24, 70:2 through 23:19, 31:13, 32:5, 38:14, 39:14 throughout 22:20, 59:1, 63:25 thursday 1:23, 2:23, 6:2 time 18:24, 27:5, 45:1, 86:5, 89:24, 113:8, 113:9 times 109:3 titled 80:18 today 6:23, 7:15, 74:10, 110:24 together 6:10, 26:16, 33:13, 34:24, 35:2, 35:7, 36:1, 36:15, 53:14, 53:16 tom 94:20	top 10:1, 16:9, 72:1, 72:20, 98:7 topics 105:8 totally 16:19 touched 99:23 touching 22:10 towards 48:2, 58:15 tpbi 33:2, 33:12, 34:25, 35:3, 35:6, 35:10, 36:2, 36:6, 36:18, 37:14 tpd 65:21, 66:7, 94:20, 95:8, 95:12, 101:4, 107:2, 108:19, 109:13, 109:18, 109:23, 110:12, 110:14, 110:15, 110:16, 110:17, 110:18, 110:24 tpk 95:8 trademark 1:1, 2:1 transcribed 113:12 transcript 7:1, 113:12, 113:18, 113:20 translation 61:23 transparency 67:23, 68:1 transport 12:1, 12:4, 21:10, 28:5, 28:9, 29:7, 29:11, 29:12,
--	---	---	--

31:15, 43:1, 43:19, 45:6, 51:3, 51:6, 51:14, 51:25, 53:23, 54:6, 54:14, 54:20, 55:2, 55:16, 55:19, 55:20, 56:2, 56:5, 56:10, 56:17, 58:20, 58:21, 65:25, 66:8, 66:12, 66:23, 67:1, 75:9, 98:12, 98:13, 99:4 transporting 28:21, 62:9, 62:10, 62:17, 62:18, 63:5, 63:19, 63:20, 65:19, 65:23, 66:17, 66:21, 67:4, 99:3 transports 65:19, 66:17 trend 100:13 trial 1:2, 2:2 triplet 54:4 triplet-induced 4:15, 67:14 true 112:3, 113:12 truth 7:11 truthful 7:15, 7:16 try 7:5, 7:17 trying 16:17, 23:12, 37:12, 52:6, 68:14, 76:5, 76:12 turbulent 65:7	turn 27:10, 28:12, 32:22, 37:23, 38:12, 38:22, 39:2, 39:13, 39:17, 42:2, 45:21, 45:24, 47:10, 47:18, 48:15, 56:19, 58:14, 58:17, 62:6, 64:13, 67:19, 70:5, 71:13, 74:17, 77:18, 78:13, 79:15, 81:2, 88:11, 107:20, 108:1 turned 110:5 tweak 55:6 two 20:9, 31:22, 41:20, 41:23, 41:25, 42:1, 71:17, 74:4, 75:5, 81:12, 84:6, 101:16 type 11:4, 109:11 typically 9:24, 74:2, 107:5 typographical 7:23, 8:11 U ugh4 42:11, 42:20, 43:14, 45:13, 45:17, 91:3 uh-huh 10:18, 15:23, 18:13, 32:4, 33:1, 33:3, 36:10, 37:8, 47:11, 48:4, 48:18, 53:6,	60:1, 61:11, 72:22, 81:6, 84:23, 87:22, 88:14, 89:15, 93:4, 97:16, 99:9, 100:10, 108:4 ultimately 16:1, 54:8, 65:4 unclear 109:8 under 4:28, 67:21, 78:21, 81:4, 93:7, 93:8, 112:1, 112:2 underpins 50:21 understand 7:10, 7:13, 18:16, 19:16, 23:12, 52:6, 68:10, 68:14, 86:3, 98:15, 110:16 understanding 14:7, 18:17, 30:14, 35:8, 52:17, 53:25, 68:15, 88:21 understood 46:24, 79:19, 80:8 uniformly 48:12 unintentional 104:11 united 1:1, 2:1 unless 36:21, 93:11 unlike 90:9 unnecessary 74:15 unsure 111:3	use 30:1, 35:19, 44:13, 45:25, 62:12, 76:17, 81:24, 81:25 useful 104:10 uses 13:25, 43:6 using 28:25, 30:25, 45:20, 85:12 usually 25:11, 72:11, 90:15, 100:23 uv 70:3 V v(b) 89:7 vacuum 22:15, 78:4, 78:10 vague 26:12 value 66:11 values 73:22, 99:23 van 22:19 vapor 65:9 vaporized 90:11 variables 64:11 various 90:6, 108:7 veer 68:8 verb 43:7 verbal 6:25 view 64:18, 66:9,
--	--	---	---

Transcript of Dr. Marc Sims
Conducted on July 31, 2025

141

82:14 virtue 91:16 visible 68:2 volt 75:20 voltammetry 74:4 volts 69:1, 71:21, 75:7	weidenfeller 3:9, 6:7 weight 66:4, 96:11, 101:3, 101:9, 101:13, 107:16, 108:15, 110:2, 110:20 weights 101:16 whatever 47:9 whenever 47:7, 86:3 whereas 61:19, 99:24 whereof 113:21 whether 10:2, 12:6, 17:12, 33:15, 34:2, 57:16, 57:21, 64:18, 64:19, 68:8, 87:12, 87:19, 88:18, 91:12, 92:6, 92:10, 105:13, 109:13 whole 12:1, 12:4, 23:22, 28:5, 31:12, 33:9, 76:3, 85:11 width 25:1, 25:5 wings 24:24 within 9:23, 60:20, 85:2, 87:12, 89:25, 98:10 without 34:22, 36:11, 37:1, 50:20, 105:5 witness 4:2, 6:16, 6:18, 9:14,	10:6, 10:21, 12:4, 12:19, 13:15, 14:22, 19:8, 19:15, 20:20, 21:22, 22:6, 22:13, 26:11, 27:14, 27:17, 27:19, 27:21, 29:10, 31:8, 31:20, 38:25, 40:1, 41:7, 42:16, 42:22, 43:6, 43:13, 43:23, 44:16, 44:25, 45:15, 47:4, 47:11, 51:8, 54:2, 55:18, 56:4, 56:25, 57:7, 66:3, 66:25, 68:8, 68:21, 71:10, 72:13, 73:7, 75:3, 75:16, 77:22, 79:1, 84:10, 86:18, 90:19, 91:24, 97:9, 101:22, 102:4, 102:13, 103:9, 103:16, 104:2, 104:18, 105:7, 107:12, 107:24, 108:4, 111:13, 111:14, 113:9, 113:21 word 43:6, 55:3, 56:12, 85:9, 85:12 words 71:15 work 51:15, 52:16, 53:1, 53:24, 54:3, 64:3, 64:5, 68:2, 68:6, 68:21, 69:6, 69:8,	69:10, 69:14, 69:21 worked 15:14 wouldn't 22:22, 25:22, 41:7, 45:7, 50:8, 51:21, 51:22, 52:16, 53:24, 63:24, 64:3, 75:9, 75:10, 82:11, 82:12 written 30:11, 61:6, 72:14 wrote 59:5
W			X
waals 22:19 want 12:9, 14:3, 25:9, 30:13, 31:21, 50:4, 55:8, 59:3, 84:15, 95:25 wanted 37:1, 75:24, 83:2 way 7:19, 12:22, 12:23, 23:19, 30:11, 33:21, 45:8, 45:10, 51:20, 51:24, 52:18, 55:5, 57:15, 57:21, 59:13, 61:5, 65:17, 73:2, 74:2, 75:25, 84:11, 86:5, 86:9, 98:22, 99:1, 103:19, 109:15, 113:15 ways 10:23, 72:25, 73:8, 74:5 we're 24:1, 24:2, 26:18, 111:20 we've 75:6			xtl 16:9
			Y
			yeah 10:17, 14:22, 15:15, 16:23, 23:17, 24:13, 27:11, 27:17, 28:11, 28:15, 31:14, 35:5, 35:12, 35:23, 36:7, 36:25, 37:1, 37:4, 38:25, 43:8, 44:16, 47:9, 49:11, 51:8, 51:19, 71:17, 72:4, 72:9, 72:15, 73:1, 73:25, 80:6, 80:14, 82:9, 84:19, 85:11, 87:22, 88:1, 88:10, 90:21, 91:24, 93:18, 93:23, 96:12, 98:24, 101:6,

Transcript of Dr. Marc Sims
Conducted on July 31, 2025

142

101:14, 101:21, 103:11, 103:16, 107:25, 110:7 yep 15:3, 15:4, 15:9, 15:19, 18:9, 28:3, 28:19, 33:14, 38:1, 38:7, 39:15, 39:22, 45:23, 47:21, 48:16, 62:3, 62:7, 67:20, 70:7, 71:14, 79:13, 87:7, 87:9, 88:7, 88:12, 91:1, 108:18 yes-or-no 102:12 yingjie 4:15 yourself 88:13 z zhang 4:15 " "ea" 78:9 "ip" 78:3 . .4707 3:14 .5200 3:33 .5220 3:32 .7183 3:24 .7199 3:25 0 0.06 81:8, 81:15	0.2 75:7, 101:4 0.5 75:13, 75:20, 75:22 01093 1:7, 2:7, 4:27 011536 77:7 0155238 79:3 02 76:23, 76:24 1 10 3:12, 37:23, 37:25, 39:13, 40:4, 40:7, 67:21, 105:23, 106:1, 106:11 100 101:4 1001 4:12, 8:15, 8:17, 8:20, 8:22, 8:25, 88:5 1004 5:3, 93:19, 93:22, 95:1 1006 5:4, 61:22, 61:25, 62:2, 62:4, 97:12, 101:1, 107:21 1007 5:5, 79:2, 79:4, 79:6, 79:7, 79:9, 79:11, 79:14 102 4:6 103 78:13 11 48:17, 77:18, 77:20, 77:21 1101 4:15, 67:7,	67:8, 67:13, 67:15 1102 4:23, 80:15, 80:17, 80:23, 87:3 110568 61:24 113 1:12, 2:12 12 74:19, 76:23, 76:24, 77:2, 77:5, 102:2 13 4:13, 37:23, 37:25 14 39:14 14373 1:34, 2:27, 6:14, 113:26 15 48:17 164 8:22, 9:1, 9:2, 13:25, 18:11, 19:25, 20:4, 20:17, 20:22, 21:11, 27:10, 33:22, 42:2, 42:24, 43:3, 43:10, 43:16, 43:20, 48:15, 48:19, 52:8, 53:4, 56:19, 88:6, 89:20, 96:23 17 28:12, 28:17, 28:18, 31:13 18 4:13, 106:5 1800 3:22 19 106:8 2 2 101:25	2.4 71:23, 71:24, 71:25 20 39:18, 39:20, 91:6, 107:10 2001 5:6, 57:25, 58:3, 58:5, 61:24 2004 79:3, 85:13 2008 77:7 2009 4:13 2014 4:13 2017 4:21 2019 4:25, 7:20, 7:24, 7:25, 8:3, 8:10, 15:2, 15:7, 18:8, 45:21, 47:18, 58:12, 89:4 2024 1:7, 2:7, 4:27, 58:2, 112:6 2025 1:23, 2:23, 6:2, 7:21, 113:22 2029 5:7, 77:6, 77:8, 77:10, 77:12, 77:15, 77:18 21 27:12, 27:14, 27:21, 32:5, 32:22, 35:18 217 4:20 218 67:19, 81:2, 84:18, 87:8
--	---	--	---

Transcript of Dr. Marc Sims
Conducted on July 31, 2025

143

219 7:23 220 74:17 23 76:6 24 28:4, 38:12, 38:14 25 28:4, 28:17 26 32:5, 38:12, 38:14, 45:24 27 28:8 28 28:8, 58:1, 111:20, 111:22 3 3 102:2, 106:5, 106:8, 111:20, 111:22 30 27:12, 27:14, 27:21, 32:23, 86:22, 102:5, 105:25 3000 3:10 31 1:23, 2:23, 6:2, 35:24 310.203 3:24, 3:25 34 2:23, 6:2, 28:12, 28:18, 31:13 3d 60:19, 62:9, 62:17, 63:20, 97:20 3e 60:19, 62:10, 62:18, 63:21,	97:20 4 4 98:2, 101:20 40 18:7, 40:4, 41:5, 106:1 400 2:22 42 79:15, 79:25 45 86:19, 102:5 46 39:2 47 39:2 48 4:20 49 58:14, 77:2, 77:5 4th 113:22 5 5.5 69:1, 71:21 54 94:17 55 40:7 56 42:3, 42:5, 56:20, 88:13, 101:25 58 5:6, 47:20 5th 7:21 6 6 (b) 70:5, 71:13 60 41:4, 101:4 61 5:4, 108:1	62 39:17, 39:19, 39:20, 42:24, 64:13, 64:16, 91:6, 98:3, 101:1, 108:3, 109:23, 110:4, 110:11 63 42:24 65 42:3, 42:5, 56:20, 88:13 650.632 3:14 67 4:15 7 7 27:19, 39:11 77 5:7 79 5:5 8 8,723,164 4:12, 8:18 8,723,64 1:8, 2:8 80 4:23, 101:4 840 2:21, 3:30 87 4:5 9 9 2:23, 6:2 9,9 87:6 90 105:24 90067 3:23 92660 3:31	93 5:3 94306 3:13 949.760 3:32, 3:33 99.94 81:19
---	---	---	---