

**In the Matter Of:**

*SAVANT TECHNOLOGIES LLC v*

*FEIT ELECTRIC COMPANY, INC.*

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*E. FRED SCHUBERT, PH.D., M.S.*

*September 12, 2025*

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

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SAVANT TECHNOLOGIES LLC d/b/a  
GE LIGHTING and LEDVANCE LLC,  
Petitioners,  
-against-  
FEIT ELECTRIC COMPANY, INC.,  
Patent Owner.

\*\*\*CAPTION CONTINUED\*\*\*

-----X  
IPR2024-01357  
Patent 8,604,678 B2

STENOGRAPHIC DEPOSITION OF:  
E. FRED SCHUBERT, Ph.D., M.S.  
Friday, September 12, 2025  
New York, New York  
10:11 a.m. - 3:03 p.m.

Reported stenographically by:  
Richard Germosen, FAPR, CA CSR No. 14391  
RDR, CRR, CCR, CROR, CSR-CA, NYACR, NYRCR  
NCRA/NJ/NY/CA Certified Realtime Reporter  
NCRA Realtime Systems Administrator  
Job No. 2025-997696

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

\*\*\*CAPTION CONTINUED\*\*\*

-----X

SAVANT TECHNOLOGIES LLC d/b/a  
GE LIGHTING, ELONG INTERNATIONAL  
USA INC., AND XIAMEN LONGSTAR  
LIGHTING CO. LTD.,

Petitioners,

-against-

FEIT ELECTRIC COMPANY, INC.,  
Patent Owner.

-----X

IPR2025-00260  
Patent 8,604,678 B2

STENOGRAPHIC DEPOSITION of E. FRED SCHUBERT,  
Ph.D., M.S., taken in the above-entitled matter before  
RICHARD GERMOSEN, Fellow of the Academy of Professional  
Reporters, Certified Court Reporter, (License No.  
30XI00184700), Certified Realtime Court Reporter-NJ,  
(License No. 30XR00016800), California Certified  
Shorthand Reporter, (License No. 14391), NCRA/NY/CA  
Certified Realtime Reporter, NCRA Registered Diplomate  
Reporter, New York Association Certified Reporter, NCRA  
Realtime Systems Administrator, taken at the offices of  
BENESCH FRIEDLANDER COPLAN & ARONOFF, 1155 Avenue of the  
Americas, New York, New York 10020, on Friday, September  
12, 2025, commencing at 10:11 a.m.

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A P P E A R A N C E S:

RADULESCU LLP

BY: ANDREW S. BROWN, ESQ.

494 8th Avenue

5 Pennsylvania Plaza

19th Floor

New York, New York 10001

(646) 502.5950

andy@radip.com

Attorneys for the Petitioners

BENESCH FRIEDLANDER COPLAN & ARONOFF LLP

BY: THOMAS M. DaMARIO, ESQ.

-and-

BY: CHARLES M. McMAHON, ESQ., (via Zoom)

71 South Wacker Drive

Suite 1600

Chicago, Illinois 60606

(312) 212.4949 | (312) 767.9192 (FAX)

tdamario@beneschlaw.com

cmcmahon@beneschlaw.com

Attorneys for the Patent Owner,

Feit Electric Company, Inc.

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A P P E A R A N C E S: (CONT'D.)

ALSO PRESENT:

NICK KLIEWER, (VIA ZOOM), FEIT ELECTRIC COMPANY,

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I N D E X

|                               |             |
|-------------------------------|-------------|
| WITNESS                       | EXAMINATION |
| E. FRED SCHUBERT, Ph.D., M.S. |             |
| BY ATTORNEY BROWN             | 11          |

E X H I B I T S

|              |                                                                                                                  |      |
|--------------|------------------------------------------------------------------------------------------------------------------|------|
| EXHIBIT NO.  | DESCRIPTION                                                                                                      | PAGE |
| Exhibit 2002 | document entitled CV, E. Fred Schubert                                                                           | 11   |
| Exhibit 2026 | document entitled Declaration of E. Fred Schubert, Ph.D. in Support of Patent Owner's Response                   | 12   |
| Exhibit 2039 | document entitled Declaration of E. Fred Schubert, Ph.D. in Support of Patent Owner's Response to IPR 2025-00260 | 13   |
| Exhibit 1001 | U.S. Patent Number 8604678                                                                                       | 14   |
| Exhibit 1005 | U.S. Patent Publication Number U.S. 2009/0057699                                                                 | 17   |

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E X H I B I T S (CONT'D.)

| EXHIBIT NO.  | DESCRIPTION                                                                                                                                                  | PAGE |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Exhibit 2014 | book entitled:<br>Light-Emitting Diodes Second<br>Edition by E. Fred Schubert                                                                                | 54   |
| Exhibit 1007 | Krummacher reference, U.S.<br>Patent Publication Number<br>22008/0079015                                                                                     | 62   |
| Exhibit 1044 | public record from the<br>National Science Foundation<br>entitled: Award Abstract<br>Number 0812056NSF,<br>Engineering Research Center<br>for Smart Lighting | 96   |
| Exhibit 1043 | public record from the<br>National Science Foundation,<br>Freedom of Information Act<br>log for the fiscal year 2011                                         | 103  |

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E X H I B I T S (CONT'D.)

| EXHIBIT NO.  | DESCRIPTION                                                                                                                                                           | PAGE |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Exhibit 1041 | public record from the<br>National Science Foundation,<br>Office of Inspector General,<br>Office of Investigations,<br>closeout number with Case<br>Number I-09080045 | 122  |

\*\*original exhibits were retained by counsel.

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IT IS HEREBY STIPULATED AND AGREED, by  
and between the attorneys for the respective parties  
herein, that filing and sealing be and the same are  
hereby waived.

IT IS FURTHER STIPULATED AND AGREED  
that all objections, except as to the form of the  
question, shall be preserved to the time of trial.

IT IS FURTHER STIPULATED AND AGREED  
that the within deposition may be signed and sworn  
to before any officer authorized to administer an  
oath, with the same force and effect as if signed  
and sworn to before the officer before whom the  
within deposition was taken.

10

E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

P R O C E E D I N G S

10:11 a.m.

New York, New York

CERTIFIED STENOGRAPHER: On the  
stenographic record at 10:11 a.m.

Good morning. My name is Rich  
Germosen. I am a Certified Stenographic  
Reporter. My license is available for  
inspection.

- - -

(Whereupon, the Certified  
Stenographic Reporter administered the oath to  
the witness.)

- - -

ATTORNEY BROWN: Andy Brown of  
Radulescu LLP on behalf of the petitioners.

ATTORNEY DaMARIO: Tom DaMario of  
Benesch on behalf of patent owner Feit  
Electric, and joined with me today remotely  
are Charles McMahon and Nick Kliever.

- - -

(Whereupon, document entitled CV,

11

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

2 E. Fred Schubert, is received and marked as  
3 Exhibit 2002 for Identification.)

4 - - -

10:11:48 5 E. F R E D S C H U B E R T, Ph.D., M.S.,  
10:11:48 6 (the witness produced a New York State driver's  
10:11:48 7 license), having been first duly sworn or affirmed,  
10:11:48 8 was examined and testified as follows:

10:11:48 9 EXAMINATION BY ATTORNEY BROWN:

10:11:50 10 BY ATTORNEY BROWN:

10:11:50 11 Q. Good morning, Dr. Schubert.

10:11:52 12 What is your full name?

10:11:56 13 A. Eric Fred Schubert.

10:12:02 14 Q. And I'm going to be handing you a  
10:12:04 15 document that's marked Exhibit 2002, and it is  
10:12:11 16 titled: CV, E. Fred Schubert.

10:12:15 17 Do you recognize Exhibit 2002?

10:12:21 18 A. Yes.

10:12:22 19 Q. What is it?

10:12:25 20 A. It is my CV.

10:12:28 21 Q. Are you still a professor at RPI?

10:12:33 22 A. Yes.

10:12:34 23 Q. And RPI is -- I may mispronounce  
10:12:38 24 this, but Rensselaer Polytechnic Institute in  
10:12:41 25 Troy, New York?

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1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:12:44 2 A. Yes.

10:12:47 3 Q. Since you submitted your CV in this  
10:12:50 4 matter, have there been any notable changes or  
10:12:54 5 additions to your CV?

10:13:07 6 A. I occasionally update my CV with  
10:13:10 7 new information. I don't think any of the new  
10:13:15 8 information is very significant.

10:13:23 9 Q. I'm going to be handing you a  
10:13:26 10 couple of documents, the first of which is  
10:13:34 11 marked Exhibit 2026.

10:13:36 12 - - -

10:13:36 13 (Whereupon, document entitled  
10:13:36 14 Declaration of E. Fred Schubert, Ph.D. in  
10:13:36 15 Support of Patent Owner's Response, is  
10:13:36 16 received and marked as Exhibit 2026 for  
10:13:36 17 Identification.)

10:13:36 18 - - -

10:13:40 19 ATTORNEY BROWN: Do you need copies of  
10:13:40 20 these? They're going to be all RPI's  
10:13:44 21 exhibits.

10:13:45 22 ATTORNEY DaMARIO: Okay. Yeah, I think  
10:13:46 23 if you had a copy, I'll take it.

10:13:48 24 ATTORNEY BROWN: All right.

25

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:13:49 2 BY ATTORNEY BROWN:

10:13:54 3 Q. So Exhibit 2026 is titled:

10:14:00 4 Declaration of E. Fred Schubert, Ph.D., in  
10:14:03 5 Support of Patent Owner's Response.

10:14:09 6 And I'm also going to be handing  
10:14:10 7 you a copy of Exhibit 2039.

10:14:13 8 - - -

10:14:13 9 (Whereupon, document entitled  
10:14:13 10 Declaration of E. Fred Schubert, Ph.D. in  
10:14:13 11 Support of Patent Owner's Response to IPR  
10:14:13 12 2025-00260, is received and marked as Exhibit  
10:14:13 13 2039 for Identification.)

10:14:13 14 - - -

10:14:13 15 BY ATTORNEY BROWN:

10:14:23 16 Q. And Exhibit 2039 is titled:

10:14:27 17 Declaration of E. Fred Schubert, Ph.D., in  
10:14:30 18 Support of Patent Owner's Response to IPR  
10:14:34 19 2025-00260.

10:14:42 20 Do you recognize Exhibits 2026 and  
10:14:45 21 Exhibit 2039?

10:15:04 22 A. Yes.

10:15:04 23 Q. What are they?

10:15:13 24 A. Exhibit 2026 is my declaration in  
10:15:21 25 support of patent owner's response in the IPR

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1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:15:35 2 2024-01357.

10:15:42 3 And Exhibit 2039 is my declaration  
10:15:50 4 in support of patent owner's response in IPR  
10:16:04 5 202500260.

10:16:29 6 Q. Do you understand that  
10:16:33 7 Exhibits 2026 and 2039 reflect your testimony  
10:16:39 8 in those two IPR proceedings you listed or you  
10:16:44 9 named?

10:16:50 10 A. Yes.

10:16:50 11 Q. And do both of those proceedings  
10:16:53 12 involve U.S. Patent -- I'm sorry. Withdrawn.

10:16:56 13 Do both of those inter partes  
10:16:58 14 review proceedings involve U.S. Patent  
10:17:00 15 Number 8604678?

10:17:09 16 A. Yes.

10:17:10 17 - - -

10:17:10 18 (Whereupon, U.S. Patent Number  
10:17:10 19 8604678, is received and marked as Exhibit  
10:17:10 20 1001 for Identification.)

10:17:10 21 - - -

10:17:10 22 BY ATTORNEY BROWN:

10:17:14 23 Q. I'm going to hand you a copy of  
10:17:15 24 Exhibit 1001, and Exhibit 1001 is a copy of  
10:17:34 25 U.S. Patent Number 8604678; correct?

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:17:42 2 A. Correct.

10:17:42 3 Q. And is this the patent that is the  
10:17:44 4 subject of your testimony in those IPRs in  
10:17:48 5 Exhibits 2026 and 2039?

10:17:54 6 A. Yes.

10:17:55 7 Q. And if I refer to that patent as  
10:17:57 8 the '678 patent, will you understand what I  
10:17:59 9 mean?

10:18:04 10 A. Yes.

10:18:06 11 Q. Do you understand that the purpose  
10:18:08 12 of your deposition today is so that you may be  
10:18:12 13 cross-examined on the testimony in your  
10:18:13 14 declarations?

10:18:20 15 A. Yes.

10:18:21 16 Q. And I know it's been a while since  
10:18:24 17 you submitted both of your declarations. So  
10:18:28 18 as you're answering my questions, please feel  
10:18:30 19 free to refer to declarations if needed. Is  
10:18:33 20 that all right?

10:18:37 21 A. Yes.

10:18:39 22 Q. Have you ever been deposed as an  
10:18:41 23 expert witness in an IPR before?

10:18:47 24 A. Yes.

10:18:47 25 Q. Roughly how many times have you

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:18:48 2 been deposed as an expert witness in an IPR?

10:19:07 3 A. I'm not sure, but I would guess  
10:19:09 4 around 15 times.

10:19:12 5 Q. And have you ever testified in a  
10:19:15 6 trial in a courtroom before?

10:19:21 7 A. Yes.

10:19:21 8 Q. How many times?

10:19:38 9 A. About 10 times.

10:19:39 10 Q. And were those all patent cases?

10:20:02 11 A. I think that's correct.

10:20:07 12 Q. So you've been deposed and you've  
10:20:10 13 testified at trial a number of times, so I'm  
10:20:12 14 sure that you understand the rules, but just  
10:20:14 15 as a reminder, you're under oath, and for the  
10:20:18 16 benefit of the court reporter, you need to  
10:20:21 17 answer each question verbally, and we should  
10:20:23 18 both do our best not to talk over one another.

10:20:26 19 Do you understand that?

10:20:29 20 A. Yes.

10:20:33 21 Q. And in your declarations, you  
10:20:36 22 analyzed certain references that were asserted  
10:20:39 23 by petitioners as prior art against the '678  
10:20:42 24 patent; correct?

10:20:49 25 A. Correct.

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10:20:49 2 - - -

10:20:49 3 (Whereupon, U.S. Patent Publication  
10:20:49 4 Number U.S. 2009/0057699, is received and  
10:20:49 5 marked as Exhibit 1005 for Identification.)

10:20:49 6 - - -

10:20:49 7 BY ATTORNEY BROWN:

10:20:53 8 Q. I'm going to hand you a document  
10:20:54 9 that's been marked Exhibit 1005.

10:21:12 10 And Exhibit 1005 is U.S. Patent  
10:21:21 11 Publication Number U.S. 2009/0057699.

10:21:30 12 Dr. Schubert, do you recognize  
10:21:32 13 Exhibit 1005?

10:21:38 14 A. Yes.

10:21:39 15 Q. And what is it?

10:21:45 16 A. It is a U.S. Patent application  
10:21:51 17 publication to a group of inventors with the  
10:22:01 18 first listed inventor being Basin, B-A-S-I-N.

10:22:12 19 Q. Have you seen this patent  
10:22:13 20 application before? Sorry.

10:22:14 21 This -- withdrawn.

10:22:16 22 Have you seen this patent  
10:22:18 23 application publication before?

10:22:30 24 A. Yes.

10:22:31 25 Q. And when have you seen it?

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:22:42 2 A. I've seen it during 2024 and 2025.

10:22:48 3 Q. And what were the circumstances in  
10:22:51 4 which you saw it?

10:23:01 5 A. I saw it in conjunction with the  
10:23:04 6 IPRs.

10:23:06 7 Q. So is this one of the references  
10:23:09 8 asserted by petitioners as prior art against  
10:23:11 9 the '678 patent?

10:23:18 10 A. Yes.

10:23:19 11 Q. So this is one of the references  
10:23:21 12 that you analyzed in your declaration;  
10:23:23 13 correct?

10:23:30 14 A. Yes.

10:23:32 15 Q. And has this reference typically  
10:23:35 16 been referred to by the parties and their  
10:23:38 17 experts as Basin-2007?

10:23:44 18 A. Yes.

10:23:45 19 Q. And that's because of the filing  
10:23:47 20 date, which you can see on the front page, was  
10:23:52 21 in 2007.

10:23:55 22 Do you understand that?

10:24:02 23 A. Yes, I see the filing date of 2007.

10:24:06 24 Q. At a general level, what does  
10:24:08 25 Basin-2007 disclose?

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:24:31 2 A. It discloses an LED having  
10:24:34 3 particles in the encapsulant.

10:24:39 4 Q. What kind of particles are in the  
10:24:40 5 encapsulant?

10:25:17 6 A. These are nonphosphor inert  
10:25:20 7 particles.

10:25:23 8 Q. What kind of LED is disclosed --  
10:25:27 9 sorry. Withdrawn.

10:25:28 10 You said it discloses an LED having  
10:25:30 11 particles in the encapsulant; correct?

10:25:38 12 A. Correct.

10:25:39 13 Q. What is the LED that you're  
10:25:41 14 referring to? What kind of LED is that?

10:25:47 15 ATTORNEY DaMARIO: Object to the form.

10:25:57 16 A. It is an LED with particles in its  
10:26:03 17 encapsulant.

10:26:07 18 Q. Is it a white LED?

10:26:40 19 A. The LED disclosed can emit white  
10:26:46 20 light.

10:26:48 21 Q. How does the LED disclosed emit  
10:26:50 22 white light?

10:27:15 23 A. The emission color of white is  
10:27:21 24 accomplished by an emission spectrum that is  
10:27:31 25 perceived as white light by a human being.

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10:27:41 2 Q. How is the emission color of white  
10:27:43 3 obtained?

10:28:07 4 A. The emission color of white is  
10:28:09 5 obtained by emitting a broader spectrum, not a  
10:28:17 6 narrow spectrum, but a broad spectrum that is  
10:28:23 7 perceived as white light by a human being.

10:28:32 8 Q. Dr. Schubert, what is the last time  
10:28:35 9 you reviewed Basin-2007?

10:28:44 10 A. Yesterday.

10:28:48 11 Q. How does Basin-2007 -- withdrawn.

10:28:55 12 How does Basin-2007 disclose  
10:29:04 13 emitting a broader spectrum, not a narrow  
10:29:08 14 spectrum, but a broad spectrum that is  
10:29:10 15 perceived as white light by a human being?

10:29:15 16 ATTORNEY DaMARIO: Object to the form.

10:29:23 17 A. It is disclosed by means of this  
10:29:26 18 patent application publication.

10:29:33 19 Q. How is it disclosed by means of  
10:29:35 20 this patent application publication?

10:29:52 21 A. It is disclosed by means of  
10:29:54 22 figures, by means of a narrative description,  
10:30:01 23 and by means of claims.

10:30:12 24 Q. In terms of the technology used,  
10:30:17 25 what does Basin-2007 disclose?

21

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:30:25 2 ATTORNEY DaMARIO: Object to form.

10:30:49 3 A. The technology is light-emitting  
10:30:52 4 diode technology.

10:31:03 5 Q. Are there any LED semiconductor  
10:31:05 6 chips that emit white light?

10:31:19 7 A. Does the question relate to Basin  
10:31:21 8 or is it a general question?

10:31:23 9 Q. It is a general question.

10:31:37 10 A. I think so. I think, yes, some  
10:31:41 11 semiconductor chips emit white light.

10:32:00 12 Q. Don't semiconductor -- sorry.  
10:32:03 13 Withdrawn.

10:32:04 14 Don't LED chips emit light in a  
10:32:10 15 narrow band of wavelengths?

10:32:26 16 A. Usually, yes, but there are  
10:32:28 17 specialized chips that can emit light at  
10:32:35 18 multiple wavelengths.

10:32:38 19 Q. What are those specialized chips?

10:33:07 20 A. Those are semiconductor chips that  
10:33:10 21 have a light emitting active region that emits  
10:33:19 22 light at multiple wavelengths.

10:33:24 23 Q. Does Basin-2007 use such a  
10:33:27 24 semiconductor chip to emit white light?

10:33:43 25 A. No.

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

10:33:43 2 Q. Then how does Basin-2007 emit white  
10:33:46 3 light?

10:34:04 4 A. It emits white light by emitting a  
10:34:08 5 broad spectrum located in the visible optical  
10:34:16 6 spectrum that is perceived as white light by a  
10:34:24 7 human being.

10:34:27 8 Q. And technologically how is that  
10:34:29 9 accomplished?

10:34:59 10 A. That is accomplished by means of  
10:35:01 11 LED technology.

10:35:10 12 Q. What kind of LED technology?

10:35:30 13 A. The technology is based on the  
10:35:31 14 material gallium nitride and is referred to as  
10:35:38 15 gallium nitride LED technology.

10:35:52 16 Q. What kind of light is emitted by  
10:35:54 17 gallium nitride LED technology?

10:36:11 18 A. The lights can be within the  
10:36:14 19 visible optical spectrum or within the UV  
10:36:23 20 ultraviolet spectrum.

10:36:31 21 Q. If gallium nitride LED technology  
10:36:35 22 emits light -- sorry. Withdrawn.

10:36:43 23 Does gallium nitride LED technology  
10:36:46 24 emit light throughout the entire visible  
10:36:49 25 optical spectrum and the entire UV spectrum?

23

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10:36:58 2 ATTORNEY DaMARIO: Object to form.

10:37:05 3 A. No.

10:37:06 4 Q. Which part of the spectrum can  
10:37:11 5 gallium nitride LED technology emit light in?

10:37:28 6 A. Gallium nitride-based materials can  
10:37:31 7 emit light in the visible optical spectrum and  
10:37:40 8 the UV optical spectrum.

10:37:46 9 Q. Throughout the entire visible  
10:37:47 10 optical spectrum?

10:38:13 11 A. In theory, yes, but as we go to  
10:38:21 12 longer wavelengths, the efficiency decreases  
10:38:26 13 quite significantly.

10:38:30 14 Q. Can you create -- sorry.  
10:38:33 15 Withdrawn.

10:38:33 16 If I refer to gallium nitride as  
10:38:36 17 GaN, will you understand what I'm referring  
10:38:39 18 to?

10:38:54 19 A. Yes.

10:38:54 20 Q. Can you create a GaN LED that emits  
10:38:57 21 red light?

10:39:10 22 A. To accomplish red emission, indium  
10:39:28 23 is added to the gallium nitride to obtain  
10:39:37 24 gallium indium nitride, and if there is  
10:39:44 25 sufficient indium in the material, red

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10:39:55 2 emission can be accomplished. However, the  
10:40:03 3 efficiency of these red emitters is relatively  
10:40:12 4 low.

10:40:26 5 Q. Does Basin-2007 disclose GaN LEDs?

10:40:42 6 A. Yes, Basin-2007 discloses gallium  
10:40:48 7 nitride LEDs as disclosed in the abstract.

10:40:56 8 Q. When you say "as disclosed in the  
10:40:57 9 abstract," what do you mean by that?

10:41:11 10 A. In the fourth and fifth line of the  
10:41:13 11 abstract, Basin-2007 discloses gallium nitride  
10:41:21 12 LEDs.

10:41:34 13 Q. And looking at the entire  
10:41:36 14 reference, not just the abstract, does  
10:41:39 15 Basin-2007 disclose that the GaN LEDs it  
10:41:45 16 describes emit light of a certain wavelength?

10:41:56 17 ATTORNEY DaMARIO: Object to form.

10:42:23 18 A. Yes, the Basin-2007 reference  
10:42:29 19 discloses the emission of white light.

10:42:34 20 Q. Does it disclose the emission of  
10:42:36 21 white light by the GaN LED alone?

10:42:59 22 A. There is an ambiguity in the  
10:43:01 23 question. LED can refer to an LED chip, an  
10:43:09 24 LED semiconductor chip. LED can also refer to  
10:43:13 25 a packaged LED, and if you could remove that

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10:43:23 2 ambiguity, then I can answer the question.

10:43:29 3 Q. So if I refer to an LED chip, then  
10:43:34 4 I would be referring just to the semiconductor  
10:43:38 5 chip; is that right?

10:43:44 6 A. Yes.

10:43:44 7 Q. Whereas, when you say the "packaged  
10:43:46 8 LED," if I refer to the LED package, that  
10:43:50 9 includes the semiconductor chip, but it also  
10:43:53 10 includes other materials or other elements  
10:43:57 11 beyond the semiconductor chip; is that  
10:43:59 12 correct?

10:44:08 13 A. Yes.

10:44:08 14 Q. What might the LED package include  
10:44:11 15 in addition to the semiconductor chip?

10:44:25 16 A. A packaged LED includes the  
10:44:34 17 semiconductor LED chip and the package.

10:44:46 18 Q. What does the package include? Or  
10:44:47 19 sorry. Withdrawn.

10:44:48 20 What can the package include?

10:45:11 21 A. The package can include various  
10:45:13 22 components, such as electrical contacts or  
10:45:26 23 encapsulation material.

10:45:31 24 Q. Anything else?

10:45:43 25 A. Yes. It can also include, for

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10:45:46 2 example, a submount or a phosphor material or  
10:46:06 3 bond wires.

10:46:11 4 Q. Does Basin-2007 disclose the  
10:46:14 5 emission of white light by the GaN LED chip by  
10:46:18 6 itself?

10:46:31 7 A. No.

10:46:33 8 Q. So how does Basin-2007 disclose  
10:46:38 9 that white light emission is obtained?

10:47:04 10 A. White light emission is obtained by  
10:47:09 11 emitting a broad wavelength spectrum, and the  
10:47:15 12 physical objects that emit light include the  
10:47:22 13 semiconductor LED chip and a phosphor  
10:47:28 14 material.

10:47:42 15 Q. How do the physical objects,  
10:47:45 16 including the semiconductor LED chip and the  
10:47:48 17 phosphor material, emit white light?

10:48:17 18 A. The semiconductor chip and the  
10:48:20 19 phosphor together emit a broad optical  
10:48:31 20 spectrum, and that broad optical spectrum is  
10:48:40 21 perceived as white light by a human being.

10:48:49 22 Q. How do they together emit a broad  
10:48:52 23 optical spectrum?

10:48:56 24 ATTORNEY DaMARIO: Objection. Vague.

10:49:43 25 A. The LED chip is injected with an

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10:49:49 2 electrical current and the phosphor is

10:50:02 3 optically excited by the light emitted from

10:50:14 4 the LED semiconductor chip.

10:50:21 5 Q. How does that create white light?

10:50:36 6 A. White light is created by emitting

10:50:46 7 a relatively broad optical spectrum within the

10:50:52 8 visible wavelength range so that the light is

10:51:00 9 perceived as white light by a human being.

10:51:17 10 Q. So light is perceived by a human

10:51:19 11 being as white light if it has a relatively

10:51:23 12 broad optical spectrum within the visible

10:51:26 13 wavelength range; is that right?

10:51:37 14 A. I think that's a fair statement.

10:51:40 15 Q. So we understand that, and there is

10:51:43 16 not a need for you to keep on telling me that

10:51:45 17 white light is created by creating a

10:51:49 18 relatively broad optical spectrum within the

10:51:52 19 visible wavelength range?

10:52:06 20 ATTORNEY DaMARIO: Object to form.

10:52:11 21 ATTORNEY BROWN: I'll withdraw the

10:52:12 22 question.

10:52:17 23 Q. How does Basin-2007 create a

10:52:21 24 relatively broad optical spectrum within the

10:52:33 25 wavelength range.

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10:52:53 2 A. It creates a relatively broad  
10:52:55 3 optical spectrum by employing an LED chip and  
10:53:05 4 a phosphor material.

10:53:10 5 Q. How does it use the LED chip and  
10:53:14 6 the phosphor material to create a relatively  
10:53:16 7 broad optical spectrum?

10:53:32 8 A. The LED chip is excited by means of  
10:53:38 9 an electrical current that is injected into  
10:53:43 10 the LED chip, and the phosphor is optically  
10:53:56 11 excited to emit fluorescent or phosphorescent  
10:54:08 12 light.

10:54:11 13 Q. So if the phosphor emits  
10:54:15 14 fluorescent or phosphorescent light, how is  
10:54:20 15 white light obtained?

10:54:33 16 A. White light is obtained by the  
10:54:38 17 configuration that I just described.

10:54:47 18 Q. The LED chip doesn't emit white  
10:54:49 19 light; does it?

10:55:03 20 A. The Basin-2007 LED chip does not  
10:55:11 21 emit white light by itself.

10:55:16 22 Q. And the phosphor disclosed in  
10:55:18 23 Basin-2007 do not emit white light by  
10:55:22 24 themselves either; correct?

10:55:36 25 A. Correct.

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10:55:38 2 Q. So how did those two together then  
10:55:42 3 emit white light?

10:55:48 4 ATTORNEY DaMARIO: Object to form.  
10:55:48 5 Vague.

10:56:11 6 A. The configuration emits white light  
10:56:15 7 by the semiconductor chip being electrically  
10:56:24 8 injected with a current so that the  
10:56:31 9 semiconductor chip emits light, and the  
10:56:40 10 phosphor two emitting light, the phosphor also  
10:56:49 11 emits light so that the light emitted by the  
10:57:00 12 packaged LED has a broad spectrum and is  
10:57:06 13 perceived as white light.

10:57:14 14 Q. How does the semiconductor chip  
10:57:19 15 emitting light and the phosphor two emitting  
10:57:23 16 light create a broad spectrum that is  
10:57:25 17 perceived as white light?

10:57:54 18 A. Broad optical emission spectra that  
10:57:58 19 span the visible spectrum are generally  
10:58:07 20 perceived as white light. For example,  
10:58:14 21 sunlight is a broad spectrum light that spans  
10:58:35 22 the visible spectrum and is perceived as white  
10:58:38 23 light.

10:58:41 24 Q. I understand why sunlight is  
10:58:43 25 perceived as white light. I'd like to know

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10:58:46 2 why the light emitted by Basin-2007 is  
10:58:53 3 perceived as white light?

10:58:54 4 ATTORNEY DaMARIO: Object to form.  
10:58:55 5 Asked and answered. Argumentative.

10:59:08 6 A. It is perceived as white light  
10:59:10 7 because both the solar spectrum and the  
10:59:23 8 packaged LED spectrum are relatively broad and  
10:59:35 9 can span a good part of or the entire visible  
10:59:44 10 spectrum.

10:59:52 11 Q. Why is the packaged LED spectrum  
10:59:56 12 for the packaged LED disclosed in Basin-2007  
11:00:02 13 relatively broad?

11:00:29 14 A. The inventors describe a packaged  
11:00:38 15 LED that can be used for cell phone camera  
11:00:49 16 flashes. That flashlight has the purpose of  
11:00:58 17 emitting white light or should emit white  
11:01:05 18 light or has the requirement of emitting white  
11:01:12 19 light, and to meet that requirement, the  
11:01:26 20 inventors, based on my understanding, designed  
11:01:33 21 the packaged LED to emit white light.

11:01:39 22 Q. How did they design the packaged  
11:01:40 23 LED to emit white light?

11:01:46 24 ATTORNEY DaMARIO: Objection. Vague.

11:02:08 25 A. They designed an LED package that

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11:02:16 2 includes the electrical contacts, a submount,  
11:02:26 3 an LED chip, and a phosphor material.

11:02:36 4 Q. What type of light does Basin-2007  
11:02:39 5 disclose that the LED chip emits?

11:03:36 6 A. The gallium nitride LED chip is  
11:03:41 7 capable of emitting light in the UV,  
11:03:46 8 ultraviolet, optical spectrum and the visible  
11:03:58 9 optical spectrum.

11:04:05 10 Q. What type of light does Basin-2007  
11:04:08 11 disclose that the GaN LED chip it describes  
11:04:15 12 emits?

11:04:17 13 ATTORNEY DaMARIO: Objection. Asked  
11:04:17 14 and answered.

11:06:38 15 A. I'm trying to find a specific  
11:06:41 16 disclosure of what you're asking in  
11:06:52 17 Basin-2007, and I've not seen any information  
11:07:00 18 in this regard in the last three minutes, but  
11:07:03 19 I'm happy to continue looking for it if you  
11:07:05 20 wish.

11:07:07 21 Q. No, that's okay.  
11:07:09 22 What type of light does Basin-2007  
11:07:12 23 disclose that the phosphors it describes emit?

11:08:09 24 A. In Paragraph 27, Basin-2007  
11:08:27 25 describes yellow, red, and green phosphor

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11:08:38 2 materials.

11:08:46 3 Q. Basin-2007 sometimes refers to the  
11:08:51 4 phosphors as YAG, Y-A-G phosphors; is that  
11:08:54 5 right? Sorry. Actually, let me withdraw that  
11:09:08 6 and ask a slightly different question.

11:09:11 7 Basin-2007 describes some of the  
11:09:15 8 phosphors it discloses as YAG phosphors; is  
11:09:18 9 that correct?

11:09:23 10 A. Yes, correct.

11:09:25 11 Q. What is a YAG phosphor?

11:09:31 12 A. YAG is an abbreviation that stands  
11:09:36 13 for yttrium aluminum garnet, G-A-R-N-E-T.

11:09:53 14 Q. Are YAG phosphors a common type of  
11:09:55 15 phosphor?

11:10:13 16 A. In the field of white LEDs, yes.

11:10:20 17 Q. Why do you say "in the field of  
11:10:21 18 white LEDs"?

11:10:31 19 A. Because there are other fields  
11:10:33 20 where YAG phosphors are not common.

11:10:39 21 Q. Why are they common in the field of  
11:10:42 22 white LEDs?

11:10:58 23 A. They are known as efficient  
11:10:59 24 phosphors.

11:11:11 25 Q. So you said -- sorry. Withdrawn.

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11:11:15 2 So in Basin-2007, the phosphors --  
11:11:23 3 sorry. Withdrawn.

11:11:24 4 In Basin-2007, it describes yellow,  
11:11:29 5 red, and green phosphor materials. Do those  
11:11:33 6 materials emit yellow, red, and green light?

11:12:00 7 A. I would say so, yes. If you look  
11:12:02 8 at Paragraph 27, Basin-2007 states: The  
11:12:17 9 phosphor may be any other phosphor or  
11:12:22 10 combination of phosphors, such as a red  
11:12:28 11 phosphor and a green phosphor, parenthesis, R  
11:12:39 12 plus G plus B equals white, close parenthesis,  
11:12:53 13 comma, to create white light.

11:13:03 14 Q. So in that particular sentence, it  
11:13:06 15 is describing an embodiment where the light  
11:13:11 16 from a red phosphor, the light from a green  
11:13:14 17 phosphor, and light from a blue phosphor is  
11:13:21 18 combined to create white light; is that  
11:13:22 19 correct?

11:13:35 20 A. In my view, the scenario that you  
11:13:37 21 are proposing is included in the sentence that  
11:13:44 22 I have quoted.

11:13:46 23 Q. And so in that embodiment, the  
11:13:48 24 light emitted by the LED chip would not  
11:13:52 25 contribute to the final visible emission

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11:13:54 2 product; is that correct?

11:13:59 3 ATTORNEY DaMARIO: Object to form.

11:14:18 4 A. I'm not sure if I understand the  
11:14:22 5 question. If you assume that we have a UV  
11:14:33 6 LED, then the UV light will have no  
11:14:42 7 contribution to the visible spectrum because  
11:14:48 8 we do not see ultraviolet light.

11:14:55 9 Q. So in that sentence where it says:  
11:14:56 10 R plus G plus B equals white, where is the B  
11:15:01 11 coming from?

11:15:21 12 A. Based on my understanding of the  
11:15:23 13 configuration that you have just proposed, the  
11:15:26 14 R or red, the G or green, and the B or blue  
11:15:40 15 come from phosphor materials.

11:15:48 16 Q. But in that sentence, all it has  
11:15:51 17 described is a red phosphor and a green  
11:15:53 18 phosphor; correct? It does not mention a blue  
11:15:56 19 phosphor.

11:16:15 20 A. The sentence starts out with "the  
11:16:18 21 phosphor may be any other phosphor."

11:16:27 22 Based on the wording "any other  
11:16:32 23 phosphor," I would not exclude a blue emitting  
11:16:41 24 phosphor.

11:16:47 25 Q. But does Basin-2007 ever describe a

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11:16:53 2 blue phosphor specifically?

11:17:06 3 A. Based on the wording "any other  
11:17:12 4 phosphor," based on this wording, it is  
11:17:26 5 reasonable to assume that the phosphor can be  
11:17:40 6 any phosphor, including blue emitting  
11:17:48 7 phosphor.

11:17:53 8 Q. Can you name a blue emitting  
11:17:55 9 phosphor?

11:18:08 10 A. You mean the chemical formula?

11:18:12 11 Q. Or by a common name, any way that  
11:18:16 12 you'd be able to identify it?

11:18:41 13 A. There are common blue emitting  
11:18:45 14 phosphors, for example, the blue phosphors  
11:18:52 15 that have been used in conjunction with CRTs,  
11:18:58 16 cathode ray tubes, but I do not recall the  
11:19:11 17 chemical formula of these phosphors.

11:19:19 18 Q. Are you aware of any blue phosphors  
11:19:20 19 that have been used in conjunction with white  
11:19:25 20 LED packages?

11:19:38 21 A. Yes.

11:19:38 22 Q. Can you identify any of those  
11:19:40 23 phosphors?

11:19:50 24 A. A prior art reference that was  
11:20:01 25 cited by the USPTO, the examiner, was the

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11:20:12 2 McNulty reference. I believe the spelling is  
11:20:17 3 M-c-N-U-L-T-Y. And that reference, based on  
11:20:29 4 my recollection, includes R, G, and B  
11:20:43 5 phosphors.

11:20:45 6 Q. Does McNulty use a UV LED chip in  
11:20:50 7 order to excite those phosphors?

11:21:07 8 A. That is consistent with my  
11:21:08 9 recollection, but I don't have the reference  
11:21:10 10 in front of me to verify that my recollection  
11:21:14 11 is correct.

11:21:16 12 Q. And so in that instance, the UV  
11:21:20 13 light emitted by the LED chip would not be  
11:21:26 14 contributing to the final emission product.  
11:21:28 15 It would just be the light emitted by the  
11:21:31 16 phosphor; correct?

11:21:34 17 ATTORNEY DaMARIO: Object to form.

11:21:52 18 A. I would prefer to have a look at  
11:21:53 19 the McNulty reference in order to answer your  
11:21:58 20 question.

11:22:13 21 Q. So setting aside McNulty for the  
11:22:16 22 moment, in a system with red, green, and blue  
11:22:21 23 phosphors, would it typically be a UV LED chip  
11:22:26 24 that would be used to excite those phosphors?

11:22:40 25 A. I think that is one possibility,

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11:22:42 2 yes.

11:22:44 3 Q. And that is the possibility that  
11:22:50 4 you were describing with respect to  
11:22:53 5 Paragraph 27 and the R plus G plus B equals  
11:22:58 6 white?

11:23:07 7 A. That is a possible scenario, but  
11:23:09 8 not the only one.

11:23:11 9 Q. What are the other scenarios?

11:23:41 10 A. One scenario is that the LED chip  
11:23:44 11 emits UV light. Another scenario is the LED  
11:23:53 12 chip emitting light in the visible spectrum.

11:24:06 13 Q. And so if the LED chip emitted  
11:24:08 14 light in the visible spectrum, could that then  
11:24:12 15 be mixed with the red and green light emitted  
11:24:18 16 by the phosphors in order to create white  
11:24:20 17 light?

11:24:28 18 A. Yes, that is a possibility.

11:24:31 19 Q. And so then the LED chip would be  
11:24:33 20 supplying the blue light; correct?

11:24:44 21 A. That is a possibility.

11:24:47 22 Q. And if I go to the sentence  
11:24:50 23 immediately before the one that we've been  
11:24:53 24 talking about, it says -- actually, the two  
11:24:58 25 sentences before it. It says: The light

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11:24:59 2 emitted by the phosphor layer 30 when mixed  
11:25:03 3 with a blue light creates white light or  
11:25:06 4 another desired color. In the example, the  
11:25:09 5 phosphor is a yttrium aluminum oxide garnet,  
11:25:16 6 YAG, phosphor that produces yellow light, and  
11:25:21 7 then in parentheses it says: Y plus B equals  
11:25:24 8 white.

11:25:25 9 Do you see that?

11:25:31 10 A. I do.

11:25:32 11 Q. And so where it says: Y plus B  
11:25:34 12 equals white, that's yellow plus blue equals  
11:25:37 13 white; correct?

11:25:51 14 A. Yes.

11:25:54 15 Q. And so there the YAG phosphor would  
11:25:59 16 emit light somewhere in the yellow range; is  
11:26:02 17 that correct?

11:26:16 18 A. Correct.

11:26:17 19 Q. And the blue light that's  
11:26:20 20 referenced comes from a blue LED chip; is that  
11:26:22 21 correct?

11:26:40 22 A. Correct.

11:26:50 23 Q. Are LED packages, such as the ones  
11:26:54 24 that we've been describing, that include an  
11:26:58 25 LED chip that emits blue light referred to as

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11:27:06 2 blue pumped white LEDs?

11:27:32 3 A. I don't recall the specific  
11:27:33 4 reference where they are referred to in this  
11:27:35 5 manner, but it's a possibility that they are  
11:27:42 6 referred to in the manner that you are  
11:27:45 7 proposing.

11:27:46 8 Q. Putting aside the specific  
11:27:49 9 references here, if somebody were to refer to  
11:27:53 10 a blue pumped LED -- sorry, a blue pumped  
11:27:57 11 white LED in conversation with you, would you  
11:28:01 12 understand what they were referring to?

11:28:37 13 A. I think a bit more context would be  
11:28:39 14 helpful, but the person may be referring to a  
11:28:54 15 specific LED configuration that uses a  
11:29:06 16 semiconductor chip emitting in the  
11:29:12 17 short-wavelength part of the optical spectrum.

11:29:17 18 Q. And by "the short wavelength part  
11:29:19 19 of the optical spectrum," are you referring to  
11:29:23 20 blue light?

11:29:32 21 A. It may be blue light, but could be  
11:29:34 22 other colors as well.

11:29:36 23 Q. If it could be other colors as  
11:29:37 24 well, why would it be called blue pumped?

11:29:47 25 ATTORNEY DaMARIO: Object to scope.

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11:29:53 2 A. I'm not exactly sure what you're  
11:29:54 3 referring to when you say "blue pumped."  
11:29:57 4 Where is the source of that? If you could  
11:30:03 5 show me a paper that refers to a blue pumped  
11:30:09 6 LED or a blue pumped white LED, I may be in a  
11:30:16 7 better position answering your question.

11:30:18 8 Q. Do you know what a UV pumped LED  
11:30:20 9 would refer to?

11:30:26 10 ATTORNEY DaMARIO: The same objection.

11:30:46 11 A. That phrase probably -- and I say  
11:30:54 12 "probably" because I don't know where the  
11:30:57 13 phrase comes from, but that phrase probably  
11:31:02 14 refers to an LED such as the one disclosed by  
11:31:10 15 the McNulty reference.

11:31:19 16 Q. Could I have you go to Paragraph 3  
11:31:23 17 of Basin-2007. And Paragraph 3 says: High  
11:31:38 18 power LEDs are now commonly used as flashes in  
11:31:42 19 small cameras, including cell phones, the LEDs  
11:31:46 20 emit a white light.

11:31:48 21 Do you see that?

11:31:53 22 A. I do.

11:31:54 23 Q. And the following sentence says --  
11:31:57 24 the following sentences say: Such LEDs used  
11:32:02 25 as flashes are typically one or more GaN LED

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11:32:07 2 dies that emit blue light covered by a layer  
11:32:11 3 of yttrium aluminum oxide garnet, parentheses,  
11:32:17 4 YAG, close parens, phosphor that emits a  
11:32:21 5 yellow-green light when energized by the blue  
11:32:26 6 light. The combination of the blue light  
11:32:29 7 leaking through the YAG phosphor and the  
11:32:30 8 yellow-green light produces white light.

11:32:33 9 Do you see that?

11:32:35 10 A. I do.

11:32:40 11 Q. And so that is describing the  
11:32:45 12 combination of blue light from a blue LED  
11:32:48 13 chip, along with yellow-green light emitted by  
11:32:53 14 the YAG phosphor; correct?

11:33:04 15 A. Correct.

11:33:05 16 Q. And that is a way that Basin-2007  
11:33:08 17 discloses emitting white light; is that right?

11:33:34 18 A. That is one possibility.

11:33:36 19 Q. That is one possibility that it  
11:33:38 20 discloses?

11:33:45 21 A. That is one possibility to create  
11:33:48 22 white light. This particular paragraph is in  
11:33:55 23 the background section. Later on in the  
11:34:00 24 detailed description of the invention, there  
11:34:05 25 are other scenarios.

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11:34:07 2 Q. What are the other scenarios and  
11:34:11 3 where are they located in the disclosure?

11:34:19 4 A. If we look at Paragraph 27, we find  
11:34:25 5 a sentence that states: The phosphor may be  
11:34:31 6 any other phosphor or combination of  
11:34:35 7 phosphors.

11:34:37 8 Q. I'm going to stop you.  
11:34:38 9 Is this the same sentence that you  
11:34:39 10 read before in Paragraph 27?

11:34:49 11 A. Yes.

11:34:50 12 Q. Can you identify any other  
11:34:51 13 sentences?

11:35:26 14 A. Yes. The two sentences before the  
11:35:30 15 sentence that I just started quoting.

11:35:39 16 Q. Are there any paragraphs other than  
11:35:41 17 Paragraph 27?

11:35:52 18 A. Yes, there are other paragraphs.

11:35:55 19 Q. What are those paragraphs?

11:36:08 20 A. Well, I think your question was  
11:36:10 21 just if there are other paragraphs other than  
11:36:13 22 27, and my answer is yes, obviously there are  
11:36:17 23 paragraphs other than 27. For example,  
11:36:21 24 Paragraph 10 or Paragraph 20.

11:36:27 25 Q. Are those paragraphs that describe

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11:36:37 2 other scenarios for creating white light?

11:37:11 3 A. Paragraph 35, for example.

11:37:24 4 Q. And how does Paragraph 35 disclose  
11:37:26 5 another scenario for creating white light?

11:37:36 6 A. Paragraph 35 relates to the black  
11:37:44 7 body curve. It relates to the Planckian  
11:37:51 8 locus, and Planckian is spelled  
11:37:57 9 P-L-A-N-C-K-I-A-N. It also refers to a color  
11:38:15 10 temperature, all of which is related to white  
11:38:23 11 light.

11:38:26 12 Q. That paragraph describes a YAG  
11:38:28 13 phosphor; doesn't it? And that YAG phosphor  
11:38:34 14 is described as yellow-green?

11:39:05 15 A. I agree. A YAG phosphor is  
11:39:07 16 disclosed in Paragraph 35.

11:39:11 17 Q. And in order to create white light  
11:39:13 18 using a YAG phosphor, you also need a source  
11:39:17 19 of blue light; is that correct?

11:39:29 20 A. That is one possibility.

11:39:31 21 Q. What is another possibility?

11:39:45 22 A. One other possibility would be to  
11:39:48 23 use violet light.

11:39:55 24 Q. Are there any other paragraphs that  
11:39:59 25 you believe disclose other scenarios for

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11:40:00 2 creating white light?

11:40:25 3 A. Paragraph 37 relates to the color  
11:40:32 4 temperature of a white LED. It also refers to  
11:40:47 5 the CCT, which is the correlated color  
11:40:55 6 temperature, and these quantities are  
11:41:07 7 associated with white light.

11:41:15 8 Q. Are they associated with a  
11:41:16 9 particular scenario for creating white light?

11:41:39 10 A. No. Color temperature and  
11:41:44 11 correlated color temperature apply to white  
11:41:52 12 light generated by any configuration.

11:42:02 13 Q. I understand that your contention  
11:42:05 14 is that Basin-2007 is not limited to LEDs  
11:42:14 15 that -- LED chips that emit blue light; is  
11:42:18 16 that correct?

11:42:24 17 ATTORNEY DaMARIO: Object to form.  
11:42:25 18 Misstates prior testimony.

11:42:37 19 A. Have I expressed this view in my  
11:42:39 20 reports? Are you referring to some statement  
11:42:45 21 in my reports?

11:42:46 22 Q. No. I'm referring to the  
11:42:48 23 conversation that we've had over the last hour  
11:42:50 24 and 40 minutes.

11:42:58 25 Let me ask a different question.

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11:43:02 2 Does Basin-2007 describe making  
11:43:07 3 white light using any method other than a blue  
11:43:10 4 LED chip with phosphors? Complementary  
11:43:18 5 phosphors?

11:43:45 6 A. As I indicated before, Paragraph 37  
11:43:50 7 is not limited to the specific scenario that  
11:43:58 8 you just indicated.

11:44:02 9 Q. So your contention is that  
11:44:05 10 Basin-2007 is not limited to making white  
11:44:11 11 light using a blue LED chip with complementary  
11:44:21 12 phosphors?

11:44:22 13 ATTORNEY DaMARIO: Objection.  
11:44:23 14 Misstates prior testimony.

11:44:33 15 A. Are you referring to an opinion  
11:44:34 16 that I expressed in my report? I'm happy to  
11:44:38 17 look at --

11:44:41 18 Q. You are -- sorry. Go ahead.

11:44:44 19 A. I'm finished.

11:44:46 20 Q. I'm trying to understand because  
11:44:48 21 you seem to be suggesting that Basin-2007  
11:44:52 22 somehow discloses the creation of white light  
11:44:56 23 using an ultraviolet LED chip. Is that  
11:45:03 24 correct, that that's your suggestion?

11:45:40 25 A. I do not recall expressing that

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11:45:45 2 view in any of my reports.

11:45:47 3 Q. I'm asking whether you expressed  
11:45:48 4 that view over the last hour and 45 minutes?

11:46:16 5 A. I expressed the view that  
11:46:24 6 Basin-2007 discloses multiple scenarios, with  
11:46:37 7 one of the scenarios using any other phosphor,  
11:46:48 8 and it appears to me that there is no  
11:46:57 9 limitation associated with the wording, and I  
11:47:04 10 quote, "any other phosphor."

11:47:17 11 Q. So I appreciate your answer, and I  
11:47:20 12 always want you to answer my questions  
11:47:23 13 honestly and to the best of your abilities,  
11:47:26 14 but to the extent that I ask a question with a  
11:47:31 15 yes-or-no answer, could you try to do your  
11:47:33 16 best to answer yes or no before you make  
11:47:39 17 whatever qualifications you want to make so  
11:47:40 18 that I can better understand what your answer  
11:47:44 19 is?

11:47:45 20 Do you understand what I'm saying?

11:47:47 21 A. Yes.

11:47:48 22 Q. Does Basin-2007 ever use the word  
11:47:52 23 "ultraviolet" or UV?

11:49:17 24 I'll withdraw the question so that  
11:49:19 25 you don't have to read the whole thing.

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11:49:20 2 Sitting here today, without reading  
11:49:21 3 the whole thing, are you aware of anywhere  
11:49:24 4 that Basin-2007 mentions specifically  
11:49:28 5 ultraviolet?

11:49:41 6 A. I'm not certain either way.

11:49:44 7 Q. Without reviewing the reference,  
11:49:46 8 are you aware whether Basin-2007 mentions  
11:49:50 9 specifically violet light?

11:49:58 10 A. And you want me to answer the  
11:49:59 11 question without looking at the reference?

11:50:01 12 Q. You may look at it if you want, but  
11:50:03 13 there is no need for you to read the entire  
11:50:05 14 thing. I'm asking for your current  
11:50:07 15 understanding.

11:50:55 16 A. So sitting here today, I do not  
11:50:57 17 recall off the top of my head if Basin-2007  
11:51:03 18 uses the word "violet."

11:51:07 19 Q. And sitting here today, are you  
11:51:10 20 aware of whether Basin-2007 ever describes  
11:51:16 21 light based on its wavelength?

11:51:20 22 ATTORNEY DaMARIO: Object to form.

11:51:24 23 Q. And actually, let me withdraw that  
11:51:26 24 and ask a slightly different question.

11:51:28 25 Sitting here today, are you aware

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11:51:29 2 of whether Basin-2007 ever describes light  
11:51:35 3 that would have a wavelength in the  
11:51:39 4 ultraviolet or violet spectrum?

11:51:43 5 ATTORNEY DaMARIO: The same objection.

11:52:35 6 A. I think that is a possibility. It  
11:52:37 7 is a possibility that the white light emitted  
11:52:49 8 by the Basin-2007 LEDs includes violet light.

11:53:01 9 Q. Does Basin-2007 describe that light  
11:53:04 10 using the particular wavelength or a  
11:53:10 11 particular wavelength?

11:53:17 12 A. Can I hear the question again?

11:53:20 13 Q. Does Basin-2007 describe violet  
11:53:25 14 light using the particular wavelength or  
11:53:28 15 wavelengths associated with violet light?

11:53:34 16 ATTORNEY DaMARIO: Object to form.

11:54:12 17 A. Based on my understanding,  
11:54:13 18 Basin-2007 does not exclude white light  
11:54:21 19 emitters that include some violet light.

11:54:28 20 Q. But it doesn't reference a  
11:54:29 21 particular wavelength for that. It's just  
11:54:33 22 your position that it doesn't exclude it; is  
11:54:35 23 that right?

11:54:46 24 ATTORNEY DaMARIO: Object to form.

11:55:25 25 A. In the time available to me, I have

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11:55:28 2 not found the word "violet" being used in  
11:55:32 3 Basin-2007.

11:55:35 4 Q. By the time available to you, are  
11:55:37 5 you referring to the time available to you so  
11:55:39 6 far today, right now? Or are you referring to  
11:55:43 7 the time available since you began work on  
11:55:46 8 this case?

11:55:51 9 A. I refer to the time available  
11:55:52 10 today.

11:55:55 11 Q. So going back to more general  
11:55:58 12 principles, there is a scenario where a white  
11:56:02 13 light emitting LED package could be comprised  
11:56:09 14 of a blue LED and yellow phosphor going back  
11:56:16 15 to as we were discussing before; correct?

11:56:20 16 A. Correct. That is one specific  
11:56:22 17 scenario.

11:56:23 18 Q. And so in that scenario, the blue  
11:56:25 19 light emits blue -- sorry. The blue LED emits  
11:56:28 20 blue light; is that right?

11:56:34 21 A. Yes.

11:56:36 22 Q. And some of that blue light is  
11:56:38 23 converted to yellowish light by the YAG  
11:56:46 24 phosphor, while some of that blue light passes  
11:56:48 25 through to the final emission product; is that

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11:56:51 2 correct?

11:56:52 3 ATTORNEY DaMARIO: Object to form.

11:56:56 4 A. That is a possible scenario.

11:56:58 5 Q. And the combination of the two is

11:57:02 6 what is perceived by the human eye as white

11:57:05 7 light; is that correct?

11:57:15 8 A. Yes, that is a fair statement.

11:57:18 9 Q. In a typical device of that type,  
11:57:21 10 which wavelengths of blue light would the blue  
11:57:24 11 LED have emitted?

11:57:27 12 ATTORNEY DaMARIO: Object to form and  
11:57:30 13 scope.

11:57:34 14 ATTORNEY BROWN: What's the basis for  
11:57:34 15 the scope objection?

11:57:37 16 ATTORNEY DaMARIO: It's a hypothetical  
11:57:37 17 that's not from his opinions at all.

11:57:44 18 ATTORNEY BROWN: So is your position  
11:57:44 19 that the wavelength of blue light emitted by a  
11:57:47 20 blue LED is outside the scope of his opinions?

11:57:52 21 ATTORNEY DaMARIO: You're not referring  
11:57:52 22 to either a specific prior art reference or  
11:57:54 23 his declarations here. So, therefore, it's  
11:57:57 24 outside the scope. That was the basis for my  
11:58:00 25 scope objection.

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11:58:01 2 ATTORNEY BROWN: Okay. I'll re-ask the  
11:58:06 3 question since I caused that.

11:58:13 4 BY ATTORNEY BROWN:

11:58:13 5 Q. In a typical device, an LED package  
11:58:20 6 that emits white light using a blue LED chip  
11:58:26 7 and a yellow phosphor, which wavelengths of  
11:58:31 8 blue light would typically be emitted by the  
11:58:33 9 blue LED?

11:58:44 10 ATTORNEY DaMARIO: Object to form.

11:58:53 11 A. I would not be able to answer that  
11:58:54 12 question with certainty because the  
11:58:58 13 description of blue depends to some degree on  
11:59:07 14 the context.

11:59:11 15 Q. Are you familiar with, typical as  
11:59:16 16 of 2010, LED packages that emit white light  
11:59:22 17 using a blue LED chip and a yellowish  
11:59:25 18 phosphor?

11:59:36 19 A. I am generally familiar with the  
11:59:38 20 technology, including the state of the  
11:59:41 21 technology in 2010.

11:59:44 22 Q. Are you familiar with which  
11:59:46 23 wavelengths of blue light would have typically  
11:59:49 24 been emitted by the blue LED in that  
11:59:54 25 technology?

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12:00:00 2 ATTORNEY DaMARIO: Object to form.

12:00:01 3 A. I'm not sure if you refer to a  
12:00:03 4 certain manufacturer or if you refer to a  
12:00:07 5 specific device configuration? It appears to  
12:00:10 6 me that your question is not sufficiently  
12:00:16 7 specific for me to answer -- to give you a  
12:00:20 8 specific answer.

12:00:22 9 Q. So you would be unable to tell me  
12:00:23 10 which wavelengths of light a typical blue LED  
12:00:29 11 in that time period would have emitted?

12:00:34 12 ATTORNEY DaMARIO: Object to the form.  
12:00:35 13 Mischaracterizes prior testimony.

12:01:02 14 A. I couldn't give you a specific  
12:01:04 15 wavelength based on your question.

12:01:07 16 Q. Blue LEDs emit blue light; don't  
12:01:08 17 they?

12:01:14 18 A. Correct.

12:01:16 19 Q. What wavelengths would typically be  
12:01:20 20 considered blue light?

12:01:24 21 ATTORNEY DaMARIO: Object to form.  
12:01:25 22 Asked and answered.

12:01:31 23 A. That depends on the context. Some  
12:01:36 24 use the term "blue" to be a broader spectrum.  
12:01:46 25 Others distinguish between violet, indigo,

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12:01:55 2 blue, and cyan, and so I'm not sure if you  
12:02:03 3 have a coarse classification of blue in mind  
12:02:13 4 or if you have a fine classification of blue  
12:02:22 5 in mind.

12:02:24 6 Q. When discussing blue LEDs, what  
12:02:28 7 range of wavelengths would a person of  
12:02:33 8 ordinary skill in the art in 2010 have  
12:02:40 9 understood blue light to include?

12:02:44 10 ATTORNEY DaMARIO: Objection. Asked  
12:02:45 11 and answered.

12:02:56 12 A. That basically depends on the  
12:02:58 13 context. Sometimes people use a relatively  
12:03:07 14 coarse classification of wavelengths. In  
12:03:11 15 those cases, the entire visible spectrum is  
12:03:15 16 described by just red, green, and blue.

12:03:23 17 On other occasions, people may use  
12:03:30 18 a fine categorization of wavelengths and may  
12:03:38 19 include red, orange, amber, lime,  
12:03:53 20 yellow-green, green, cyan, blue, indigo, and  
12:04:10 21 violet, and depending on coarse or fine  
12:04:24 22 categorization of colors, my answer would be  
12:04:33 23 different.

12:04:49 24 ATTORNEY BROWN: Let's take a break.  
12:04:51 25 We can go off the record.

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12:04:52 2 CERTIFIED STENOGRAPHER: Off the  
12:04:53 3 stenographic record at 12:04 p.m.

12:04:54 4 - - -

12:04:54 5 (Whereupon, a short recess was  
12:04:54 6 taken.)

12:04:55 7 - - -

12:18:42 8 CERTIFIED STENOGRAPHER: Back on the  
12:18:42 9 stenographic record at 12:18 p.m.

12:18:54 10 ATTORNEY BROWN: I'm giving you a  
12:18:55 11 document.

12:18:57 12 ATTORNEY DaMARIO: Oh, okay. Thank  
12:18:58 13 you.

12:18:58 14 - - -

12:18:58 15 (Whereupon, book entitled:  
12:18:58 16 Light-Emitting Diodes Second Edition by E.  
12:18:58 17 Fred Schubert, is received and marked as  
12:18:58 18 Exhibit 2014 for Identification.)

12:18:58 19 - - -

12:18:59 20 ATTORNEY BROWN: That's previously been  
12:18:59 21 marked as Exhibit 2014. It's a book entitled:  
12:19:05 22 Light-Emitting Diodes, Second Edition, by  
12:19:10 23 E. Fred Schubert.

12:19:15 24 BY ATTORNEY BROWN:

12:19:16 25 Q. Dr. Schubert, have you seen

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12:19:18 2 Exhibit 2014 before?

12:19:23 3 A. Yes.

12:19:23 4 Q. And what is it?

12:19:29 5 A. It is a book that I authored. The  
12:19:34 6 book is titled: Light-Emitting Diodes, and it  
12:19:39 7 is the second edition of the book.

12:19:43 8 Q. And is the subject matter of this  
12:19:49 9 book light-emitting diodes generally or does  
12:19:53 10 it have a more specific aim at all?

12:20:08 11 A. I didn't understand the last word.

12:20:13 12 Q. I guess is this a textbook?

12:20:21 13 Withdrawn.

12:20:22 14 Why did you write this book?

12:20:33 15 A. I don't remember.

12:20:33 16 Q. Who is this book for?

12:20:37 17 A. For anyone interested in  
12:20:40 18 light-emitting diodes.

12:20:41 19 Q. Was this book used in any of your  
12:20:43 20 classes?

12:20:47 21 A. Yes. I have used the book in  
12:20:49 22 classes.

12:20:50 23 Q. Which classes have you used the  
12:20:52 24 book in?

12:20:59 25 A. I have taught in the past courses

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12:21:00 2 on microelectronics, light-emitting diodes,  
12:21:04 3 and solid-state lighting, and I have used the  
12:21:11 4 book in those classes.

12:21:15 5 Q. Do you know whether anybody else  
12:21:16 6 uses this book for their classes, any other  
12:21:19 7 professors?

12:21:33 8 A. No.

12:21:34 9 Q. When was the first edition of this  
12:21:38 10 textbook written? I'm not really asking for  
12:21:47 11 the precise date. I'm just trying to get a  
12:21:49 12 sense of how you put this altogether.

12:21:53 13 A. I think around 2002.

12:21:57 14 Q. And has it been kept updated to  
12:21:59 15 today with a third edition and a fourth  
12:22:02 16 edition?

12:22:05 17 A. Yes.

12:22:06 18 Q. And why do you continue to update  
12:22:09 19 this book?

12:22:28 20 A. The writing of books is a scholarly  
12:22:30 21 activity, and as an academic, I engage in  
12:22:46 22 scholar activities.

12:22:48 23 Q. Could I have you turn to Page 84 of  
12:22:51 24 Exhibit 2014. And there is a box on that page  
12:23:00 25 that says: Exercise dry voltages of LEDs.

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12:23:06 2 Do you see that?

12:23:10 3 A. Yes.

12:23:11 4 Q. And below there is a table with  
12:23:16 5 columns for emission color, wavelength, photon  
12:23:21 6 energy, and dry voltage.

12:23:23 7 Do you see that?

12:23:26 8 A. Yes.

12:23:28 9 Q. And this table is in the LED Basics  
12:23:35 10 Electrical Properties section of the book; is  
12:23:38 11 that right?

12:23:45 12 A. Yes.

12:23:46 13 Q. And what is this table here showing  
12:23:50 14 or what is the purpose of this table in the  
12:23:53 15 book?

12:24:00 16 A. The purpose of the table is to show  
12:24:06 17 that the voltage that needs to be applied to  
12:24:11 18 an LED varies and depends on the emission  
12:24:22 19 color or emission wavelength.

12:24:26 20 Q. And here in the table for the LED  
12:24:29 21 with an emission color listed as blue, the  
12:24:32 22 wavelength is 470 nanometers.

12:24:36 23 Do you see that?

12:24:46 24 A. Yes.

12:24:49 25 Q. Can I have you go to Page 109. And

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12:25:01 2 in the final paragraph on that page, it says:

12:25:04 3 Junction temperatures of several different

12:25:07 4 devices are shown in Figures 6.8.

12:25:09 5 Do you see that?

12:25:18 6 A. Yes.

12:25:19 7 Q. And for the "several different  
12:25:24 8 devices," those are listed following; correct?

12:25:32 9 A. Yes.

12:25:32 10 Q. And in particular, there is a blue  
12:25:35 11 LED listed there.

12:25:36 12 Do you see that?

12:25:45 13 A. Yes.

12:25:46 14 Q. And what is that blue LED made of?

12:25:51 15 A. Gallium, indium, nitride.

12:25:59 16 Q. And what's the wavelength listed  
12:26:01 17 for that LED?

12:26:08 18 A. 460-nanometer.

12:26:13 19 Q. And what's this -- when it's  
12:26:15 20 referring to junction temperatures of several  
12:26:17 21 different devices, what's that referring to?

12:26:27 22 A. Junction temperature refers to the  
12:26:34 23 temperature of the light emitting active  
12:26:39 24 region within the LED chip.

12:26:47 25 Q. So does that have kind of general

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12:26:49 2 applicability to LEDs?

12:27:01 3 ATTORNEY DaMARIO: Object to form.

12:27:07 4 A. The junction temperature can be  
12:27:09 5 measured for any LED.

12:27:14 6 Q. Could I have you turn to Page 215.  
12:27:23 7 And there is a chart on this page -- actually,  
12:27:31 8 let's withdraw that.

12:27:33 9 This page is in the section  
12:27:35 10 discussing general characteristic of high  
12:27:38 11 brightness LEDs.

12:27:39 12 Do you see that?

12:27:48 13 A. Yes.

12:27:48 14 Q. What are high brightness LEDs?

12:27:59 15 A. These are LEDs that emit light  
12:28:03 16 having a high brightness.

12:28:06 17 Q. Is having a high brightness  
12:28:10 18 beneficial when you're trying to increase the  
12:28:13 19 luminous efficacy of an LED package, a white  
12:28:20 20 LED package?

12:28:29 21 A. High brightness is desirable.

12:28:31 22 Q. So if we look at the chart at the  
12:28:34 23 top of that page, it charts: Luminous  
12:28:36 24 efficiency against peak wavelength; is that  
12:28:38 25 right?

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12:28:46 2 A. Yes.

12:28:46 3 Q. There is a gallium indium  
12:28:49 4 nitride -- well, there are a couple of gallium  
12:28:53 5 indium nitride LEDs listed on this graph. I'm  
12:28:57 6 interested in the leftward most one.

12:29:00 7 Do you see that? That's near the  
12:29:05 8 one that is labeled as "blue"?

12:29:11 9 A. Yes.

12:29:12 10 Q. And what is the wavelength, the  
12:29:13 11 peak wavelength for that LED?

12:29:22 12 A. 470-nanometer.

12:29:25 13 Q. And if we go down to 217, and this  
12:29:31 14 is, again, in the same section, and if we go  
12:29:34 15 through 217 through 219, I think there are a  
12:29:40 16 number of charts that are presumably graphing  
12:29:44 17 similar or the same LEDs.

12:29:45 18 Do you see that?

12:30:00 19 A. Yes.

12:30:00 20 Q. And it lists as the peak wavelength  
12:30:07 21 for gallium indium nitride, slash, gallium  
12:30:11 22 nitride blue LEDs, and then in parentheses it  
12:30:15 23 says: "470 nanometers."

12:30:17 24 Do you see that?

12:30:28 25 A. Yes.

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12:30:28 2 Q. And that's true for all five of the  
12:30:33 3 charts?

12:30:52 4 A. Yes.

12:30:54 5 Q. On Page 218, the last paragraph is:  
12:30:59 6 Electrical characteristics of high brightness  
12:31:01 7 LEDs, and in the second-to-last line on the  
12:31:05 8 page, it refers to a blue LED, and again, it  
12:31:09 9 lists the wavelength subscript blue equal to  
12:31:15 10 470 nanometers; is that right?

12:31:22 11 A. Yes.

12:31:26 12 Q. If we go to -- I believe it's 284.  
12:31:56 13 In Table 16.5 on Page 284, it says: Colors in  
12:32:03 14 associated typical LED peak wavelength ranges.

12:32:06 15 Do you see that?

12:32:10 16 A. Yes.

12:32:10 17 Q. And the table for blue lists the  
12:32:14 18 peak wavelength range as being from between  
12:32:19 19 455 nanometers and 490 nanometers.

12:32:23 20 Do you see that?

12:32:29 21 A. I do.

12:32:33 22 Q. Go to 353. And 353 has a  
12:32:59 23 subsection starting on the last half of the  
12:33:00 24 page called: White LEDs based on phosphor  
12:33:07 25 converters.

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12:33:08 2 Do you see that?

12:33:10 3 A. Yes.

12:33:10 4 Q. And that's the sort of white LED  
12:33:14 5 that was disclosed in Basin-2007; right? A  
12:33:18 6 white LED based on phosphor converters?

12:33:27 7 A. Yes.

12:33:32 8 Q. And I didn't pull out Krummacher or  
12:33:34 9 I guess I showed it to you, gave it to you,  
12:33:36 10 but didn't talk about it, but either way, are  
12:33:39 11 you familiar with Krummacher, the Krummacher  
12:33:42 12 reference?

12:33:47 13 I'll withdraw that. I actually  
12:33:49 14 have it here.

12:33:49 15 - - -

12:33:49 16 (Whereupon, Krummacher reference,  
12:33:49 17 U.S. Patent Publication Number 22008/0079015,  
12:33:49 18 is received and marked as Exhibit 1007 for  
12:33:49 19 Identification.)

12:33:49 20 - - -

12:33:49 21 BY ATTORNEY BROWN:

12:33:50 22 Q. I'm handing you what has previously  
12:33:51 23 been marked Exhibit 1007. And this is the  
12:33:58 24 Krummacher reference, which is U.S. Patent  
12:34:01 25 Publication Number 22008/0079015.

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12:34:14 2 And, Dr. Schubert, do you recognize

12:34:17 3 Exhibit 1007?

12:34:25 4 A. I do.

12:34:25 5 Q. And this is another reference that  
12:34:28 6 has been asserted by petitioners against  
12:34:31 7 the '678 patent; correct?

12:34:37 8 A. Correct.

12:34:39 9 Q. And the Krummacher reference,  
12:34:40 10 although different from the Basin-2007  
12:34:44 11 reference, also discloses white LEDs based on  
12:34:48 12 phosphor converters; is that right?

12:34:51 13 ATTORNEY DaMARIO: Object to form.

12:35:29 14 A. Can you refer me to a specific  
12:35:31 15 statement in Krummacher?

12:35:34 16 Q. Are you unable to tell me whether  
12:35:36 17 Krummacher discloses white LEDs based on  
12:35:39 18 phosphor converters without me referring to a  
12:35:41 19 specific section?

12:35:48 20 A. I'm happy to have a closer look.

12:36:41 21 Q. I'll refer you to Paragraph 3  
12:36:42 22 maybe.

12:37:12 23 A. Paragraph 3 appears to refer to LED  
12:37:19 24 chips that emit blue or ultraviolet light.

12:37:29 25 Q. Does that mean it discloses white

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12:37:32 2 LEDs based on phosphor converters?

12:37:48 3 A. This description, Paragraph 3, is  
12:37:52 4 in the background section of the patent. So  
12:38:01 5 this gives the background of the invention,  
12:38:05 6 but does not describe the invention itself.

12:38:11 7 Q. Is that an understanding that you  
12:38:12 8 apply to all patents you analyze?

12:38:17 9 ATTORNEY DaMARIO: Object to form.

12:38:32 10 A. Based on my understanding, the  
12:38:34 11 background section describes the prior art in  
12:38:43 12 the following summary of the invention and the  
12:38:49 13 detailed description of the invention, and the  
12:38:57 14 claims do not describe the prior art, but the  
12:39:02 15 invention itself.

12:39:06 16 Q. I'm going to ask you a yes-or-no  
12:39:06 17 question and I'd like you to do your very best  
12:39:11 18 to answer yes or no. Can you do that for me?

12:39:15 19 ATTORNEY DaMARIO: I'll add the caveat  
12:39:16 20 that if the question cannot be answered yes or  
12:39:19 21 no, you're allowed to answer -- you're allowed  
12:39:23 22 to explain why it can't be answered yes or no  
12:39:25 23 or say "I can't answer yes or no."

12:39:32 24 Q. Does Paragraph 3 describe  
12:39:42 25 generating white light?

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12:39:55 2 A. Yes.

12:39:55 3 Q. Does it describe generating white  
12:40:02 4 light using a radiation emitting active region  
12:40:07 5 that emits blue?

12:40:27 6 A. Blue light is one possibility  
12:40:28 7 mentioned in Paragraph 3, yes, and the other  
12:40:31 8 possibility is ultraviolet light.

12:40:35 9 Q. And as a rule, blue or ultraviolet  
12:40:38 10 light is converted by -- sorry, withdrawn.

12:40:55 11 Paragraph 3 discloses that as a  
12:40:57 12 rule, blue or ultraviolet light is converted  
12:41:00 13 by a luminescence conversion layer or what  
12:41:04 14 we've been describing as a phosphor layer to  
12:41:09 15 light a longer wavelength, particularly to  
12:41:09 16 light of a complementary color, such as  
12:41:13 17 yellow, for example, such that the blue or  
12:41:16 18 ultraviolet radiation emitted by the active  
12:41:19 19 region is superimposed on the fraction  
12:41:22 20 converted to the complementary color to yield  
12:41:25 21 white light.

12:41:25 22 Do you see that?

12:41:29 23 A. I do.

12:41:31 24 Q. And so doesn't Krummacher in  
12:41:33 25 Paragraph 3 disclose a white LED based on

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12:41:38 2 phosphor converters?

12:41:44 3 ATTORNEY DaMARIO: Object to form.

12:42:03 4 A. Yes.

12:42:03 5 Q. If we turn back to Exhibit 2014, in  
12:42:09 6 the section: White LEDs Based on Phosphor  
12:42:13 7 Converters on Page 353, can you let me know  
12:42:17 8 when you're there?

12:42:30 9 A. Yes, I'm there.

12:42:31 10 Q. And that describes, as you can see  
12:42:35 11 in the figure, a white LED package that  
12:42:43 12 comprises a blue LED emitting blue  
12:42:47 13 luminescence and a phosphor that is emitting  
12:42:52 14 light that is mixed with the blue light in  
12:42:57 15 order to create white light.

12:42:58 16 Do you see that?

12:43:20 17 A. Yes.

12:43:20 18 Q. And this same idea of a blue LED  
12:43:26 19 and the phosphor being used to create a white  
12:43:30 20 light is the same principle, the same idea  
12:43:35 21 that is discussed -- not exclusively, but is  
12:43:39 22 discussed in Basin-2007 and Krummacher as  
12:43:42 23 well; correct?

12:43:44 24 ATTORNEY DaMARIO: Object to form.

12:44:04 25 A. There is some overlap, but the

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12:44:06 2 descriptions are not co-extensive.

12:44:10 3 Q. And so if you turn to the next page  
12:44:13 4 of Exhibit 2014, Page 354, and Figure 21.8 is  
12:44:29 5 the emission spectrum of a phosphor-based  
12:44:33 6 white LED manufactured by Nichia Corporation;  
12:44:37 7 is that correct?

12:44:41 8 A. Yes, this is one specific example  
12:44:43 9 of an LED.

12:44:45 10 Q. And this is an LED that would use a  
12:44:50 11 YAG-based phosphor; right?

12:44:58 12 A. Correct.

12:44:59 13 Q. And a blue LED was also used; is  
12:45:01 14 that correct?

12:45:08 15 A. Blue LED chip, yes.

12:45:10 16 Q. And this graph shows a line with  
12:45:15 17 basically kind of two humps or two bumps, the  
12:45:20 18 first one being taller than the second one.

12:45:23 19 Do you see that?

12:45:30 20 A. I do.

12:45:31 21 Q. And the first one of those is kind  
12:45:33 22 of shaded gray; is that right?

12:45:40 23 A. Right.

12:45:41 24 Q. And there is an arrow pointing to  
12:45:43 25 it, this says "blue luminescence"?

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12:45:54 2 A. Yes.

12:45:54 3 Q. And that blue luminescence is the  
12:45:57 4 blue light that is emitted by the blue LED  
12:45:59 5 chip; correct?

12:46:11 6 A. Correct.

12:46:12 7 Q. What is the peak wavelength of that  
12:46:13 8 blue light emitted by that blue LED chip?

12:46:22 9 A. In this particular example, which  
12:46:25 10 is a specific LED made by the Nichia,  
12:46:31 11 N-I-C-H-I-A, Nichia Company, the peak  
12:46:38 12 wavelength of the blue luminescence is  
12:46:46 13 slightly longer than 550-nanometer.

12:46:53 14 Q. I believe you may have misread  
12:46:55 15 that. Is it 450 or 460 nanometers perhaps?

12:47:03 16 A. In this specific example, which  
12:47:05 17 shows a specific LED, the peak wavelength of  
12:47:11 18 the blue luminescence is slightly longer than  
12:47:18 19 450-nanometer.

12:47:23 20 Q. So that was a yes?

12:47:30 21 ATTORNEY DaMARIO: Object to form.

12:47:31 22 ATTORNEY BROWN: I'll withdraw the  
12:47:32 23 question.

12:47:33 24 Q. Would you be surprised that in your  
12:47:35 25 entire textbook, despite discussing blue LEDs

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12:47:40 2 throughout, that there is never a blue LED  
12:47:44 3 described as having a wavelength less than  
12:47:49 4 440 nanometers, a peak wavelength of less than  
12:47:54 5 440 nanometers?

12:47:55 6 ATTORNEY DaMARIO: Object to form.

12:48:32 7 A. I believe in a subsequent edition  
12:48:33 8 of the book, I have a chapter in there that  
12:48:37 9 relates to UV, ultraviolet, LEDs, and I just  
12:48:45 10 see Chapter Number 13 relates to ultraviolet  
12:48:52 11 emitters. These emitters have a peak  
12:48:57 12 wavelength that is shorter than 460-nanometer.

12:49:06 13 Q. What page is that section on or  
12:49:12 14 that chapter on?

12:49:12 15 A. Starting at Page 222.

12:49:28 16 Q. And so the answer to my question --  
12:49:29 17 let me ask my question again because I don't  
12:49:31 18 believe you answered it.

12:49:34 19 Would you be surprised that in your  
12:49:36 20 entire textbook, there is never a blue LED  
12:49:42 21 described as having a wavelength less than  
12:49:44 22 440 nanometers?

12:49:47 23 ATTORNEY DaMARIO: Object to form.

12:50:03 24 A. My textbook has multiple  
12:50:12 25 descriptions of LEDs having a wavelength

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12:50:20 2 shorter than 460-nanometer, and those  
12:50:25 3 wavelengths may be characterized as blue,  
12:50:30 4 sometimes they are characterized as by using  
12:50:35 5 other colors, but, as I said before, it  
12:50:41 6 depends if we use a coarser or finer  
12:50:49 7 categorization of colors.

12:50:53 8 Q. Would a person of ordinary skill in  
12:50:54 9 the art use a particular categorization of  
12:51:05 10 colors -- sorry. Withdrawn.

12:51:08 11 Would a person of ordinary skill in  
12:51:09 12 the art use a particular categorization of  
12:51:14 13 colors, either coarser or finer?

12:51:25 14 A. It depends on the context.  
12:51:28 15 Sometimes, yes. Sometimes, no.

12:51:34 16 Q. In the context of your textbook,  
12:51:37 17 did you use a typical categorization of  
12:51:41 18 colors?

12:51:45 19 ATTORNEY DaMARIO: Object to form.

12:52:12 20 A. I think that multiple  
12:52:20 21 categorizations are being used -- are being  
12:52:24 22 used in the art, including by myself. That  
12:52:32 23 is, sometimes the visible spectrum is  
12:52:39 24 described by the three primary colors. The  
12:52:46 25 three primary colors are red, green, and blue.

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12:52:55 2 That is, the entire visible spectrum can be  
12:53:01 3 categorized by those three primary colors,  
12:53:09 4 red, green, and blue.

12:53:10 5 On other occasions, a more detailed  
12:53:22 6 categorization is used. For example, going  
12:53:30 7 from the short wavelengths to the long  
12:53:32 8 wavelengths, one can use the categories  
12:53:40 9 violet, royal blue, blue, cyan, green, lime or  
12:54:02 10 greenish yellow.

12:54:06 11 Q. Are you going to start naming  
12:54:07 12 Crayola Crayons next or --

12:54:10 13 ATTORNEY DaMARIO: Objection.  
12:54:10 14 Argumentative, and let's let the witness,  
12:54:13 15 please, finish his statements.

12:54:18 16 ATTORNEY BROWN: Sorry.

12:54:19 17 Q. Go ahead.

12:54:21 18 A. Amber, orange, and red.

12:54:28 19 Q. So you said that your textbook has  
12:54:30 20 multiple descriptions of LEDs having a  
12:54:33 21 wavelength shorter than 460-nanometer and  
12:54:37 22 those wavelengths may be characterized as  
12:54:41 23 blue.

12:54:41 24 Do you remember that?

12:54:45 25 A. Correct. That is consistent with

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12:54:46 2 the literature that we are looking at in this  
12:54:52 3 proceedings.

12:54:53 4 Q. Does your textbook ever  
12:54:54 5 characterize those LEDs as blue? Actually,  
12:55:04 6 let me withdraw that and ask a more direct  
12:55:06 7 question.

12:55:08 8 Your textbook never characterizes  
12:55:12 9 an LED having a peak wavelength of less than  
12:55:15 10 440 nanometers as blue; isn't that correct?

12:55:26 11 A. No.

12:55:31 12 Q. Why do you say "no"?

12:55:35 13 A. Because as I said before, sometimes  
12:55:38 14 the visible spectrum is described by the three  
12:55:44 15 primary colors. The three primary colors --

12:55:48 16 Q. I'm not asking whether it can be.  
12:55:50 17 I'm asking: In your textbook where you  
12:55:54 18 categorize colors, did you ever categorize an  
12:55:56 19 LED having a wavelength less than  
12:55:59 20 440 nanometers as blue?

12:56:03 21 ATTORNEY DaMARIO: Please let the  
12:56:04 22 witness finish his answer before you jump in.

12:56:07 23 ATTORNEY BROWN: I'm trying to make  
12:56:08 24 sure he makes his train.

12:56:12 25 ATTORNEY DaMARIO: Appreciate that, but

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12:56:14 2 for everybody here, let's not talk over each  
12:56:16 3 other.

12:56:29 4 A. On occasion, and it is very common,  
12:56:33 5 including very common for myself, we follow  
12:56:41 6 the teaching that there are three primary  
12:56:44 7 colors. These three primary colors are blue,  
12:56:52 8 green, and red. That is, the optical spectrum  
12:57:01 9 is categorized by these three primary colors.

12:57:11 10 There are not four primary colors.  
12:57:14 11 There are only three primary colors, and there  
12:57:22 12 is a relatively coarse categorization of  
12:57:25 13 colors, but it is very common. The term  
12:57:27 14 "primary color" is a very common term, and if  
12:57:37 15 we, for example, attribute a color name to an  
12:57:50 16 LED emitting at 420-nanometer, then we would  
12:57:57 17 attribute the color blue to that wavelength  
12:58:06 18 given that we restrict ourselves to the three  
12:58:09 19 primary colors, red, green, and blue.

12:58:13 20 BY ATTORNEY BROWN:

12:58:14 21 Q. What is the basis for that  
12:58:15 22 restriction?

12:58:23 23 A. The concept of primary colors, red,  
12:58:26 24 green, and blue, is very common. You can find  
12:58:34 25 it --

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12:58:39 2 Q. In elementary school color 3?

12:58:41 3 A. -- in the technical literature.

12:58:45 4 Q. Let's go back to your declaration,  
12:58:47 5 which is Exhibit 2026. And I'd like you to go  
12:58:54 6 to Paragraph 112, if you can.

12:58:59 7 THE WITNESS: I'm so sorry.

12:59:14 8 Q. My questions will relate to -- I  
12:59:15 9 think Paragraph 112 through Paragraph 115 are  
12:59:21 10 all related, if you wanted to take a look  
12:59:24 11 through those?

01:00:46 12 A. Yes.

01:00:46 13 Q. And in Paragraph 112, it's your  
01:00:51 14 opinion that the petition, Dr. Dolittle's  
01:00:56 15 expert declaration based on 2007 or based on  
01:01:02 16 2005, would lead a person of ordinary skill in  
01:01:04 17 the art to use wavelengths longer than  
01:01:07 18 440 nanometers; is that right?

01:01:16 19 ATTORNEY DaMARIO: Objection.  
01:01:17 20 Misstates the declaration.

01:01:29 21 A. I think your statement was contrary  
01:01:30 22 to the first sentence.

01:01:32 23 Q. Did I leave out a "nothing"? I  
01:01:34 24 think I may have left out a "nothing."

01:01:36 25 I was just confirming the first

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01:01:38 2 sentence, which is: Additionally, it is my  
01:01:40 3 opinion that nothing in the petition,  
01:01:42 4 Dr. Dolittle's expert declaration based on  
01:01:47 5 2007 or based on 2005, would lead a person of  
01:01:52 6 ordinary skill of the art to use wavelengths  
01:01:54 7 longer than 440 nanometers.

01:01:58 8 Did I read it right that time?

01:02:00 9 A. Yes.

01:02:03 10 Q. And the basis for that opinion is  
01:02:07 11 that the quantum efficiency of an LED  
01:02:10 12 decreases with longer wavelength; is that  
01:02:12 13 right?

01:02:21 14 A. The specific LEDs that are relevant  
01:02:24 15 in this context, I would say yes. Not all  
01:02:30 16 LEDs, but the specific LEDs that we are --

01:02:34 17 Q. And so would that be LEDs made  
01:02:40 18 within GaN or GaN in this particular  
01:02:42 19 wavelength, is that the idea?

01:02:51 20 ATTORNEY DaMARIO: Object to form.

01:03:03 21 A. On Page 67 of my report, I have a  
01:03:05 22 figure, and we can see that the external  
01:03:13 23 quantum efficiency decreases when we go from  
01:03:20 24 shorter wavelengths, such as 400 nanometers,  
01:03:25 25 to longer wavelengths, such as 500 nanometers.

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01:03:32 2 Q. So in Paragraph 112 you say: The  
01:03:36 3 blue light is generally emitted in the range  
01:03:38 4 of 300 to -- sorry, to 480 nanometers.

01:03:45 5 What's your basis for saying that  
01:03:47 6 blue light is generally emitted from the range  
01:03:49 7 of 380 to 480 nanometers? Which  
01:03:59 8 categorization did you use?

01:04:04 9 A. There are three primary colors or  
01:04:09 10 three basic colors, and the short wavelength  
01:04:22 11 colors can be referred to as blue. The long  
01:04:29 12 wavelength colors can be referred to as red,  
01:04:32 13 and the middle range can be referred to as  
01:04:40 14 green.

01:04:42 15 So the blue starts at the boundary  
01:04:50 16 to the UV and that boundary is well-accepted  
01:04:59 17 to occur at 380-nanometer.

01:05:06 18 Q. In the following few paragraphs,  
01:05:11 19 there is a discussion of the quantum  
01:05:16 20 efficiency, as well as luminous efficacy; is  
01:05:20 21 that right?

01:05:24 22 A. Yes.

01:05:25 23 Q. And could you explain to me, you  
01:05:33 24 know, what the relationship is or what the  
01:05:36 25 difference is between quantum efficiency and

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01:05:38 2 luminous efficacy?

01:05:57 3 A. Quantum efficiency relates to the  
01:06:00 4 number of light quanta or photons. Luminous  
01:06:15 5 efficacy relates to the human eye, the  
01:06:24 6 sensitivity of the human eye.

01:06:33 7 Q. And in Paragraph 115, and you  
01:06:39 8 explain in more detail why you believe that  
01:06:43 9 quantum efficiency matters in this context  
01:06:46 10 more than luminous efficacy; is that right?

01:07:00 11 A. Yes.

01:07:01 12 Q. You say: A person of ordinary  
01:07:05 13 skill in the art would understand -- sorry,  
01:07:09 14 withdraw that. That's the same question.

01:07:17 15 Why would a person of ordinary  
01:07:21 16 skill in the art understand that quantum  
01:07:26 17 efficiency is more relevant than luminous  
01:07:28 18 efficacy in this context?

01:07:35 19 A. As I state in Paragraph 115,  
01:07:42 20 quantum efficiency is more relevant because  
01:07:48 21 approximately 90 percent of the primary light  
01:07:53 22 photons from the LED chip are used to excite  
01:07:58 23 the phosphor, and only 10 percent of the  
01:08:04 24 primary light photons from the LED chip are  
01:08:11 25 transmitted through the phosphor.

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01:08:21 2 Q. And so in that section back up in  
01:08:25 3 Paragraph 113, you say that: A person of  
01:08:29 4 ordinary skill in the art would have been  
01:08:31 5 deterred from using an LED with a wavelength  
01:08:35 6 longer than 440 nanometers for a white LED  
01:08:41 7 package; is that right?

01:08:45 8 A. That's correct, based on the figure  
01:08:48 9 that we have on Page 67 of my report, of my  
01:08:55 10 declaration, and based on the fact that is  
01:09:09 11 referred to as the green gap that I mentioned  
01:09:15 12 in Paragraph 112, a person of skill would be  
01:09:27 13 deterred from using an LED chip wavelength  
01:09:39 14 greater than or equal to 440 nanometers.

01:09:51 15 Q. Is quantum efficiency typically --  
01:09:57 16 sorry. Withdrawn.

01:10:02 17 Is quantum efficiency one of the  
01:10:05 18 parameters that need to be considered when  
01:10:08 19 answering the question as to the optimum way  
01:10:10 20 to generate white light?

01:10:15 21 ATTORNEY DaMARIO: Object to form.

01:10:22 22 A. In the present context, quantum  
01:10:24 23 efficiency is the more relevant quantity,  
01:10:26 24 because 90 percent of all the photons will be  
01:10:35 25 absorbed by the phosphor material, and I point

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out that Dr. Dolittle and I agree on the  
90 percent. He mentions in his -- mentions  
the 90 percent in his declaration, and I  
mention the 90 percent in my declaration.

So there is no dispute that  
90 percent of the light is absorbed by  
phosphor, and given this 90 percent fact and  
given that the external quantum efficiency  
strongly decreases as shown in the figure on  
Page 67, a POSITA would not increase the  
wavelength to greater than or equal to  
440 nanometers or to be more specific, in 2010  
a POSITA would not have done this.

Q. So a person of ordinary skill in  
the art, based on what you were saying, would  
prefer the greater quantum efficiency because  
it would better excite the 90 percent --  
sorry, the 90 percent of light that is  
converted by the phosphors would be more  
efficiently converted; is that correct?  
Actually, let me -- that didn't make sense.  
Let me withdraw that.

So 90 percent of the light, as  
you're discussing here, would be converted by

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01:12:56 2 the phosphor; correct?

01:13:03 3 A. Can I hear the question again?

01:13:05 4 Q. So in the example we were talking  
01:13:08 5 about or in the hypothetical, 90 percent of  
01:13:10 6 the light would be converted by the phosphors;  
01:13:14 7 correct?

01:13:20 8 A. Yes, and the 90 percent is agreed  
01:13:21 9 upon among the technical experts.

01:13:25 10 Q. Can you please focus on my question  
01:13:27 11 and then try to answer them? I understand  
01:13:30 12 that it's not disputed. I'm just trying to  
01:13:32 13 move things along and confirm that. I  
01:13:34 14 apologize for interrupting. I'm just trying  
01:13:36 15 to keep things moving.

01:13:38 16 And so the other 10 percent would  
01:13:40 17 pass through; is that right?

01:13:46 18 A. Yes.

01:13:46 19 Q. And so you would want in your view  
01:13:50 20 a greater quantum efficiency for the LED  
01:13:53 21 because most of the photons emitted by the  
01:13:56 22 LED, 90 percent of them, are being converted  
01:14:00 23 by the phosphors; right?

01:14:09 24 A. Yeah, the question is are we  
01:14:10 25 interested in the 90 percent effect or are we

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01:14:12 2 interested in the 10 percent effect? So I  
01:14:15 3 would agree that a person of skill would  
01:14:22 4 consider the 90 percent effect to be more  
01:14:24 5 relevant than the 10 percent effect.

01:14:29 6 Q. And the 90 percent effect with  
01:14:31 7 respect to quantum efficiency matters because  
01:14:35 8 that increases the luminous efficacy of that  
01:14:39 9 90 percent; correct?

01:15:01 10 A. I don't think I make that argument.  
01:15:03 11 I don't see that argument being made. The  
01:15:08 12 argument that is made is that we want to  
01:15:13 13 primarily excite the phosphor. 90 percent of  
01:15:25 14 the photons we create in the LED chip are  
01:15:33 15 meant to excite the phosphor.

01:15:41 16 Based on that, we clearly realize  
01:15:46 17 that we want to have as many photons exciting  
01:15:50 18 the phosphor as possible.

01:15:53 19 Now, if we would go to a wavelength  
01:15:56 20 of longer than 440 nanometers, the efficiency  
01:16:03 21 significantly drops, and it is not a minor  
01:16:08 22 effect. If we look at the figure on Page 67,  
01:16:15 23 the quantum efficiency drops from more than  
01:16:20 24 60 percent to less than 15 percent. So it's a  
01:16:27 25 big effect. It's not a small effect, and

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01:16:32 2 based on that significant effect and based on  
01:16:40 3 the fact that 90 percent of the primary  
01:16:42 4 photons are used to excite the phosphor, one  
01:16:50 5 comes to the conclusion, a POSITA would come  
01:16:54 6 to the conclusion -- a POSITA would have come  
01:16:56 7 to the conclusion in 2010 that he or she, the  
01:17:03 8 POSITA, would not choose a configuration,  
01:17:11 9 would not choose a wavelength that has a  
01:17:19 10 significantly lower external quantum  
01:17:23 11 efficiency, and for that reason, I have come  
01:17:25 12 to the conclusion that based on what was  
01:17:32 13 available in 2010, based on the prior art,  
01:17:36 14 looking at the prior art references, and  
01:17:39 15 looking at the state of the knowledge at that  
01:17:42 16 time, a POSITA would not have chosen a greater  
01:17:48 17 than or equal to 440-nanometer wavelength.

01:17:57 18 Q. And that's even though every blue  
01:17:59 19 LED described -- sorry, every LED described as  
01:18:02 20 blue in your textbook has a wavelength greater  
01:18:07 21 than that?

01:18:08 22 ATTORNEY DaMARIO: Object to form.

01:18:23 23 A. Your statement appears to be  
01:18:25 24 broader than I would like to hear it. There  
01:18:27 25 are specific examples in my textbook where we

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01:18:33 2 have some specific examples with LEDs emitting  
01:18:45 3 at 460 nanometers, and I would like to point  
01:18:50 4 out that you will refer to quite a number of  
01:18:56 5 examples. Most of those examples did not  
01:19:00 6 relate to white LEDs. Most of those examples  
01:19:05 7 just related to blue LEDs.

01:19:08 8 Now, when we talk about blue  
01:19:10 9 LEDs --

01:19:11 10 Q. Can I -- I don't want to interrupt  
01:19:13 11 you, but I don't need the lesson on the  
01:19:17 12 categorization again.

01:19:20 13 A. I was not going to the  
01:19:24 14 categorization. I was going to say where we  
01:19:26 15 just have a blue LED, the luminous efficacy is  
01:19:31 16 more important than the quantum efficiency,  
01:19:34 17 but this is different for white LEDs, and I  
01:19:38 18 would like to point out that most of the  
01:19:41 19 examples related to pure blue LEDs, these  
01:19:46 20 examples of pure blue LEDs did not relate to  
01:19:53 21 phosphor wavelength conversion.

01:19:57 22 If we have these blue LEDs, the  
01:19:59 23 luminous efficacy is more important. So what  
01:20:02 24 I'm suggesting is I would disregard all  
01:20:07 25 examples that you mentioned, except the one

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01:20:12 2 that is mentioned in the section of white  
01:20:17 3 LEDs, and there is one example that you had,  
01:20:21 4 all the other examples related to pure blue  
01:20:25 5 LEDs, and that clarification I think is  
01:20:29 6 relevant.

01:20:33 7 Q. There is an energy cost for  
01:20:35 8 phosphor conversion; isn't there? When  
01:20:38 9 phosphor converts light from one wavelength to  
01:20:41 10 another, isn't energy lost?

01:20:46 11 A. Some energy is converted to heat in  
01:20:49 12 the wavelength conversion process.

01:20:52 13 Q. And light at the boundary line  
01:20:56 14 between ultraviolet light and violet light is  
01:21:01 15 essentially not visible; right? It's at the  
01:21:03 16 boundary line between visible and not visible?

01:21:11 17 A. Yes, it can be seen either way.  
01:21:12 18 You know, if we go to the boundary between  
01:21:16 19 ultraviolet and blue, if we look at that  
01:21:19 20 boundary, and you're asking the question is  
01:21:21 21 that wavelength visible or not visible, I  
01:21:25 22 think either one -- either answer will be fine  
01:21:30 23 because it's the boundary.

01:21:31 24 Q. And so all of those things lead to  
01:21:35 25 the luminous efficacy of the overall package;

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01:21:38 2 right? The quantum efficiency of the LED, the  
01:21:42 3 amount of visible light put out by the LED,  
01:21:45 4 and the energy lost from the conversion  
01:21:49 5 altogether affect the luminous efficacy of the  
01:21:53 6 white light package as a whole; don't they?

01:21:57 7 ATTORNEY DaMARIO: Object to form.

01:22:06 8 A. Can I hear the question again?

01:22:10 9 Q. So all of these things lead to the  
01:22:12 10 luminous efficacy of the overall package;  
01:22:14 11 right? The quantum efficiency of the LED, the  
01:22:17 12 amount of visible light put out by the LED,  
01:22:20 13 and the energy lost from the conversion  
01:22:23 14 altogether affect the luminous efficacy of the  
01:22:25 15 white light package as a whole; don't they?

01:22:32 16 ATTORNEY DaMARIO: The same objection.

01:23:00 17 A. Are you referring to an opinion  
01:23:01 18 that I rendered in my declarations or --

01:23:04 19 Q. No. I mean, it's related to them,  
01:23:07 20 but I'm asking you the question standing alone  
01:23:10 21 right now.

01:23:16 22 A. In a newer edition of this book, I  
01:23:18 23 have a whole chapter on efficiency, and there  
01:23:25 24 are multiple factors that contribute to the  
01:23:27 25 efficiency, but in this particular case, I

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01:23:33 2 have responded to Dr. Dolittle's argument, and  
01:23:38 3 Dr. Dolittle has stated that 90 percent of the  
01:23:44 4 photons are used to excite the phosphor  
01:23:52 5 material.

01:23:54 6 I agree with him on the 90 percent,  
01:23:56 7 and based on the fact that 90 percent are  
01:24:08 8 converted, a POSITA would understand that the  
01:24:19 9 external quantum efficiency is highly  
01:24:25 10 relevant, and based on the well-known curve  
01:24:33 11 that I showed on Page 67 of my declaration  
01:24:46 12 where the quantum efficiency significantly  
01:24:48 13 drops from more than 60 percent to less than  
01:24:53 14 15 percent, based on that knowledge, a POSITA  
01:24:59 15 would hesitate to extend the wavelength to  
01:25:08 16 values where the external quantum efficiency  
01:25:13 17 is significantly lower.

01:25:23 18 Q. Are you finished?

01:25:27 19 A. Yes.

01:25:29 20 Q. Isn't it true that a fundamental  
01:25:32 21 drawback of UV pumped white LEDs is the energy  
01:25:36 22 loss incurred when converting UV light to  
01:25:39 23 white light, which makes the potential  
01:25:41 24 luminous efficacy of UV pumped white LED lamps  
01:25:47 25 markedly lower than that of white sources

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01:25:49 2 based on a blue LED exciting a yellow  
01:25:53 3 phosphor?

01:25:55 4 ATTORNEY DaMARIO: Object to form.

01:26:10 5 A. No, I do not agree with your  
01:26:13 6 assessment, because there are other factors  
01:26:22 7 that I see, and I can be more detailed if you  
01:26:32 8 wish, but there are other reasons that UV  
01:26:38 9 light is not being used, and I can be more  
01:26:43 10 detailed if you wish.

01:26:47 11 The reason that you mentioned is  
01:26:48 12 not the reason that I see.

01:26:54 13 Q. Can you turn to Page 358 of your  
01:26:57 14 textbook? In the very last paragraph it says:  
01:27:12 15 A fundamental drawback of UV pumped white LEDs  
01:27:17 16 is the energy loss, parentheses, Stoke's  
01:27:20 17 shift, parentheses, incurred when converting  
01:27:23 18 UV light to white light.

01:27:25 19 The potential luminous efficiency  
01:27:27 20 of UV pumped white LED lamps is, therefore,  
01:27:32 21 markedly lower than that of white sources  
01:27:34 22 based on a blue LED exciting a yellow  
01:27:39 23 phosphor.

01:27:39 24 Did I read that correctly?

01:27:40 25 A. Yes.

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01:27:40 2 Q. And this is your textbook; isn't  
01:27:42 3 it?

01:27:44 4 A. Correct.

01:27:46 5 ATTORNEY BROWN: I think now is a good  
01:27:48 6 time for a break.

01:27:49 7 CERTIFIED STENOGRAPHER: Off the  
01:27:49 8 stenographic record at 1:27 p.m.

9 - - -

10 (Whereupon, a luncheon recess is  
11 taken at 1:27 P.M.)

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

3 (1:59 p.m.)

01:58:57 4 CERTIFIED STENOGRAPHER: Back on the  
01:58:58 5 stenographic record at 1:59 p.m.

01:59:06 6 BY ATTORNEY BROWN:

01:59:07 7 Q. Dr. Schubert, have you ever been  
01:59:09 8 the subject of a formal investigation or  
01:59:12 9 proceeding involving accusations of dishonesty  
01:59:16 10 or fraud?

01:59:23 11 A. No.

01:59:24 12 Q. Did you say no?

01:59:25 13 A. Correct.

01:59:28 14 Q. You mentioned that you had  
01:59:29 15 testified in a number of District Court cases;  
01:59:31 16 right?

01:59:37 17 A. Yes.

01:59:37 18 Q. And most of those cases you were  
01:59:39 19 presumably an expert witness; is that correct?

01:59:43 20 A. Yes.

01:59:43 21 Q. But there was a case that you were  
01:59:46 22 involved with as well as a plaintiff; were you  
01:59:49 23 not?

01:59:52 24 A. Correct.

01:59:53 25 Q. What were the circumstances of that

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01:59:54 2 case?

01:59:58 3 A. Boston University returned --

02:00:04 4 - - -

02:00:04 5 (Clarification requested by the  
02:00:04 6 stenographer.)

02:00:04 7 - - -

02:00:04 8 A. Boston University returned patents  
02:00:10 9 to the inventors, and Boston University  
02:00:20 10 offered to return two patents to me and I  
02:00:31 11 accepted that offer.

02:00:34 12 Q. And then the District Court case  
02:00:38 13 was a case that you had filed asserting the  
02:00:40 14 patents that Boston University had returned to  
02:00:42 15 you?

02:00:44 16 A. Yes.

02:00:46 17 Q. And during that District Court  
02:00:50 18 case, it was alleged that you had committed  
02:00:54 19 inequitable conduct; is that correct?

02:01:00 20 A. I don't recall it.

02:01:02 21 Q. There was a bench trial where there  
02:01:04 22 was a judge and you testified; correct?

02:01:09 23 A. Correct.

02:01:11 24 Q. And the questions they asked you  
02:01:12 25 were related to whether you had an intent to

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02:01:16 2 deceive the Patent Office; isn't that right?

02:01:20 3 A. My recollection is different.

02:01:22 4 Q. What is your recollection?

02:01:24 5 A. My recollection is that the  
02:02:01 6 misconduct was somehow associated with Boston  
02:02:03 7 University.

02:02:04 8 Q. And there was an allegation that  
02:02:05 9 you were the one who had orchestrated that  
02:02:09 10 misconduct; correct?

02:02:15 11 A. You have to be, you know, more  
02:02:16 12 concrete. It's more than 10 years ago. My  
02:02:19 13 recollection is very limited, but as I said,  
02:02:23 14 according to my recollection, Boston  
02:02:30 15 University handled a patent application, and I  
02:02:39 16 was the inventor, and there was some kind of  
02:02:43 17 allegation of misconduct that based on my  
02:02:45 18 recollection was Boston University's handling  
02:02:55 19 of the patent application.

02:02:57 20 Q. The trial was in 2020 or 2021;  
02:03:02 21 wasn't it?

02:03:13 22 ATTORNEY DaMARIO: Object to form.

02:03:15 23 A. I don't think there was a trial.

02:03:17 24 Q. You don't remember testifying for  
02:03:19 25 the judge?

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02:03:21 2 A. I do remember testifying for the  
02:03:24 3 judge, but as far as I recall, there was a  
02:03:29 4 settlement and the settlement was before the  
02:03:32 5 trial.

02:03:34 6 Q. The settlement was before the jury  
02:03:35 7 trial; correct?

02:03:40 8 ATTORNEY DaMARIO: Object to form.

02:03:42 9 Q. But the settlement was after the  
02:03:44 10 bench trial where the judge heard testimony  
02:03:48 11 related to inequitable conduct; isn't that  
02:03:51 12 right?

02:03:55 13 A. I don't recall the details.

02:03:57 14 Q. Didn't the judge suggest to the  
02:03:59 15 parties that they should settle because she  
02:04:01 16 wasn't sure which way things would go?

02:04:06 17 ATTORNEY DaMARIO: Object to form.

02:04:07 18 A. I don't recall.

02:04:08 19 Q. How many patent cases have you  
02:04:10 20 filed as an individual?

02:04:12 21 A. Three.

02:04:13 22 Q. And were all of those three cases  
02:04:15 23 related?

02:04:16 24 A. Yes.

02:04:18 25 Q. And did all of those three cases

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02:04:20 2 settle before those allegations of misconduct  
02:04:22 3 could be resolved?

02:04:27 4 ATTORNEY DaMARIO: Object to form.

02:04:31 5 A. I think there was only one case in  
02:04:35 6 which misconduct was alleged. The other two  
02:04:37 7 cases settled, I think, one of them 10 years  
02:04:44 8 ago and the other one maybe 12 or 13 years  
02:04:48 9 ago.

02:04:50 10 Q. When did the third one settle? Was  
02:04:51 11 that in the 2020, 2021 time frame?

02:04:55 12 A. Potentially, yes. I don't recall  
02:04:56 13 the year.

02:04:58 14 Q. Do you remember how long that case  
02:05:00 15 had been pending before it settled?

02:05:08 16 A. It could have been an extended  
02:05:11 17 period of time, because the case was stayed  
02:05:13 18 during an IPR proceeding, and the IPR  
02:05:18 19 proceeding went to the federal appeals court.

02:05:29 20 Q. So that case was finally -- the IPR  
02:05:32 21 was finally resolved, but it took a good  
02:05:36 22 amount of time to do that, and so that was the  
02:05:38 23 reason for the delay? Is that what you're --

02:05:41 24 ATTORNEY DaMARIO: Object to form.

02:05:51 25 A. There was an IPR, and the patent

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02:05:53 2 emerged from the IPR unscathed. So there was  
02:05:57 3 no change in claims, and there was no  
02:06:05 4 invalidity. So the patent remained valid, and  
02:06:11 5 I believe that this led to a delay.

02:06:20 6 Q. And you don't recall what the  
02:06:21 7 specific allegations of inequitable conduct or  
02:06:23 8 fraud on the Patent Office were in that case?

02:06:34 9 A. Can I hear the question again?

02:06:38 10 Q. You don't recall what the specific  
02:06:39 11 allegations of inequitable conduct or fraud on  
02:06:41 12 the Patent Office were against you in that  
02:06:44 13 case; correct?

02:06:53 14 A. As I said earlier, based on my  
02:06:56 15 understanding, I was not subject to that  
02:07:10 16 allegation. Based on my understanding, the  
02:07:15 17 allegation was directed at Boston University,  
02:07:16 18 and Boston University was the organization  
02:07:21 19 that communicated with the Patent Office. I  
02:07:24 20 never communicated with the Patent Office in  
02:07:27 21 that matter.

02:07:30 22 Q. Do you remember any other formal  
02:07:32 23 investigations or proceedings involving  
02:07:34 24 accusation of dishonesty or fraud against you?

02:07:45 25 A. No.

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02:07:45 2 Q. In 2008, you founded the  
02:07:49 3 Engineering Research Center for Smart Lighting  
02:07:50 4 at RPI; is that correct?

02:07:57 5 A. Yes, if you want to express it that  
02:08:00 6 way, fine.

02:08:01 7 Q. How would you express it?

02:08:03 8 A. Well, I was awarded an Engineering  
02:08:05 9 Research Center from the National Science  
02:08:07 10 Foundation. It was not that I founded it, but  
02:08:10 11 there was a federal reward from the United  
02:08:12 12 States Government, specifically the U.S.  
02:08:15 13 National Science Foundation, and they made a  
02:08:19 14 big award, ultimately a 10-year center, and  
02:08:33 15 that was a center where I served as the  
02:08:39 16 founding director, as the first director. So,  
02:08:42 17 you know, the way I see it, was an award by  
02:08:45 18 the U.S. Government to RPI, with me serving as  
02:08:48 19 the first director.

02:08:50 20 - - -

02:08:50 21 (Whereupon, public record from the  
22 National Science Foundation entitled: Award  
23 Abstract Number 0812056NSF, Engineering  
24 Research Center for Smart Lighting, is  
25 received and marked as Exhibit 1044 for

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2 Identification.)

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4 BY ATTORNEY BROWN:

02:08:54 5 Q. I'm going to hand you a document  
02:08:55 6 that's been marked as Exhibit 1044.

02:09:00 7 This is a public record from the  
02:09:03 8 National Science Foundation entitled: Award  
02:09:08 9 Abstract Number 0812056NSF, Engineering  
02:09:15 10 Research Center for Smart Lighting.

02:09:20 11 Dr. Schubert, do you recognize  
02:09:21 12 Exhibit 1044?

02:09:27 13 A. I have no recollection, but I see  
02:09:28 14 the document in front of me.

02:09:31 15 Q. If I could have you turn to what's  
02:09:37 16 marked as Page 2 at the bottom of that. There  
02:09:40 17 is the start of an abstract and continues onto  
02:09:41 18 the next page. And that just says -- I'll  
02:09:52 19 withdraw the question.

02:09:56 20 So at the bottom of Page 2 it says  
02:09:59 21 that: RPI, the University of New Mexico, and  
02:10:04 22 Boston University are jointly proposing to  
02:10:06 23 establish an Engineering Research Center for  
02:10:10 24 Smart Lighting under the direction of Fred  
02:10:12 25 Schubert.

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02:10:13 2 Do you see that?

02:10:24 3 A. Yes.

02:10:24 4 Q. And so what was your involvement in  
02:10:29 5 the proposal to establish the Engineering  
02:10:31 6 Research Center for Smart Lighting?

02:10:39 7 A. I participated in the proposal  
02:10:40 8 process.

02:10:45 9 Q. Was that under your direction, the  
02:10:49 10 proposal process?

02:10:57 11 In other words, let me withdraw  
02:10:58 12 that and ask a different question.

02:11:01 13 It says here that the Engineering  
02:11:02 14 Research Center would be under the direction  
02:11:04 15 of Fred Schubert; right? Does that mean that  
02:11:08 16 you would be responsible for the Engineering  
02:11:09 17 Research Center primarily?

02:11:20 18 A. Can I hear the question again?

02:11:25 19 Q. So in the abstract, it says that  
02:11:27 20 the Engineering Research Center would be under  
02:11:29 21 your direction. Does that mean that you were  
02:11:32 22 primarily responsible for the Engineering  
02:11:33 23 Research Center?

02:11:43 24 A. I'm not sure. The award is always  
02:11:46 25 made to the institution. The award is never

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02:11:52 2 made to a person. So the award is made to, in  
02:11:59 3 this case, RPI, not to me.

02:12:06 4 Q. So the award was made to RPI, but  
02:12:08 5 did RPI's proposal in order to receive the  
02:12:11 6 award include that you would be director of  
02:12:14 7 the ERC?

02:12:25 8 A. Can I hear the question again?

02:12:26 9 Q. So the award was made to RPI, but  
02:12:29 10 did RPI's proposal to receive the award  
02:12:32 11 include that you would be director of the ERC?

02:12:38 12 A. I would need to see that proposal.

02:12:39 13 Q. How were you selected to be the  
02:12:41 14 director of the ERC?

02:12:45 15 ATTORNEY DaMARIO: I'm just going to  
02:12:45 16 make a general scope objection regarding this  
02:12:48 17 document and the line of questioning.

02:12:58 18 A. Can I hear the question again?

02:13:01 19 Q. How were you selected to be the  
02:13:02 20 director of the ERC?

02:13:12 21 A. How was I selected to be director  
02:13:13 22 of the ERC? Who made that selection?

02:13:19 23 Q. That would be part of my question.  
02:13:23 24 I'm trying to just get a sense of, you know,  
02:13:26 25 how you became involved with the ERC, what it

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02:13:28 2 meant to you, what the process was, because

02:13:31 3 I'm not familiar with it. Maybe let me ask a

02:13:37 4 different question.

02:13:39 5 Why were you selected to be the

02:13:41 6 director of the ERC?

02:13:53 7 A. And what year was that?

02:13:56 8 Q. 2008.

02:14:07 9 A. To the extent that there was a  
02:14:08 10 selection process in 2008, I do not recall  
02:14:14 11 that selection process.

02:14:18 12 Q. And you said that the grant was for  
02:14:22 13 10 years. Was it initially intended to be 10  
02:14:24 14 years?

02:14:29 15 A. Intended by whom?

02:14:31 16 Q. In other words, the original grant,  
02:14:33 17 was the original grant a 5-year grant or a  
02:14:36 18 10-year grant?

02:14:45 19 A. To the extent that the initial  
02:14:46 20 grant was a 5-year grant or a 10-year grant in  
02:14:49 21 2008, I have no recollection on that.

02:14:52 22 Q. Do you recall how long it actually  
02:14:54 23 ended up lasting for?

02:15:01 24 A. I think Engineering Research  
02:15:03 25 Centers can last more than 10 years, but I'm

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02:15:08 2 not a specialist in that field, and I'm more  
02:15:12 3 speculating than saying something based on --  
02:15:17 4 on sordid information.

02:15:20 5 This is under the domain of the  
02:15:22 6 National Science Foundation, you know, they  
02:15:24 7 award -- they make awards, they decide how  
02:15:30 8 long the award is. I think the award can take  
02:15:36 9 1 year, 5 years, 10 years, even more than 10  
02:15:39 10 years, but I have no knowledge, no direct  
02:15:45 11 knowledge of processes that go on at the U.S.  
02:15:51 12 National Science Foundation.

02:15:55 13 Q. At the time that the ERC was  
02:15:56 14 funded, how long did you expect to be the  
02:16:00 15 director and principal investigator of the  
02:16:04 16 ERC?

02:16:10 17 A. You mean in 2008?

02:16:12 18 Q. In 2008, yes.

02:16:16 19 A. To the extent that I had an  
02:16:17 20 expectation in 2008, to the extent that I have  
02:16:21 21 an expectation in 2008, I do not recall any  
02:16:28 22 expectation of mine in 2008.

02:16:32 23 Q. Would you typically expect to stay  
02:16:34 24 as the director of the ERC for some period of  
02:16:36 25 time?

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02:16:54 2 A. To the extent that I had an  
02:16:55 3 expectation in 2008, I do not recall any  
02:16:58 4 expectation at this time. It is, I think, 17  
02:17:06 5 years ago.

02:17:07 6 Q. So did there come a time when you  
02:17:09 7 were no longer the director and principal  
02:17:11 8 investigator at the ERC?

02:17:22 9 A. Yes.

02:17:22 10 Q. When was that?

02:17:49 11 A. My CV says that in the time frame  
02:17:53 12 2008 to 2009, I was director and founding  
02:17:56 13 director and principal investigator of the NSF  
02:18:05 14 Engineering Research Center for Smart Lighting  
02:18:12 15 at Rensselaer Polytechnic Institute.

02:18:17 16 Q. So you were the director for a year  
02:18:19 17 or was it less than a year?

02:18:28 18 A. I don't recall the exact dates, but  
02:18:32 19 I don't think it was less than a year.

02:18:34 20 Q. Was it less than two years?

02:18:40 21 A. Less than two years it looks like  
02:18:43 22 based on my CV.

02:18:44 23 Q. Is it typical for the director of  
02:18:45 24 an Engineering Research Center to only remain  
02:18:49 25 as the director for less than two years?

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02:18:58 2 ATTORNEY DaMARIO: Object to form.

02:19:03 3 A. I would not be able to speak on  
02:19:05 4 that point because it exceeds the boundary of  
02:19:09 5 my knowledge.

02:19:12 6 Q. Why were you terminated as the  
02:19:14 7 director and principal investigator of the  
02:19:17 8 ERC?

02:19:20 9 ATTORNEY DaMARIO: Object to form.

02:19:24 10 A. I disagree with your premise of  
02:19:29 11 your question that I was terminated.

02:19:35 12 Q. If you were not terminated, how did  
02:19:38 13 your role as the director and principal  
02:19:40 14 investigator of the ERC conclude?

02:19:54 15 A. I was certainly not terminated.

02:19:58 16 Q. Did you fire -- or sorry. Did you  
02:20:00 17 quit? Did you resign in lieu of being  
02:20:14 18 terminated?

02:20:30 19 A. Can you explain what you mean by  
02:20:32 20 this question?

02:20:33 21 Q. In other words, sometimes when an  
02:20:35 22 organization wants to get rid of somebody or  
02:20:38 23 remove somebody from a role, rather than  
02:20:41 24 telling them that they are fired, they will  
02:20:44 25 instead ask for their resignation so that the

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02:20:47 2 person can then say that they resigned from  
02:20:49 3 the position rather than having to say they  
02:20:52 4 were fired.

02:20:54 5 My question: Is that what happened  
02:20:55 6 to you?

02:20:55 7 A. Based --

02:21:00 8 ATTORNEY DaMARIO: Sorry. Object to  
02:21:01 9 form.

02:21:02 10 A. Based on my understanding, a  
02:21:06 11 principal investigator can only be fired if  
02:21:10 12 misconduct has been done. There was  
02:21:15 13 absolutely no misconduct.

02:21:17 14 Q. Was there a finding of no  
02:21:18 15 misconduct?

02:21:21 16 A. I do not recall any allegation of  
02:21:23 17 misconduct in conjunction -- against me in  
02:21:28 18 conjunction with the ERC.

02:21:40 19 - - -

02:21:40 20 (Whereupon, public record from the  
21 National Science Foundation, Freedom of  
22 Information Act log for the fiscal year 2011,  
23 is received and marked as Exhibit 1043 for  
24 Identification.)

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02:21:40 2 BY ATTORNEY BROWN:

02:21:40 3 Q. I'm going to be handing you a  
02:21:41 4 document marked Exhibit 1043. And I apologize  
02:21:50 5 for the size of this, although it is at least  
02:21:52 6 in this instance not my fault because this is  
02:21:55 7 a public record from the National Science  
02:21:58 8 Foundation, their Freedom of Information Act  
02:22:03 9 log for the fiscal year 2011.

02:22:09 10 Dr. Schubert, have you seen  
02:22:11 11 Exhibit 1043 before?

02:22:34 12 A. I don't know.

02:22:35 13 Q. You don't know whether you've seen  
02:22:36 14 it before?

02:22:37 15 A. I have no recollection having seen  
02:22:41 16 this document. I may have seen it before.  
02:22:42 17 I've seen many documents, but I don't recall  
02:22:45 18 it.

02:22:46 19 Q. You don't recall being asked about  
02:22:47 20 this document when you testified in the trial  
02:22:52 21 regarding your alleged inequitable conduct in  
02:22:58 22 2020, 2021?

02:23:02 23 ATTORNEY DaMARIO: Object to form.

02:23:08 24 A. Can I see that allegation that  
02:23:09 25 you're referring to?

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02:23:10 2 Q. I'm sorry, I didn't print it out or  
02:23:11 3 bring it with me, but it would have been in  
02:23:14 4 the answer to your complaint in that case,  
02:23:16 5 among other places.

02:23:27 6 So you don't recall about being  
02:23:28 7 asked about this document during that trial;  
02:23:30 8 is that right?

02:23:35 9 A. I have no recollection.

02:23:38 10 Q. And the easiest way to identify  
02:23:42 11 specific entries here I think is that there is  
02:23:44 12 a column that's a FOIA number and it starts  
02:23:49 13 20111 on the first page and then goes through,  
02:23:50 14 and I'd like to ask you about one of the  
02:23:53 15 entries on Page 7, if you could go there. And  
02:24:07 16 the one I want to ask you about has FOIA  
02:24:10 17 Number 2011188, and let me know when you're  
02:24:19 18 there.

02:24:31 19 A. Yes.

02:24:31 20 Q. And there are a number of entries,  
02:24:33 21 requested documents that are per -- with  
02:24:37 22 different people, but this particular request  
02:24:41 23 is: All documents residing with the NSF  
02:24:45 24 assistant director of the directorate for  
02:24:48 25 engineering that contain any allegations made

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02:24:51 2 against Fred Schubert. The allegations may  
02:24:54 3 include, but not limited to, fraud; failure to  
02:24:58 4 disclose interest in any entity; violation of  
02:25:00 5 any law; violation of NSF procedures;  
02:25:04 6 providing false and/or misleading information  
02:25:06 7 to NSF and/or Rensselaer, comma, unethical  
02:25:12 8 conduct, etc.

02:25:14 9 Do you see that?

02:25:21 10 And if you look to the left, the  
02:25:22 11 requester is listed as E. Fred Schubert.

02:25:30 12 A. I couldn't read along when you read  
02:25:32 13 it because the font size is so small. So if  
02:25:35 14 you'll read it again, I'll make an attempt to  
02:25:38 15 follow what you're reading.

02:25:40 16 Q. All documents residing with the NSF  
02:25:43 17 assistant director of the directorate for  
02:25:45 18 engineering that contain any allegations made  
02:25:48 19 against Fred Schubert. The allegations may  
02:25:52 20 include, but not limited to, fraud; failure to  
02:25:56 21 disclose interest in any entity; violation of  
02:25:58 22 any law; violation of NSF procedures;  
02:26:03 23 providing false and/or misleading information  
02:26:05 24 to NSF and/or Rensselaer; unethical conduct,  
02:26:10 25 etc.

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02:26:18 2 Do you recall why you requested  
02:26:19 3 these documents?

02:26:23 4 A. So you're reading on the right-hand  
02:26:25 5 column, is that right?

02:26:26 6 Q. Yes.

02:26:26 7 A. When I look at the right-hand  
02:26:29 8 column it starts with 2011-03, and I didn't  
02:26:32 9 hear you saying that. If you would start at  
02:26:34 10 the beginning, I will try to follow you, but I  
02:26:40 11 think you started somewhere in the middle of  
02:26:41 12 that paragraph.

02:26:42 13 Q. I believe that the first kind of  
02:26:45 14 word there with the dashes is just the name of  
02:26:46 15 the file, but I'll read the whole thing if  
02:26:49 16 that will be helpful for you.

02:26:52 17 So this request sends: 2011, dash,  
02:26:56 18 03, dash, 14A, dash, EFS, dash, FOIA, dash,  
02:27:05 19 privacy, dash, allegation, dash, documents,  
02:27:13 20 dash, against, dash, EFS, dash, with, dash,  
02:27:18 21 assist, dash, DIR, D-I-R, dash, engineering,  
02:27:27 22 E-N-G, and then there is a semicolon, and it  
02:27:33 23 goes on to say what I read before, which is:  
02:27:36 24 All documents residing with the NSF assistant  
02:27:39 25 director of the directorate for engineering

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02:27:42 2 that contain any allegations made against Fred  
02:27:45 3 Schubert.

02:27:47 4 The allegations may include, but  
02:27:48 5 not limited to, fraud; failure to disclose  
02:27:52 6 interest in any entity; violation of any law;  
02:27:56 7 violation of NSF procedures; providing false  
02:28:00 8 and/or misleading information to NSF and/or  
02:28:03 9 Rensselaer; unethical conduct, etc.

02:28:15 10 Do you recall requesting these  
02:28:16 11 documents?

02:28:21 12 A. I do not.

02:28:22 13 Q. Do you recall filing a number of  
02:28:23 14 Freedom of Information Act requests with the  
02:28:26 15 NSF in 2011 or the end of 2010, fiscal year  
02:28:34 16 2011?

02:28:44 17 A. I -- I recall making FOIA requests.

02:28:47 18 Q. And what do you recall about making  
02:28:49 19 FOIA requests?

02:29:18 20 A. Nothing comes to mind right now.

02:29:22 21 Q. Why would you have thought that the  
02:29:24 22 NSF might have documents containing  
02:29:28 23 allegations made against you?

02:29:33 24 ATTORNEY DaMARIO: Object to form.

02:29:40 25 A. I do not recall.

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02:29:40 2 Q. Do you recall what those  
02:29:42 3 allegations may have been?

02:29:48 4 A. I do not recall.

02:29:50 5 Q. Do you recall why you believed the  
02:29:53 6 NSF might have documents containing  
02:29:56 7 allegations of fraud against you?

02:30:03 8 A. I do not recall.

02:30:17 9 Q. Go to another entry on Page 19 of  
02:30:24 10 this. And especially looking at Entry  
02:30:40 11 2011487, which is another request from you,  
02:30:46 12 Dr. E. Fred Schubert. Do you see that entry?

02:30:53 13 A. Can you say the number again?

02:30:55 14 Q. 2011-487.

02:30:59 15 A. Yes.

02:31:00 16 Q. And the request there says: The  
02:31:03 17 National Science Foundation conducted an  
02:31:05 18 investigation into possible conflicts of  
02:31:08 19 interests, COIs, that I may have had as  
02:31:11 20 principal investigator of the Smart Lighting  
02:31:14 21 Engineering Research Center, NSF Award  
02:31:17 22 Number 0812056.

02:31:34 23 What possible conflicts of interest  
02:31:36 24 were the National Science Foundation  
02:31:38 25 conducting an investigation into?

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02:31:46 2 A. Sorry, I don't recall.

02:31:55 3 Q. I'd like to go to another entry on  
02:31:56 4 Page 10. And this is the final entry on that  
02:32:08 5 page, which is Number 2011-283. Let me know  
02:32:14 6 when you've got that.

02:32:23 7 A. Yes.

02:32:23 8 Q. And that requests documents  
02:32:28 9 commenting on the number of FOIA requests made  
02:32:31 10 by Mr. E. Fred Schubert.

02:32:35 11 Do you see that?

02:32:39 12 A. No.

02:32:39 13 Q. Let me read the full first thing.  
02:32:41 14 Maybe that will be helpful.

02:32:43 15 This requests documents from a  
02:32:45 16 number of different offices or people, but the  
02:32:47 17 first one is: Documents residing with the NSF  
02:32:51 18 office of the general counsel commenting on  
02:32:53 19 the number of FOIA requests by Mr. E. Fred  
02:32:56 20 Schubert.

02:33:15 21 A. Is there a question pending?

02:33:16 22 Q. Do you remember why you made this  
02:33:17 23 request?

02:33:25 24 A. I do not.

02:33:26 25 Q. Well, why would you believe that

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02:33:27 2 the NSF might have documents commenting on the  
02:33:32 3 number of FOIA requests you had made?

02:33:37 4 ATTORNEY DaMARIO: Object to form.

02:33:42 5 A. I have no recollection.

02:33:44 6 Q. You made a very large number of  
02:33:46 7 FOIA requests; didn't you?

02:33:48 8 ATTORNEY DaMARIO: Object to form.

02:34:15 9 A. Based on my recollection, I made  
02:34:17 10 FOIA requests.

02:34:18 11 Q. How many? Oh, you made FOIA  
02:34:23 12 requests, but you don't recall how many you  
02:34:25 13 made?

02:34:30 14 A. I have no recollection.

02:34:34 15 Q. Who is, and I may mispronounce this  
02:34:38 16 name, so I apologize, Jutta Schubert,  
02:34:41 17 J-U-T-T-A?

02:34:47 18 A. My wife.

02:34:48 19 Q. And she made a number of FOIA  
02:34:49 20 requests on these topics as well; did she not?

02:34:59 21 ATTORNEY DaMARIO: I'm going to renew  
02:35:00 22 my scope objection.

02:35:01 23 ATTORNEY BROWN: This goes to  
02:35:02 24 credibility.

02:35:13 25 A. Can I hear the question again?

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02:35:16 2 Q. Jutta Schubert made a number of  
02:35:18 3 FOIA requests on these topics as well; did she  
02:35:21 4 not?

02:35:23 5 A. I'm sorry. I have no recollection.

02:35:27 6 Q. Would she have been making such  
02:35:30 7 FOIA requests on her own behalf or would they  
02:35:33 8 have been at your request?

02:35:36 9 ATTORNEY DaMARIO: Object to form.

02:35:43 10 A. I have no recollection.

02:35:44 11 Q. Why would your wife be making  
02:35:46 12 Freedom of Information Act requests regarding  
02:35:49 13 investigations into you?

02:35:53 14 ATTORNEY DaMARIO: Object to form.

02:36:10 15 A. I don't know.

02:36:11 16 Q. Was your wife involved with your  
02:36:12 17 work?

02:36:21 18 A. Can I hear the question again?

02:36:23 19 Q. Was she involved with your work?

02:36:41 20 A. I don't recall.

02:36:42 21 Q. She also made a number of requests  
02:36:44 22 on behalf of a company called the Troy  
02:36:45 23 Research Corporation. What is the Troy  
02:36:47 24 Research Corporation?

02:37:04 25 A. I believe it was a startup company.

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02:37:08 2 Q. What kind of startup company was  
02:37:10 3 it?

02:37:21 4 A. It was a startup company.

02:37:23 5 Q. What business were they in?

02:38:00 6 A. No, I do not recall that.

02:38:03 7 Q. Were they working in the  
02:38:05 8 light-emitting diode space?

02:38:13 9 A. Potentially, yes, but I do not  
02:38:15 10 recall.

02:38:15 11 Q. What was your wife's involvement  
02:38:16 12 with the Troy Research Corporation?

02:38:23 13 A. I do not recall.

02:38:25 14 Q. Did you have a son that worked in  
02:38:27 15 your lab?

02:38:42 16 A. My son graduated with a Ph.D. from  
02:38:44 17 RPI.

02:38:50 18 Q. What was your son's name?

02:38:53 19 A. His first name is Martin,  
02:38:56 20 M-A-R-T-I-N.

02:38:59 21 Q. And your son was the Chief  
02:39:01 22 Technology Officer for Troy Research  
02:39:05 23 Corporation; wasn't he?

02:39:10 24 A. I have no recollection. It may be  
02:39:14 25 possible. I have no recollection.

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02:39:17 2 Q. Do you know what happened to the  
02:39:17 3 Troy Research Corporation?

02:39:30 4 A. I have no recollection.

02:40:06 5 Q. So if you'd go to Page 20, there  
02:40:22 6 are more requests from the Troy Research  
02:40:28 7 Corporation, and in particular, I'm interested  
02:40:32 8 in Number 2011-510, although it looks like  
02:40:38 9 there may be a number of duplicate entities  
02:40:41 10 there with different numbers.

02:40:42 11 Do you see that?

02:40:44 12 A. You're asking about 2011510?

02:40:47 13 Q. Yes.

02:40:49 14 A. Yes, I see that number.

02:40:51 15 Q. And that was a request from Troy  
02:40:53 16 Research Corporation for information  
02:40:56 17 pertaining to NSF ERC Award Number 0812056,  
02:41:01 18 National Science Foundation Smart Lighting  
02:41:07 19 Engineering Research Center.

02:41:10 20 Do you have any understanding as to  
02:41:10 21 why the Troy Research Corporation would be  
02:41:15 22 requesting documents regarding the award for  
02:41:19 23 the Smart Lighting ERC?

02:41:30 24 A. I have no recollection.

02:41:32 25 Q. What were the circumstances that

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02:41:34 2 led to you no longer being the director of the  
02:41:38 3 Smart Lighting ERC?

02:41:41 4 ATTORNEY DaMARIO: Object to form.  
02:41:42 5 Asked and answered.

02:41:54 6 A. I have no recollection.

02:41:55 7 Q. You don't know why you were the  
02:41:57 8 director of the Smart Lighting ERC for less  
02:42:00 9 than two years?

02:42:04 10 ATTORNEY DaMARIO: Object to form.  
02:42:04 11 Asked and answered.

02:42:08 12 A. Can I hear the question again?

02:42:13 13 Q. So you don't know why you were the  
02:42:15 14 director of the Smart Lighting ERC for less  
02:42:17 15 than two years?

02:42:20 16 ATTORNEY DaMARIO: The same objection.

02:42:28 17 A. I believe I became director of the  
02:42:31 18 NSF Smart Lighting Engineering Research Center  
02:42:38 19 in 2008, and I ceased to be director of the  
02:42:49 20 center in 2009, but I do not recall the  
02:42:54 21 circumstances under which I became director  
02:42:59 22 and the circumstances under which I ceased to  
02:43:03 23 be the director.

02:43:05 24 Q. So you're not able to tell me  
02:43:06 25 anything at all about how or why you ceased to

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02:43:11 2 be the director of the ERC?

02:43:15 3 ATTORNEY DaMARIO: Object to form.

02:43:15 4 Asked and answered.

02:43:20 5 A. I can give you the date. It's in  
02:43:21 6 my CV.

02:43:23 7 Q. And the FOIA request we've just  
02:43:25 8 been discussing regarding allegations against  
02:43:27 9 you, you don't recall whether that had  
02:43:30 10 anything to do with your ceasing to be the  
02:43:33 11 director of the ERC?

02:43:36 12 ATTORNEY DaMARIO: Object to form.

02:43:36 13 Asked and answered.

02:43:48 14 A. I have no recollection.

02:43:49 15 Q. You can't tell me whether you were  
02:43:52 16 fired and if so, why you were fired?

02:43:55 17 ATTORNEY DaMARIO: The same objection.

02:44:11 18 A. You have two questions at the same  
02:44:13 19 time. So if you could ask one question at a  
02:44:16 20 time, I would appreciate it.

02:44:17 21 Q. So you can't tell me whether you  
02:44:18 22 were fired?

02:44:24 23 ATTORNEY DaMARIO: Objection. Asked  
02:44:24 24 and answered.

02:44:25 25 A. I was not fired.

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02:44:27 2 Q. Then why did you cease to be the  
02:44:31 3 director of the ERC?

02:44:32 4 ATTORNEY DaMARIO: Objection. Asked  
02:44:32 5 and answered.

02:44:36 6 Q. Did you request it?

02:44:42 7 A. Okay, you asked me two questions at  
02:44:44 8 the same time, and I would appreciate if you  
02:44:46 9 would ask me one question at a time.

02:44:53 10 Q. Why did you cease to be the  
02:44:55 11 director of the ERC?

02:44:58 12 ATTORNEY DaMARIO: Objection. Asked  
02:44:58 13 and answered.

02:45:22 14 A. I do not recall.

02:45:23 15 Q. But you recall that you were not  
02:45:24 16 fired?

02:45:28 17 ATTORNEY DaMARIO: The same objection.

02:45:30 18 A. I have never been fired.

02:45:36 19 Q. What's your basis for saying that  
02:45:38 20 if you don't recall why you ceased to be the  
02:45:41 21 director of the ERC?

02:45:46 22 A. Can I hear the question again?

02:45:50 23 Q. What is your basis for saying that  
02:45:52 24 if you don't recall why you ceased to be the  
02:45:55 25 director of the ERC?

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02:45:57 2 ATTORNEY DaMARIO: Object to form.

02:46:03 3 A. Why do I say that I have never been  
02:46:05 4 fired?

02:46:06 5 Q. Yes.

02:46:07 6 A. I have never been fired.

02:46:09 7 Q. But you don't recall --

02:46:10 8 A. Never.

02:46:12 9 Q. But you don't --

02:46:13 10 A. Never.

02:46:15 11 Q. But you don't recall why it is one  
02:46:17 12 day you were the director of the ERC and then  
02:46:19 13 the next day you were not?

02:46:23 14 ATTORNEY DaMARIO: Objection. Asked  
02:46:24 15 and answered.

02:46:36 16 A. This is a decision that the NSF  
02:46:38 17 makes.

02:46:40 18 Q. So it was a decision the NSF made,  
02:46:42 19 not one that you made or that Rensselaer made?

02:46:49 20 A. The National Science Foundation  
02:46:52 21 names the director.

02:46:57 22 Q. And so at a certain point, the NSF  
02:47:00 23 decided that you should no longer be the  
02:47:01 24 director and that somebody else should?

02:47:08 25 A. No.

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02:47:09 2 Q. Why is your answer "no"?

02:47:15 3 A. Because as I've said, I've never  
02:47:16 4 been fired.

02:47:22 5 Q. Do you know what -- do you know  
02:47:23 6 what question begging is? I'm -- I'm asking  
02:47:26 7 you --

02:47:29 8 - - -

02:47:29 9 (Clarification requested by the  
02:47:29 10 stenographer.)

02:47:29 11 - - -

02:47:29 12 ATTORNEY BROWN: Sorry, question  
02:47:29 13 begging.

02:47:30 14 Q. So I'm asking you why you say  
02:47:33 15 you've never been fired, and your answer is  
02:47:34 16 that you've never been fired; right?

02:47:36 17 A. That's correct.

02:47:38 18 Q. But you had a job as the director  
02:47:39 19 of the ERC and you lost that job; correct?

02:47:47 20 ATTORNEY DaMARIO: Object to form.  
02:47:47 21 Asked and answered.

02:47:48 22 A. No.

02:47:49 23 Q. How is that wrong?

02:47:51 24 A. I have been a professor at  
02:47:53 25 Rensselaer Polytechnic Institute since 2002.

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02:47:58 2 I've been a professor for 23 years. I've  
02:48:08 3 always held that job. I've never been fired  
02:48:14 4 from that job, and therefore, your suggestion  
02:48:25 5 that I lost my job is not correct.

02:48:31 6 If you look at my CV, you know,  
02:48:33 7 there is one current appointment, 2002 to  
02:48:37 8 present. That's my appointment, and that's my  
02:48:42 9 current appointment.

02:48:43 10 Now, you see, I had previous  
02:48:45 11 appointments, one, two, three, four, five,  
02:48:51 12 six, seven, eight, nine. I had nine previous  
02:48:58 13 appointments. These nine appointments have  
02:49:02 14 ended.

02:49:06 15 They have ended. There is  
02:49:08 16 nothing -- you know, there is not nine  
02:49:13 17 firings. I mean, you seem to imply if a job  
02:49:17 18 ends, you're being fired or something, but,  
02:49:20 19 you know, here is nine appointments. All of  
02:49:22 20 these nine appointments have terminated, but I  
02:49:25 21 have not been terminated -- I have not been  
02:49:27 22 fired from the ERC.

02:49:31 23 Q. But you said that it was a decision  
02:49:32 24 that the NSF made; right?

02:49:36 25 ATTORNEY DaMARIO: Object to form.

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02:49:36 2 Misstates prior testimony.

02:49:40 3 A. The NSF names the director of any  
02:49:48 4 center as far as I understand.

02:49:50 5 Q. And you don't understand why they  
02:49:51 6 named a different director when you were  
02:49:55 7 already director?

02:49:58 8 ATTORNEY DaMARIO: Objection. Asked  
02:49:58 9 and answered.

02:50:04 10 A. Can I hear the question again?

02:50:08 11 Q. And you don't understand why they  
02:50:09 12 named a different director when you were  
02:50:11 13 already the director?

02:50:13 14 A. To the extent that your question  
02:50:15 15 proposes that there have been two directors,  
02:50:20 16 that suggestion is wrong.

02:50:21 17 Q. I'll withdraw the question then.

02:50:23 18 You say that the NSF names  
02:50:25 19 directors; right?

02:50:26 20 A. Well, I think so, but my  
02:50:29 21 limitation -- my understanding of NSF  
02:50:34 22 procedures is not complete. So if you want to  
02:50:39 23 know what the NSF does, you needed to ask the  
02:50:42 24 NSF.

02:50:42 25 Q. How did you learn that you were no

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02:50:44 2 longer the director of the Smarting Lighting

02:50:47 3 ERC?

02:50:49 4 A. I have no recollection.

02:50:51 5 Q. You don't remember whether somebody  
02:50:52 6 from the NSF told you that?

02:50:57 7 ATTORNEY DaMARIO: Objection. Asked  
02:50:57 8 and answered.

02:51:07 9 A. I have no recollection, but I was  
02:51:08 10 not fired, sir.

02:51:26 11 Q. So did you learn anything from the  
02:51:28 12 documents you received in response to your  
02:51:30 13 FOIA requests?

02:51:33 14 A. I have no recollection, sir.

02:51:40 15 Q. Let me show you a document that's  
02:51:42 16 previously -- I'm sorry, that's been marked  
02:51:44 17 Exhibit 1041.

02:51:46 18 - - -

02:51:46 19 (Whereupon, public record from the  
20 National Science Foundation, Office of  
21 Inspector General, Office of Investigations,  
22 closeout number with Case Number I-09080045,  
23 is received and marked as Exhibit 1041 for  
24 Identification.)

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1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

02:51:46 2 BY ATTORNEY BROWN:

02:51:55 3 Q. And Exhibit 1041 is another public  
02:51:58 4 record from the National Science Foundation.  
02:52:01 5 This is from the Office of Inspector General,  
02:52:03 6 Office of Investigations. The closeout number  
02:52:08 7 with Case Number I-09080045.

02:52:15 8 Dr. Schubert, do you recognize  
02:52:18 9 Exhibit 1041?

02:52:22 10 A. I may have seen before, but I have  
02:52:24 11 no recollection.

02:52:26 12 Q. Why may you have seen it before?

02:52:40 13 A. I have no idea. I may have seen  
02:52:43 14 the document before. I may not have seen the  
02:52:46 15 document before. I mean, the fact that you've  
02:52:48 16 given me this document, maybe I've seen it  
02:52:51 17 before. Maybe I've not seen it before. I  
02:52:54 18 just don't know.

02:52:54 19 Q. It says at the top: This  
02:52:56 20 investigation was initiated from an allegation  
02:52:59 21 that a PI spent funds from an NSF award on  
02:53:03 22 activities not included in the original  
02:53:06 23 proposal and contrary to instructions received  
02:53:08 24 from the NSF.

02:53:09 25 Do you see that?

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02:53:12 2 A. Yes.

02:53:13 3 Q. And then the details of those  
02:53:15 4 allegations are in the paragraph below.

02:53:18 5 Do you see that?

02:53:58 6 A. Yeah, I see, I see the second  
02:54:01 7 paragraph, if that's the question.

02:54:03 8 Q. And then -- and that second  
02:54:06 9 paragraph describes certain allegations;  
02:54:07 10 correct?

02:54:16 11 ATTORNEY DaMARIO: Object to form.

02:54:19 12 A. Which allegation are you referring  
02:54:20 13 to?

02:54:21 14 Q. I just wanted to confirm that you  
02:54:22 15 understood that the second paragraph recites  
02:54:24 16 an allegation regarding misuse of funds. I  
02:54:29 17 can read it into the record if that would be  
02:54:31 18 helpful.

02:54:32 19 A. Sure. Go ahead.

02:54:34 20 Q. So the second paragraph of this  
02:54:36 21 closeout memorandum says: Our investigation,  
02:54:39 22 which included a review of financial records  
02:54:42 23 and an interview of the PI, revealed that  
02:54:45 24 following the completion of the activities set  
02:54:47 25 forth in the original proposal, the PI

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02:54:50 2 requested permission from NSF to spend  
02:54:53 3 remaining funds on other activities, but was  
02:54:56 4 directed to provide a proposed budget for such  
02:54:59 5 expenditures to NSF for consideration.

02:55:02 6 Rather than provide the proposed  
02:55:04 7 budget as directed, the PI obtained a grantee  
02:55:08 8 approved no cost extension and expended the  
02:55:10 9 remaining award funds without NSF permission.

02:55:14 10 NSF did not learn of these  
02:55:16 11 expenditures until the PI filed an annual  
02:55:19 12 report more than a year after the report was  
02:55:22 13 due to NSF. Our investigation also revealed  
02:55:25 14 that there were charges made to the award that  
02:55:28 15 were unallowable or not supported by  
02:55:30 16 sufficient documentation.

02:55:33 17 Did I read that all correctly?

02:55:40 18 A. I didn't follow it, so if you want  
02:55:41 19 me to follow it, I will follow it.

02:55:44 20 Q. I'll just go on to the next  
02:55:46 21 paragraph. In response to the investigation  
02:55:49 22 that was conducted, it says that the awarding  
02:55:55 23 institution returned \$19,736 of unallowable  
02:55:58 24 and unsupported charges.

02:56:00 25 Do you see that?

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02:56:06 2 A. Yes.

02:56:07 3 Q. And the institution made changes to  
02:56:10 4 their no cost extension policy.

02:56:12 5 Do you see that?

02:56:14 6 A. Yes.

02:56:14 7 Q. Do you know what a no cost  
02:56:16 8 extension policy is?

02:56:18 9 A. No.

02:56:19 10 Q. It says: The institution also  
02:56:21 11 removed the PI from his position as an  
02:56:24 12 academic center director.

02:56:27 13 Do you see that?

02:56:30 14 A. Yes.

02:56:31 15 Q. And they wrote to the PI  
02:56:32 16 admonishing him to adhere with applicable  
02:56:37 17 grant conditions and to promptly reply to  
02:56:40 18 requests of program officers.

02:56:41 19 Do you see that?

02:56:42 20 A. I do see that, yes.

02:56:43 21 Q. Are you the PI described in this  
02:56:44 22 document?

02:56:45 23 A. Certainly not. Certainly not. I  
02:56:48 24 have never been admonished by the National  
02:56:50 25 Science Foundation, and I have never been

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02:56:54 2 alleged by the National Science Foundation of  
02:56:55 3 any misconduct.

02:57:20 4 Q. Go back to the Freedom of  
02:57:20 5 Information Act log and to Entry 2011-173.  
02:57:32 6 And it's at the top of Page 7. And this is a  
02:57:52 7 request from you; is it not?

02:57:57 8 A. Which number are you talking about?

02:57:59 9 Q. 2011-173, the top of Page 7, the  
02:58:43 10 very first entry.

02:59:12 11 A. Yes, I'm there.

02:59:13 12 Q. And so if I read the request entry  
02:59:16 13 there it says: 2011, dash, 03, dash, 04,  
02:59:21 14 dash, EFS, dash, FOIA, dash, privacy, dash,  
02:59:27 15 documents, dash, disclosing, dash, avenue,  
02:59:32 16 dash, 4, dash, appeal, dash, PI, dash,  
02:59:38 17 removal. All documents that disclose any  
02:59:43 18 avenue for any appeal available for the PI  
02:59:46 19 under described circumstances.

02:59:49 20 Did I read that correctly?

02:59:51 21 A. Yes.

02:59:52 22 Q. Why would you be requesting all  
02:59:55 23 documents that disclose any avenue for any  
02:59:57 24 appeal available for the PI under described  
03:00:00 25 circumstances, which based on the tag, appears

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03:00:04 2 to be the PI was removed?

03:00:09 3 ATTORNEY DaMARIO: Object to form.

03:00:11 4 A. No recollection. Sorry.

03:00:14 5 Q. You don't remember that you were  
03:00:15 6 removed as the PI?

03:00:16 7 ATTORNEY DaMARIO: Object to form.

03:00:21 8 A. Can I hear the question again?

03:00:23 9 Q. You don't remember why you were  
03:00:24 10 removed as the PI?

03:00:26 11 ATTORNEY DaMARIO: The same objection.

03:00:32 12 A. What are you talking about? Are  
03:00:34 13 you talking about this PI here --

03:00:38 14 Q. No.

03:00:38 15 A. -- that you have on Exhibit --

03:00:44 16 Q. I'm asking about the entry that I  
03:00:46 17 directed you to.

03:00:59 18 A. I'm not that PI here on  
03:01:02 19 Exhibit 1041. I have never been admonished by  
03:01:06 20 the National Science Foundation.

03:01:08 21 Q. Please, could you look at  
03:01:09 22 Exhibit 1043, and the entry I just directed  
03:01:15 23 you to, 2011-173, that refers to avenues for  
03:01:21 24 appeal, PI removal; does it not?

03:01:30 25 ATTORNEY DaMARIO: Object to form.

1 E. FRED SCHUBERT, Ph.D., M.S. | 09.12.25

03:01:44 2 A. Yes.

03:01:47 3 Q. Why would you be asking the NSF for  
03:01:51 4 information regarding avenues for appeal when  
03:01:55 5 a PI is removed?

03:01:57 6 ATTORNEY DaMARIO: Object to form.  
03:01:57 7 Asked and answered.

03:02:01 8 A. I have no recollection.

03:02:04 9 Q. Dr. Schubert, you made scores at  
03:02:07 10 least of FOIA requests. Do you have any  
03:02:12 11 recollection regarding why you made those  
03:02:13 12 requests at all?

03:02:16 13 ATTORNEY DaMARIO: Object to form.  
03:02:17 14 Asked and answered.

03:02:36 15 A. I don't remember.

03:02:39 16 ATTORNEY BROWN: No further questions.

03:02:59 17 ATTORNEY DaMARIO: I don't have any  
03:02:59 18 redirect.

03:03:00 19 ATTORNEY BROWN: Then we're all set.

03:03:01 20 (Continued on next page for jurat.)

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03:03:02  
03:03:02

CERTIFIED STENOGRAPHER: Off the  
stenographic record at 3:03 p.m.

- - -

(Time noted: 3:03 p.m.)

- - -

\_\_\_\_\_  
E. FRED SCHUBERT, Ph.D., M.S.

Subscribed and sworn to before me  
this \_\_\_\_ day of \_\_\_\_\_ 2025.

\_\_\_\_\_  
Notary Public  
My Commission Expires:

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C E R T I F I C A T E

I, RICHARD GERMOSEN, Fellow of the  
Academy of Professional Reporters, stenographic New  
Jersey Certified Court Reporter, New Jersey Certified  
Realtime Court Reporter, California Certified  
Shorthand Reporter, California Certified Realtime  
Reporter, NCRA Registered Diplomate Reporter, and  
NCRA Certified Realtime Reporter, do hereby certify:

That E. FRED SCHUBERT, Ph.D., M.S., the  
witness whose deposition is hereinbefore set forth,  
having been duly sworn, and that such deposition is  
a true record of the testimony of said witness.

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

IN WITNESS WHEREOF, I have hereunto set  
my hand this 15th day of September 2025.



RICHARD GERMOSEN,  
FAPR, RDR, CRR, CCR-NJ, CRCR, CSR-CA, CCRR-CA,  
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