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2 UNITED STATES PATENT AND TRADEMARK OFFICE
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD
4

5 Case IPR2015-01277

6 U.S. Patent No. 8,309,943

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8 ASML NETHERLANDS B.V., EXCELITAS

9 TECHNOLOGIES CORP., AND QIOPTIQ

10 PHOTONICS GMBH & CO. KG,

11 Petitioners,

12 V.

13 ENERGETIQ TECHNOLOGY, INC.,

14 Patent Owner.

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18 VIDEOTAPED DEPOSITION OF J. GARY EDEN, Ph.D.

19 WilmerHale, LLP

20 60 State Street

21 Boston, Massachusetts

22
23 Reported by:

24 MARYJO O'CONNOR, RMR, CSR

25 JOB NO. 102208

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Wednesday, January 27, 2015
9:09 a.m.

VIDEOTAPED DEPOSITION of J. GARY EDEN, Ph.D., at the offices of WilmerHale, LLP 60 State Street, Boston, Massachusetts, before MaryJo O'Connor, a Registered Merit Reporter, Certified Shorthand Reporter and Notary Public in and for the Commonwealth of Massachusetts.

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Peter Crowley, Videographer

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J.G. Eden

PROCEEDINGS

VIDEO TECHNICIAN: This is the start of DVD labeled one of the videotaped deposition of Dr. J. Gary Eden, Ph.D. in the matter of ASML Netherlands B.V., et al, versus Energetiq Technology in the United States Patent and Trademark Office before the Patent and Trial Appeal Board, Action No. IPR2015-01277, U.S. Patent No. 8,309,943.

This deposition is being held at the offices of Wilmer Hale, 60 State Street, Boston, Massachusetts, on January 27, 2016, at 9:09 a.m..

My name is Peter Crowley. I'm the legal video specialist from TSG Reporting, Inc., headquartered at 747 Third Avenue, New York, New York. The court reporter is MaryJo O'Connor in association with TSG Reporting.

Will counsel please introduce yourself.

MR. GOLDENBERG: My name is Richard Goldenberg representing the petitioner ASML and the witness Dr. Eden.

With me here today are Kevin Prussia and Michael Smith, both also of Wilmer Hale.

1 J.G. Eden

2 portion of the light at a given wavelength is
3 transmitted by a given thickness of the material.
4 In other words, in the normal conventional sense.

5 Q. Dr. Eden, in the context of the '000
6 patent, what is your understanding of the word
7 "sustain"?

8 A. Can you tell me where you're looking,
9 Ms. Reed? Are you still in the '000 patent, or
10 are you looking at a particular occurrence of the
11 term?

12 Q. Dr. Eden, I'm still looking at
13 Claim 1.

14 A. Okay, thank you.

15 Q. You're welcome.

16 A. So the word "sustain" to me I
17 interpret as extending the life; maintaining the
18 plasma. So perhaps a synonym for "sustain" would
19 be to maintain the existence of.

20 Q. Is there a duration of time that the
21 plasma would need to be maintained to meet the
22 claim element "sustained" in your opinion?

23 A. Well, Ms. Reed, let me suggest this.
24 I don't have my declaration before me. You've
25 read, I presume my declaration. And all of the

1 J.G. Eden

2 issues that you're pursuing now are addressed in
3 my declaration. So it would be very helpful if I
4 were able to review my declaration.

5 Q. Dr. Eden, are you referring to the
6 '000 declaration or the -- because I believe you
7 have that one in front of you.

8 A. Oh, I do. That's true. Very good.
9 I do. I forgot that I had it. Thank you,
10 Ms. Reed.

11 Q. You're welcome.

12 A. So would you be so kind as to repeat
13 your question?

14 Q. Sure. Is there a duration of time
15 that the plasma would need to be maintained to
16 meet the claim element "sustained" in your
17 opinion?

18 A. Ms. Reed, the claim as it's written
19 is very vague. So that issue is left unresolved.

20 Q. Well, what's your understanding of
21 "maintain"?

22 A. Well, the broader -- let me mention
23 that the broader context of the language that
24 you're mentioning is it says "to maintain a
25 plasma."

1 J.G. Eden

2 So it's very difficult to answer your
3 question because the plasma can range over an
4 extraordinary degree in electron density, for
5 example. So I don't know how to answer your
6 question.

7 Q. If I direct your attention to
8 Exhibit 2 in the '000 patent Column 21.

9 A. Column 21?

10 Q. Lines 12 through 15. This reads,
11 "The laser source 704 then provides laser energy
12 to the ionized medium to sustain the plasma 732
13 which generates the high brightness light 736."

14 In that context of the '000 patent,
15 could you tell me how a person of ordinary skill
16 in the art would understand the phrase "sustain
17 the plasma"?

18 A. Well, to use a vernacular expression,
19 Ms. Reed, I would assume they would interpret it
20 as to keep it alive. In other words, that the
21 plasma would continue to exist.

22 Q. How long does "continue to exist"
23 mean?

24 A. Oh, that's a function of the plasma
25 itself and the electron lifetime.

1 J.G. Eden

2 Q. How long does "continue to exist"
3 mean in the context of the '000 patent?

4 A. I don't know because it's not clear,
5 Ms. Reed. It doesn't tell me under what
6 conditions. I cannot do a calculation based on
7 what is given here.

8 Q. Dr. Eden, directing your attention
9 back to Exhibit 2 of the '000 patent, Claim 1.
10 In the context of the '000 patent, can you tell
11 me what is meant by "plasma-generated light"?

12 A. Sure. I take that just to mean that
13 the radiation that is generated by the plasma.
14 The word "light" is used in a somewhat loose
15 sense, but it's explained to some extent by what
16 follows the word "light."

17 Q. Would you agree that plasma-generated
18 light in the '000 context would be brighter than
19 an arc lamp?

20 MR. GOLDENBERG: Objection, form.

21 A. I think that's a conclusion that I
22 can't confirm. Or that's an assertion I can't
23 confirm.

24 Q. Dr. Eden, if I could direct your
25 attention to Exhibit 1, your '000 declaration,

1 J.G. Eden
2 innovative?

3 MR. GOLDENBERG: Objection.

4 A. Well, you're making a qualitative
5 statement in connecting a number of things,
6 Ms. Reed. The passage that you just read from
7 this document indicates that the improvement is
8 the result of a combination of factors. And it's
9 impossible from this document to say just what
10 the source contributed to the improvement of
11 performance. And you're implying, but you're not
12 saying, that this improvement was due to one of
13 your client's lamps.

14 Q. Do you know if in the industry there
15 was a need for a brighter light?

16 A. I don't know that there was in the
17 industry, but I would assume that there is; that
18 improvements in all aspects of the optical system
19 are always welcome.

20 Q. And would you agree that ASML
21 identified the increase in the total amount of
22 light as one of the new aspects of their
23 metrology tool?

24 MR. GOLDENBERG: Objection.

25 A. Well, it's very difficult to tell

1 J.G. Eden

2 what ASML intended or how they view the
3 development. It is, in the short passage that
4 you've given me, a document I've never seen
5 before, it appears to be a positive development.

6 Q. Dr. Eden, in Exhibit 1, which is your
7 declaration regarding the '000 patent, you gave a
8 proposed construction for light, correct?

9 A. I believe that is correct. Are you
10 referring to a specific page, Ms. Reed?

11 Q. Yes. Dr. Eden, if I could direct
12 your attention to Paragraph 36. Doctor, are you
13 there? At Paragraph 36?

14 A. I am indeed.

15 Q. And you gave some ranges for the
16 meaning of light, correct?

17 A. I suggested some intervals, if you
18 will, that are -- in wavelength that are
19 associated with different spectral regions.

20 Q. Now, is this your own understanding
21 of the different spectral regions?

22 A. It is my understanding, but I, for
23 the purposes of this declaration, adopted the
24 definition given by Bill Silfvast.

25 Q. Dr. Eden, if I could hand you what's

1 J.G. Eden

2 going to be marked as Exhibit 5.

3 (Eden Exhibit 5, Document entitled
4 "Optical Engineering" December 2003, Volume 42
5 Number 12 ISSN 0091-3286, marked for
6 identification)

7 Q. Dr. Eden, do you recognize this
8 document?

9 A. I certainly do.

10 Q. Could you tell me what it is?

11 A. Well, it's the -- a copy of the cover
12 of the December 2003 issue of Optical
13 Engineering. It's the first page, front and
14 back. And then you have supplied a copy of an
15 article that I and my colleagues wrote that
16 appeared in that same issue, December of 2003.

17 Q. If I could direct your attention to
18 that, it says 3612 at the bottom, the first page
19 with your name as the author and your colleague's
20 name as the author in the abstract.

21 In there in the abstract you write,
22 "A near-infrared 1.315"; is that correct?

23 A. That's what it says. That's correct.

24 Q. So in your opinion would
25 near-infrared include -- strike that.

1 J.G. Eden

2 In your opinion would near-infrared
3 be above 1,000?

4 A. Yes. I think it's been a long time
5 ago, but my recollection is that the definition
6 that's offered there is slightly longer than the
7 limit that I'm proposing in the '000 declaration.

8 Q. So, Dr. Eden, in your opinion
9 near-infrared could be above 1,000; is that
10 correct?

11 A. The more common understanding of the
12 limits of the near-infrared, or any other
13 spectral region, I think are represented in my
14 statement in the '000 declaration.

15 Q. But we can agree that you have
16 authored a paper where near-infrared was above
17 1,000, correct?

18 A. That's correct. It's a little bit
19 beyond the limit that I'm proposing in the '000.
20 But I have to say that in my courses and work for
21 at least the last 20 years, I've told my students
22 that the infrared, by general agreement in the
23 community, ends at about 1,000 nanometers.

24 Q. Thank you, Dr. Eden.

25 MS. REED: Let me mark what's going

1 J.G. Eden
 2 ultraviolet, you proposed a range of 200
 3 nanometers to 400 nanometers; is that correct?
 4 MR. GOLDENBERG: Objection, form,
 5 foundation.
 6 A. That is correct. That is the
 7 commonly-accepted boundaries of the ultraviolet.
 8 Q. If I could direct your attention to
 9 Exhibit 2, the '000 patent, Column 20, Lines 32
 10 to 35 this reads as "Ultraviolet light is
 11 electromagnet energy with a wavelength shorter
 12 than that of visible light, for instance between
 13 about 50 and 400 nanometers."
 14 Did I read that correctly?
 15 A. You did.
 16 Q. So in your opinion would a person of
 17 ordinary skill in the art reading this passage of
 18 the '000 patent think that ultraviolet light was
 19 lower than your 200 to 400 range?
 20 A. Someone who is skilled in the art
 21 knows where the boundaries of the various
 22 spectral regions are, Ms. Reed. And they would
 23 probably assume, as I did, that the author was
 24 referring to the ultraviolet writ large, that the
 25 ultraviolet consists of the region between 200 to

1 J.G. Eden
 2 400 nanometers, which is the normal range for
 3 ultraviolet light, but that at lower wavelengths
 4 is the vacuum ultraviolet, and below that is the
 5 extreme ultraviolet.
 6 Q. Thank you, Dr. Eden. I think now is
 7 a good time to break.
 8 VIDEO TECHNICIAN: The time is now
 9 12:09 p.m.. This concludes DVD number two of
 10 today's deposition. We are off the record.
 11 (Proceedings recessed at 12:09 p.m.
 12 for the luncheon recess.)
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1 J.G. Eden
 2 A F T E R N O O N S E S S I O N
 3 VIDEO TECHNICIAN: The time is now
 4 1:07 p.m.. This begins DVD number three of
 5 today's deposition. We are back on the record.
 6 By MS. REED:
 7 Q. Dr. Eden, did you discuss any of your
 8 testimony this morning with counsel during break?
 9 A. No.
 10 Q. Dr. Eden, would you agree that
 11 Gärtner discloses a light source?
 12 A. Yes, he does.
 13 Q. And do you agree that Mourou
 14 discloses a light source?
 15 A. Yes.
 16 Q. And would you agree that Kensuke
 17 Murai discloses a light source?
 18 A. I don't remember Kensuke in detail;
 19 but my recollection is, yes, Kensuke also
 20 describes a light source.
 21 Q. Dr. Eden, do you agree that a person
 22 of ordinary skill in the art would have known
 23 that sufficient absorption of the laser radiation
 24 by the plasma is needed to sustain the plasma,
 25 correct?

1 J.G. Eden
 2 MR. GOLDENBERG: Objection.
 3 A. Are you referring to a particular
 4 part of one of my declarations, Ms. Reed?
 5 Q. No. I'm just asking you a question,
 6 Dr. Eden.
 7 A. Okay. Could you repeat the question?
 8 Q. Sure. Do you agree that a person of
 9 ordinary skill in the art would have known that
 10 sufficient absorption of the laser radiation by
 11 the plasma is needed to sustain the plasma?
 12 MR. GOLDENBERG: Objection, form.
 13 A. That's a very vague question,
 14 Ms. Reed. Can you make it a bit more
 15 quantitative?
 16 Q. Would a person of ordinary skill in
 17 the art known that the plasma needed to absorb
 18 the laser energy?
 19 MR. GOLDENBERG: Objection, form.
 20 A. For the type of -- I presume you're
 21 talking to the type of light source that is
 22 described in the patents at issue as well as, for
 23 example, Gärtner that involves a laser-produced
 24 plasma. One of the critical aspects of it is
 25 that the plasma absorbs the laser light, that is

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