

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

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SAMSUNG ELECTRONICS CO., LTD.;	)	Case No.: PGR2024-00030
	)	U.S. Patent No. 11,868,178
	)	and
Petitioner	)	Case No.: PGR2024-00039
	)	U.S. Patent No. 11,874,702
v.	)	
	)	
OURARING, INC.,	)	
	)	
Patent Owner.	)	
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CONTAINS CONFIDENTIAL PORTIONS

PURSUANT TO PROTECTIVE ORDER

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VOLUME I

REMOTE VIDEO DEPOSITION OF

PATRICK P. MERCIER, Ph.D.

TUESDAY, JUNE 24, 2025

8:17 A.M. PDT

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Reported by: JULIE RUMSEY, CSR 14144

Job No. 114243

Page 2 1 UNITED STATES PATENT AND TRADEMARK OFFICE 2 BEFORE THE PATENT TRIAL AND APPEAL BOARD 3 ---000--- 4 SAMSUNG ELECTRONICS CO., LTD.;) Case No.: PGR2024-00030 5) U.S. Patent No. 11,868,178 6) and 7 Petitioner) Case No.: PGR2024-00039 8) U.S. Patent No. 11,874,702 9 v.) 10) 11 OURARING, INC.,) 12) 13) 14 Patent Owner.) 15 _____) 16 17 REMOTE VIDEO DEPOSITION OF Patrick P. Mercier, 18 Ph.D., located in San Diego, California, commencing at 8:17 19 A.M. PDT on Tuesday, June 24, 2025, before JULIE RUMSEY, 20 Certified Shorthand Reporter 14144, in and for the State of 21 California. 22 23 24 25	Page 4 1 INDEX 2 ---000--- 3 EXAMINATION 4 5 BY ATTORNEY HABER 6 CONFIDENTIAL PORTION - PURSUANT TO PROTECTIVE ORDER 7 (Portions of the transcript are confidential: 8 Page 54, Line 2, to Page 74, Line 3.) 9 10 ---000--- 11 EXHIBITS 12 EXHIBIT DESCRIPTION PAGE 13 Exhibit 1005 Niwa et al. 14 Pub. No.: U.S. 2012/0016245 A1 15 Bates Petitioner Samsung Ex-1005, 0001 16 through Petitioner Samsung Ex-1005, 0048 125 17 48 Pages 18 Exhibit 1006 Yuen et al. 19 U.S. 8,954,135 B2 20 Bates Petitioner Samsung Ex-1006, 0001 21 through Petitioner Samsung Ex-1006, 0053 159 22 53 Pages 23 Exhibit 1007 Schroder 24 U.S. 10,303,867 B2 25 Bates Petitioner Samsung Ex-1007, 0001 through Petitioner Samsung Ex-1007, 0022 74 22 Pages Exhibit 1010 Mestas Pub. No.: U.S. 2014/0244009 A1 Bates Petitioner Samsung Ex-1010, 0001 through Petitioner Samsung Ex-1010, 0216 125 216 Pages 24 25 /////
Page 3 1 APPEARANCES VIA ZOOM: 2 3 FOR THE PETITIONER: 4 OMELVENY & MYERS LLP 5 BY: BENJAMIN HABER, ESQ. 6 RENIA ZERVOS, ESQ. 7 SHANE SCOTT 8 400 SOUTH HOPE ST., 19TH FL. 9 LOS ANGELES, CA 90071 10 (213) 430-6000 11 bhaber@omm.com 12 13 FOR THE PATENT OWNER: 14 MAYER BROWN LLP 15 BY: ROBERT G. PLUTA, ESQ. 16 DANIEL KIM, ESQ. 17 NICHOLAS H. CIULLA, ESQ. 18 71 S. WACKER DR. 19 CHICAGO, IL 60606 20 (312) 782-0600 21 RPluta@mayerbrown.com 22 DKim@mayerbrown.com 23 NCiulla@mayerbrown.com 24 25 MAYER BROWN LLP BY: JASJIT S. VIDWAN, ESQ. 1999 K ST., N.W. WASHINGTON, D.C. 20006-1101 (202) 263-3065 JVidwan@mayerbrown.com LEGAL VIDEOGRAPHER: A.M. SESSION: JOHN DUSENBERY P.M. SESSION: DANIEL LONG ---000---	Page 5 1 EXHIBITS CONTINUED 2 EXHIBIT DESCRIPTION PAGE 3 Exhibit 2018 U.S. Patent No. 11,868,178 4 Declaration of Dr. Patrick Mercier 5 Bates Patent Owner Oura Ex. 2018, 0001 6 through Patent Owner Oura Ex. 2018, 0175 12 7 175 Pages 8 * Exhibit 2034 CONFIDENTIAL 9 Oura Gen1 Structure 10 Bates Patent Owner Oura Ex. 2034, 0001 11 through Patent Owner Oura Ex. 2034, 0007 54 12 7 Pages 13 14 * (Exhibit 2034 marked Confidential) 15 16 17 18 19 20 21 22 23 24 25 ---000---

Page 6 1 TUESDAY, JUNE 24, 2025, 8:17 A.M. PDT 2 ---000--- 3 THE VIDEOGRAPHER: Good morning. This -- we are 4 on the record. This begins the recorded deposition of 5 Patrick Mercier, testifying in the matter of Samsung 6 Electronics Company, et al., versus the Oura Ring -- Oura 7 Ring, Inc. et al., case numbers, PGR2024-00039 and 00030. 8 This deposition is taking place via Zoom videoconferencing. 9 The deposition -- today's date is June 24th, 2025. The 10 time is -- the time is approximately 8:17 a.m. Pacific 11 time. 12 The California certified shorthand reporter today 13 is Julie Rumsey. My name is John Dusenbery. I'm the 14 videographer on behalf of First Legal Depositions, located 15 in Los Angeles, California. The deposition is being 16 recorded at all times unless all counsel agree to go on or 17 off the record. All counsel have given their appearances 18 to the court reporter. 19 The court reporter will now swear in the witness. 20 CERTIFIED STENOGRAPHER: Good morning. My name is 21 Julie Rumsey, California Certified Shorthand Reporter 22 Number 14144. The stenographic record is the official 23 record pursuant to C.C.P. 2025. 24 ///// 25 /////	Page 8 1 of objection, you are to answer the questions that are 2 posed to you to the best of your ability. 3 Do you understand? 4 A. I do. 5 Q. And we have a court reporter on the line that's 6 going to be transcribing our discussions, so I'm going to 7 ask you to wait for me to finish asking my question so the 8 court reporter can write it down before you start your 9 answer. Similarly, I will wait for you to finish your 10 answer before moving on. 11 Is that fair? 12 A. Sounds fair. 13 Q. And, again, it's important to give verbal answers 14 rather than nods or gestures so the court reporter can take 15 it down. 16 Do you understand? 17 A. Understood. 18 Q. And you have been sworn in, and you are to testify 19 truthfully and accurately to the best of your ability today 20 as if you were in a court of law. 21 Do you understand that? 22 A. I do. 23 Q. Is there any reason why you can't give your best, 24 most truthful and accurate testimony today? 25 A. No.
Page 7 1 ---000--- 2 PATRICK P. MERCIER, Ph.D., 3 called as a witness herein, having been 4 administered an oath remotely in accordance with C.C.P. 5 Section 2096, was examined and testified as follows: 6 ---000--- 7 EXAMINATION 8 BY ATTORNEY HABER: 9 Q. Good morning. Can you please state your full name 10 for the record. 11 A. Patrick Mercier. 12 Q. And Dr. Mercier; is that correct? 13 A. That's right. 14 Q. Have you been deposed before, Dr. Mercier? 15 A. I have. 16 Q. How many times would you say you've been deposed 17 before? 18 A. Three times. 19 Q. All right. So I'm going to go over a few quick 20 ground rules. So I'm going to ask you a series of 21 questions today. You are to answer the questions unless 22 specifically instructed not to answer by your counsel. 23 Do you understand? 24 A. I do. 25 Q. Counsel may object from time to time. Regardless	Page 9 1 Q. You're not under the influence of any medications 2 or drugs that would impair your ability to testify 3 truthfully and accurately? 4 A. No. 5 Q. All right. Do you have with you any papers or 6 documents in the room today? 7 A. I do. 8 Q. Can you tell me what you have with you today? 9 A. I have printouts of my expert declarations as well 10 as the prior art references that I referred to. All are 11 unmarked. 12 Q. Okay. So they don't have any notes or annotations 13 or other things; they are documents as they were submitted 14 previously? 15 A. That's correct. 16 Q. Okay. So I also have copies of the documents. I 17 imagine counsel has copies of the documents as well. I'm 18 going to be asking you questions about, largely, the 19 documents that you have printed in front of you. You can 20 feel free to refer to the documents that are in front of 21 you. If it would be easier for you, I can throw them up on 22 the screen and we talk through them. But if you do refer 23 to anything, I'll ask you to just let me know what it is 24 you're referring to so that -- so that I can follow along. 25 A. Okay.

Page 10 1 Q. And I think -- so this is a remote deposition. So 2 I am not in the room with you. You are in a conference 3 room in San Diego; is that correct? 4 A. That's correct. 5 Q. Is this a conference room of counsel for Oura in 6 this case? 7 A. I'm not sure what you mean. 8 Q. Fair. The -- let me ask you a different question. 9 Is counsel for Oura in the room with you today? 10 A. Yes. 11 Q. Can you identify for the record who is in the room 12 with you? 13 A. Yes. It's Robert, Jas, and Nicholas. 14 Q. And are Robert, Jas, and Nicholas attorneys that 15 you've worked with on this case? 16 A. Yes. 17 Q. Did you prepare for your deposition today? 18 A. I did. 19 Q. Can you tell me what you did to prepare for your 20 deposition today? 21 A. Yes. I reviewed my expert declarations, some of 22 the prior art references, and I had meetings with counsel 23 to discuss. 24 Q. How long would you say you prepared for your 25 deposition today?	Page 12 1 interests. 2 Q. Were these discussions that you requested, or were 3 these discussions that were prompted by counsel? 4 A. Counsel provided the -- or provided the 5 opportunity, and I requested that we go forward with it. 6 ATTORNEY HABER: I want to start with a document, 7 and you can tell me if you have it in front of you. I want 8 to start with a document, which has been previously marked 9 as Exhibit 2018, in PGR 2024-000030, that's regarding 10 U.S. patent number 11,868,178. 11 (Exhibit 2018, previously marked, was 12 presented.) 13 THE WITNESS: Could you -- could I request that 14 you put it into the electronic record so I could see it on 15 my computer? 16 ATTORNEY HABER: Let me drop it into the chat. 17 You'll be able so -- see how this works. Hold on one 18 minute. 19 All right. So I'm dropping it into the chat. 20 I'll also share it on the screen. Host has disabled 21 participant screen sharing. The technician is still there. 22 Can you authorize screen sharing? 23 THE VIDEOGRAPHER: Yes. Let me make the setting 24 change. That's their default. Sorry. 25 ATTORNEY HABER: Yeah. No problem.
Page 11 1 A. We had two days of meetings plus some amount of 2 review time on my own. 3 Q. In preparation for your deposition today, did you 4 meet with anyone other than counsel for Oura? 5 A. I did not -- oh, I'm sorry. I did meet with an 6 Oura engineer. 7 Q. What is the name of that engineer? 8 A. I don't recall the name off the top of my head. 9 Q. How long would you say you met with the Oura 10 engineer? 11 A. Approximately 30 minutes. 12 Q. What did you discuss with the Oura engineer? 13 A. I discussed with the Oura engineer the 14 generation 1 ring that Oura developed, including asking 15 some questions about the battery. I was provided some 16 pictures about the generation 1 device in various states of 17 disassembly. And then we discussed a little bit of the 18 history of the design modifications going through 19 generations 2, 3, and 4. 20 Q. Was this information that was previously included 21 in your expert report, or was this new information to you? 22 A. The discussions happened after the submission of 23 my expert declaration. It doesn't change any of the 24 opinions that I have in the report. It was, you know, 25 partly for intellectual curiosity and -- yeah, for my own	Page 13 1 THE VIDEOGRAPHER: Try it now. 2 BY ATTORNEY HABER: 3 Q. All right. Can you see on the screen a 4 declaration of Dr. Patrick Mercier? 5 A. Yes, I can. 6 Q. Okay. 7 A. And I have that document in front of me in case I 8 would like to refer to it in the paper version. 9 Q. Okay. Get my screen lock. Supposed to be. Okay. 10 So can you tell me, generally, the process that 11 you followed in writing this declaration? 12 A. Certainly. So I obviously reviewed the patents, 13 the prior art, the declaration by Dr. Anthony. I, you 14 know, read these documents and began forming my opinions. 15 I had many meetings with counsel to discuss these opinions 16 back and forth, drafting collaboratively, ultimately, to 17 come up with this document. 18 Q. Did you write all of the opinions that are 19 reflected in this declaration? 20 A. All of the opinions are my own, yes. 21 Q. How long would you say you spent preparing this 22 declaration? 23 A. I'd have to go back at the logs and look. I would 24 estimate less than 100 hours. 25 Q. And the declaration that I'm beginning with today

Page 14 1 is directed to U.S. patent number 11,868,178. 2 Do you see that? 3 A. I do. 4 Q. If I refer to this as the '178 patent, will you 5 understand what I'm referring to? 6 A. I will. 7 Q. Do you have a copy of the '178 patent there with 8 you? 9 A. I do. Yes. 10 Q. I have a copy as well. I'll just throw it into 11 the chat for everyone's benefit. 12 A. I didn't see my declaration put into the chat, by 13 the way, either. 14 Q. You didn't see it in there? Oh, think I might 15 have just sent it to the court reporter. I apologize. Let 16 me do it again. 17 Declaration should be coming through, and I will 18 also put in the '178 patent. Do you see those documents 19 come through the chat now? 20 A. Yes. 21 Q. Okay. And can you see on the screen U.S. 22 patent 11,868,178? 23 A. I can. 24 Q. Okay. And, again, feel free to refer to the paper 25 copy if that would be easier for you.	Page 16 1 before the '178 patent, right? 2 A. I would agree with that. However, not of the size 3 that it needed to be go -- needed to go into such a small 4 form ring factor. 5 Q. So if you had to describe the innovation of 6 the '178 patent, how would you describe that? 7 ATTORNEY PLUTA: Object to form. 8 THE WITNESS: So the '178 patent is a -- 9 ATTORNEY PLUTA: Object to the form. 10 (Clarification by the certified stenographer.) 11 ATTORNEY PLUTA: Yeah. Sorry. I got -- I'll go 12 louder. 13 THE WITNESS: Okay. So the '178 patent is a very 14 extensive patent detailing a number of interesting subject 15 matter as it relates to the design of smart rings or 16 wearable computing devices in ring form factors. And it 17 includes innovations in engineering, in packaging, in 18 manufacturing, in electronics assembly, and the entire 19 ecosystem for operating a smart ring device, amongst other 20 things. 21 BY ATTORNEY HABER: 22 Q. Does the '178 patent describe details of 23 manufacturing a curved battery for use in a ring wearable 24 device? 25 A. I would say the '178 patent discusses how to use a
Page 15 1 Did you review the '178 patent in forming the 2 opinions that are reflected in your declaration in this 3 case? 4 A. I did. 5 Q. And you reviewed all parts of the patents, the 6 figures, the specification, the claims; is that right? 7 A. That's right. 8 Q. Were there any parts of the patent that you didn't 9 understand? 10 A. No. 11 Q. Would you agree with me that the inventor of 12 the '178 patent did not invent a ring form factor for 13 wearable devices? 14 A. I would agree with that. 15 Q. Would you agree with me that the inventor of 16 the '178 patent did not invent batteries for use in 17 wearable ring devices? 18 A. Yes. 19 Q. Would you agree with me that the inventor of 20 the '178 patent did not invent curved batteries? 21 A. Yes. 22 Q. And would you agree that the inventor of the '178 23 patent did not invent biometric sensors for use on rings? 24 A. Yes. 25 Q. You would agree that curved batteries were known	Page 17 1 curved battery in a ring device, including how to 2 manufacture said ring device with a curved battery. 3 Q. My question was a little bit more specific. Does 4 the '178 patent describe how to manufacture a curved 5 battery for use in a ring wearable device? 6 A. The '178 patent, to the best of my recollection, 7 does not describe manufacturing of batteries. 8 Q. Does the '178 patent describe how to reduce the 9 size of a curved battery for use in a ring wearable device? 10 A. I'm sorry. Could you repeat the question, please? 11 Q. Sure. 12 Does the '178 patent describe how to reduce the 13 size of a curved battery for use in a ring wearable device? 14 A. Well, the '178 patent describes how to kind of 15 design and manufacture a ring wearable device, including 16 placement and integration of curved batteries. So from 17 that perspective, it does describe how to use a curved 18 battery in such a device. 19 Q. All right. Again, that's not exactly my question. 20 The question is regarding manufacture. Does the '178 21 patent describe anything about how to reduce the size of a 22 curved battery for use in a ring wearable device? 23 A. Reduce the size relative to what? 24 Q. So I asked you earlier if curved batteries were 25 known for the '178 patent. Do you recall that?

Page 18 1 A. Yes. 2 Q. And you said that they were, but they were not of 3 sufficient size to be used in a ring wearable device. Do 4 you recall that? 5 A. That's right. 6 Q. And so the question that I'm asking you is 7 relative to the curved batteries that were known at the 8 time the '178 patent. Does the '178 patent teach anything 9 about reducing the size of a curved battery for use in a 10 ring wearable device? 11 A. And, again, I'll say that the '178 patent does 12 describe, you know, manufacturing of smart rings and 13 integration techniques of things like curved batteries and 14 so on. As it relates to, you know, manufacturing efforts 15 specifically on how to reduce the size of a curved battery, 16 no. 17 Q. So if a person of skill in the art at the time had 18 the '178 patent in front of them and they had a curved 19 battery that was too large to fit into a ring wearable 20 device, the '178 patent doesn't describe any details of how 21 you would manufacture a reduced-sized curved battery, 22 correct? 23 ATTORNEY PLUTA: Object to form. 24 THE WITNESS: Did you catch that, Julie? Just the 25 audio track. Do you have --	Page 20 1 need to disclose the details related to the size reduction 2 for a curved battery to fit into a ring wearable device 3 because that level of engineering effort would have been 4 within the level of ordinary skill in the art as defined by 5 a POSITA in your declaration? 6 ATTORNEY PLUTA: Object to form. Relevance. 7 THE WITNESS: So let me just read the definition 8 of a POSITA that I have in the report. And this definition 9 actually comes from Dr. Anthony's report where he says a 10 POSITA would have at least a four-year degree in electrical 11 engineering, mechanical engineering, biomedical 12 engineering, optical engineering, or a related field of 13 study, or equivalent experience, and at least two years' 14 experience in academia or industry studying or developing 15 physiological monitoring devices, such as noninvasive 16 biosensors. A POSITA would have also been familiar with, 17 for example, sensor system design and signal processing. 18 So just to be clear, you know, I consider myself 19 to, you know, meet and exceed this definition of a POSITA 20 now, today, as well as with at the time in- -- of invention 21 or the earliest priority date of the '178 patent. 22 And, furthermore, as a professor, I work with 23 graduate students who are, you know, just meeting this 24 definition or exceeding this definition of a POSITA. And 25 so I feel I'm very well equipped to personally and through
Page 19 1 CERTIFIED STENOGRAPHER: (Nods head.) 2 THE WITNESS: Yeah. Okay. Thank you. 3 So, again, the '178 patent describes a lot of 4 interesting and innovative design, manufacturing, assembly 5 techniques, and so on as it relates to the design of smart 6 ring devices. 7 As it relates to, you know, manufacturing 8 specifically of curved batteries, you know, it doesn't 9 provide specific details on how to do size reduction. 10 BY ATTORNEY HABER: 11 Q. Okay. Is it your opinion that the '178 patent 12 does not need to disclose those details because size 13 reduction of a curved battery would have been within the 14 level of ordinary skill in the art? 15 A. What level of ordinary skill in the art are you 16 referring to? 17 Q. So if you have your declaration in front of you, 18 paragraph 26 sets forth a level of skill in the art for 19 a -- it sets forth the definition of a POSITA, which is a 20 person of ordinary skill in the art, and there is a 21 paragraph that continues on to the top of page 11 of your 22 declaration. And so that is the level of skill in the art 23 that I'm referring to. 24 And so maybe I can just ask you the question 25 again. Is it your opinion that the '178 patent does not	Page 21 1 the lens of my students understand their relative level of 2 experience and can view things, you know, from their 3 perspective or from my perspective at the time when I just 4 acquired these POSITA-level skills. 5 And I can say that someone, you know, studying 6 electrical engineering or mechanical or biomedical 7 engineering who is focusing on physiologic monitoring 8 devices would not have the capabilities to go ahead and 9 miniaturize and manufacture a smaller curved battery. 10 BY ATTORNEY HABER: 11 Q. In your opinion, a POSITA, as defined in your 12 declaration, faced with the problem of minimizing the size 13 of a curved battery for use in a ring wearable device would 14 not have understood how to, for example, acquire such a 15 device from manufacturers that were producing them; is that 16 your testimony? 17 ATTORNEY PLUTA: Object to form. 18 THE WITNESS: That's not my testimony, because 19 curved batteries of the size needed to go into a wearable 20 ring device, to my knowledge, did not exist as of the 21 priority date of this patent, and so it wasn't possible to 22 just go to a battery vendor and acquire an appropriately 23 sized curved battery. 24 BY ATTORNEY HABER: 25 Q. And the POSITA, with the '178 patent in hand and

Page 22 1 all of the instructions provided in the '178 patent, would 2 not have been able to provide those instructions to another 3 to reduce the size of a large curved battery to a smaller 4 one; is that correct? 5 A. So I -- I think the question you're asking me is a 6 little different than the opinions that I've offered in my 7 report. When I'm offering my opinions in the report, I'm 8 looking at the state-of-the-art landscape in view of a 9 POSITA at the time of invention in terms of, you know, what 10 was available to that POSITA in order to, you know, for 11 example, combine prior art references to make a case of 12 whether or not the '178 patent was obvious or not. 13 And it's my opinion that a POSITA, according to 14 the definition given by Dr. Anthony, in light of the prior 15 art references, focused on noninvasive biosensors would not 16 have the skills to miniaturize existing curved batteries 17 into the form factor necessary to operate a small 18 finger-worn ring. 19 Q. In your opinion, what skills would be necessary to 20 do that battery miniaturization? 21 A. That's going a little outside of what I analyzed 22 for my report. So I think, to answer that question, I'd 23 have to do some more analysis. 24 Q. So, sitting here today, you haven't considered 25 what sort of skills would be necessary to miniaturize a	Page 24 1 details regarding the battery, correct? 2 A. That's correct. I think it would be difficult to 3 provide precise manufacturing directions for every single 4 component that goes into the -- into the ring. So I didn't 5 find that objectionable as a POSITA reading this. 6 Q. Okay. At line -- column 15, line 12, '178 patent 7 states (as read): 8 The battery can be any type of battery, such 9 as a rechargeable battery. 10 Do you see that? 11 A. I do. 12 Q. Does the '178 patent require the use of a curved 13 battery? 14 A. While I can answer by saying certainly the '178 15 patent has quite a bit of discussion about curved batteries 16 in the specification, in the written text and the figures, 17 as well as in claim 12, it does directly discuss the 18 battery as a curved battery. 19 Q. Line 12 on the screen recites a curved battery. 20 A. That's right. 21 Q. And claim 1 does not recite a curved battery, 22 correct? 23 A. Claim 1 describes -- and it might be best to just 24 read this into the record. (As read): 25 A battery positioned within a cavity formed
Page 23 1 larger curved battery to a smaller ring form factor; is 2 that correct? 3 ATTORNEY PLUTA: Object to form. 4 THE WITNESS: Yeah. I mean, I wasn't asked to do 5 that analysis. I didn't feel the need to do the analysis. 6 I felt the need to opine on whether or not a POSITA, given 7 the definition that we're using here, could have done so, 8 and my opinion is they could not have done so, given the 9 prior art and the level of ordinary skill that we've 10 defined. 11 BY ATTORNEY HABER: 12 Q. All right. So just to confirm, sitting here 13 today, you don't have an opinion one way or the other on 14 the types of efforts that would be necessary to reduce a 15 larger-sized curved battery to a smaller ring form factor; 16 is that fair? 17 A. That's correct. 18 Q. I want to, if -- we're still in the '178 patent. 19 If you have that in front of you, I want to direct you to 20 column 15, around line 12. Just let me know when you're 21 there. I'll bring it up on the screen as well. 22 A. Okay. 23 Q. So you would agree, I think -- strike that. 24 So previously, I think you agreed that the '178 25 patent does not provide substantial technical manufacturing	Page 25 1 between the internal housing component and the 2 external housing component wherein the battery 3 comprises a shape and size configured to fit 4 within the cavity between the outer 5 circumferential surface of the external housing 6 component and the inner circumferential surface of 7 the internal housing component wherein the battery 8 extends through at least a first portion of the 9 cavity of the finger-worn wearable ring device. 10 So the '178 patent in claim 1 is describing the 11 battery that's, you know, fitting in between the external 12 and internal housing components. And a POSITA reading 13 this, in light of, you know, what's presented in the 14 specification vis-a-vis, you know, the size constraints, 15 the known power requirements of the various components that 16 are described in the body or the specification of the '178 17 patent as well as in the claims, would understand that a 18 curved battery would be a preferable embodiment. And then, 19 again, it's explicitly mentioned in claim 12. 20 Q. So you said a curved battery would be preferable. 21 But a curved battery isn't required, right? 22 A. Again, in claim 1, they describe -- the '178 23 patent describes, you know, the mechanical design of the 24 ring-based device, and a POSITA reading claim 1 in light of 25 the specification with understanding of, you know, the

Page 26 1 various components that would need to go into the system 2 would understand that -- you know, and it's explicitly 3 stated throughout the specification -- that a curved 4 battery would be advantageous. A strict reading of claim 1 5 doesn't require a curved battery. But, again, in light of 6 the specification and a POSITA's knowledge, it's a very 7 good choice someone would want to do that. 8 Q. Okay. Well, so let me just break that down a 9 little bit. 10 You would agree that claim 1, strictly speaking, 11 does not require a curved battery, right? 12 A. Again, the answer isn't quite a simple yes-or-no 13 question because, you know, the claims need to be read in 14 light of the specification. And the specification, you 15 know, repeatedly, both in text and in figures, describes 16 the use of a curved battery, and so, again, a POSITA 17 reading this isn't -- you know, the first thought that's 18 going to come into a POSITA's mind isn't a noncurved 19 battery. It's going to be a curved battery because of the 20 specification and everything preceding as well as the 21 description of the mechanical design of the device in which 22 a curved battery would be possibly the only solution that 23 would provide sufficient power given the mechanical 24 physical constraints described in claim 1. 25 Q. Well, we just looked at column 15, line 12. The	Page 28 1 the specification and the figures, and when I see the word 2 "circular-formed," I'm -- I'm reading that as being, you 3 know, a curved battery. 4 Q. But you understand that you can have circular 5 batteries that are not curved, correct? 6 A. In isolation of the '178 patent, yeah. I mean, 7 there's button cell and coin cell batteries and so on. But 8 as far as I recall, to the best of my knowledge, none of 9 those batteries are shown in the '178 patent. 10 And so, again, a POSITA reading that sentence -- 11 and just as I was just doing it now -- would have read that 12 in light of the figures that are shown in the rest of the 13 text describing the system as representing a curved 14 battery. 15 Q. I want to go back to the language you are looking 16 at claim 1. (As read): 17 The battery comprises a shape and size 18 configured to fit within the cavity between the 19 outer circumferential surface of the external 20 housing component and the inner circumferential 21 surface of the internal housing component. 22 (Clarification by the certified stenographer.) 23 BY ATTORNEY HABER: 24 Q. And so the question that I have for you -- and I 25 think this is a yes-or-no question -- does that language
Page 27 1 specification says the battery can be any type of battery, 2 right? 3 A. Yes. It says any type of battery. But the first 4 example they give is, such as a rechargeable battery. So 5 another example could be a primary cell battery or a 6 non-rechargeable battery as another type of battery. That 7 doesn't say anything about if it's curved or not. 8 Q. Right. It doesn't say one way or the other 9 whether it's curved, correct? 10 A. Not in that first sentence. But I think that 11 first sentence, in my read of that -- is it's referring to 12 the battery type and chemistry in terms of whether it's 13 rechargeable or not. Because the very next sentence talks 14 about flexible batteries, and the sentence after that talks 15 about circular-formed batteries with different chemistries 16 and so on. 17 Q. And a circular-formed -- 18 (Clarification by the certified stenographer.) 19 BY ATTORNEY HABER: 20 Q. A circular-formed lithium polymer or lithium ion 21 battery may or may not be curved, correct? They're 22 button-sized batteries that are not curved, correct? 23 A. You know, that's an interesting interpretation. 24 You know, that's not how I read that sentence as a POSITA. 25 You know, I'm reading that sentence in light of the rest of	Page 29 1 preclude the use of noncurved batteries? 2 A. So it's really hard to boil a question like that 3 down to a yes-or-no answer simply because these are complex 4 nuanced designs that demand many, many trade-offs. And so, 5 if a POSITA reading this somehow -- and, again, this is not 6 how I would read this. If someone else was reading this 7 who is not a POSITA could say, well, yeah, why don't you 8 use a small -- a very, very small flat battery and put it 9 in the ring, a POSITA would understand that maybe it could 10 fit, but it's not going to be able to provide sufficient 11 either peak power or sufficient energy capacity to run all 12 of the features that are described within the claims and 13 the specification of the patent. 14 And so could someone, a non-POSITA, interpret 15 claim 1 to consider a noncurved battery? Possibly. Would 16 a POSITA consider a noncurved battery in light of the 17 specification the language of the construction described in 18 the claims and their knowledge of the power requirements of 19 all the blocks that need to go into such a device? It's my 20 opinion that they would not. 21 Q. That was a long answer. I just want to make sure 22 I understand. Is it your opinion that a device that 23 otherwise meets all of the elements of claim 1 but is 24 implemented using a noncurved battery would thus not be 25 within the scope of claim 1 for no other reason than it has

Page 30 1 a noncurved battery? 2 A. Again, that's -- it's an interesting hypothetical 3 exercise that you're posing here; and, again, I think my 4 opinion here is that a POSITA, kind of knowing all of the 5 features that need to go into such a device as required by 6 the claims and as described in the specification of the 7 patent, would not consider a tiny battery that would fit 8 within the geometry as specified in claim 1 as developing a 9 device that would, you know, be usable according to the 10 desired need as stated in the specification of the patent. 11 So it's my opinion that a POSITA would not 12 consider that during design. 13 Q. Okay. And, again, you used -- slightly changed 14 the thrust of my question to answer with regard to the size 15 of the battery. You said a tiny battery. And so the 16 question I'm asking you, again, is a little bit different, 17 is -- has to do with the shape of the battery. If the 18 battery was of a shape that was not curved, is it your 19 opinion that a device built with such a noncurved battery 20 would be outside the scope of claim 1? 21 A. So I want to break this down just a little bit. 22 So just to be very clear, the reason I said a tiny battery, 23 if we're discussing a noncurved battery, is simply due to 24 the constrained geometry that's expressed through the 25 requirements of claim 1 where the battery must be	Page 32 1 to be a finger-worn wearable ring device, and the 2 specification of the patent does actually suggest a 3 possible range of sizes that this device could be. 4 And so a POSITA reading those sizes could, you 5 know, compute what the volume or area available inside the 6 cavity would be. 7 Q. So just focusing on the claims for a moment. 8 There's no specific size required by the claims themselves; 9 is that fair? 10 A. The claims, as read in isolation of the 11 specification, which is my understanding you're not 12 supposed to do, don't have size explicitly described, but, 13 again, the claims read in light of the specification do 14 have some size guidelines. 15 Q. So if you flip over to column 17, around line, I 16 think, 13. You can let me know when you're there. 17 A. Okay. 18 Q. There is a range of approximately 1.5 millimeters 19 to 3 millimeters. 20 Do you see that? 21 A. Yes. 22 Q. In view of this particular passage in the 23 specification, would you agree that the cavity, as recited 24 in the claims, is at least broad enough to include a range 25 of 1.5 to 3 millimeters?
Page 31 1 positioned within the cavity, you know, between the curved, 2 you know, portions of the ring. 3 And if this is to be a, you know, human-sized, 4 finger-worn ring, there's just simply not a lot of room 5 within that very small cavity to put in a large battery, 6 and so, as a result, it must be a very small battery in 7 order to fit in there. 8 And a POSITA reading claim 1 would not 9 understand -- if they, for some reason, elected to use a 10 small noncurved battery, would quickly understand that it's 11 not going to be possible to power all of the devices that 12 are required in -- you know, in the finger ring as laid out 13 in claim 1 and, you know, the specification in the patent. 14 And so, again, it's my opinion that a POSITA would 15 not choose to use a small, tiny noncurved battery when 16 implementing such a device. 17 Q. Maybe I can try a different tack because the 18 question that you're answering is whether a POSITA would 19 use a device. Not whether or not the claims would cover 20 that device. 21 But let me -- let me ask a different question. 22 The claims recite a cavity. Do the claims recite 23 any particular dimensions for that cavity? 24 A. Well, again, the claims need to be read in light 25 of the specification of the patent. The claim requires it	Page 33 1 A. I don't agree with that. If you refer to 2 figure 12B in the '178 patent. Let me know when you're 3 there. 4 Q. Okay. 5 A. So figure 12B shows the two diameters that are 6 mentioned in the -- in this paragraph. And they 7 specifically say that the thickness between diameters D1 8 and D2 can vary widely but can typically reside in an 9 approximate range of 1.5 to 3 millimeters. And so they 10 provide a range of diameter D2, range of diameter D1. They 11 say the thickness can be 1.5 to 3 millimeters, and D1 12 minus -- sorry -- D2 minus D1 -- I'm reading the sentence 13 as saying D2 minus D1 is 1.5 to 3 millimeters, that that 14 would describe the thickness of both sides of the ring, and 15 so the thickness of one side of the ring would be 16 approximately half. 17 And, furthermore, on top of that, you know, the 18 internal and the external housing components occupy space, 19 and that would take away from some of the volume available 20 inside the cavity. So in reality, the size available to 21 you in that cavity as a designer would be quite a bit 22 smaller than those cited numbers. 23 Q. '178 patent describes, in discussing figure 12B, 24 that the width can vary widely, correct? 25 A. Yes.

Page 34 1 Q. And there is no particular limit provided in the 2 claim for the size of the cavity in view of that wide 3 variety of widths, correct? 4 A. Well, I mean, you know, the specification does 5 provide a typical approximate range, which is, I think, a 6 good basis. In addition to that, you know, the 7 specification of the patent does describe things like user 8 comfort and so on, and so it's -- you know, while there's 9 no explicitly stated upper bound, a POSITA would understand 10 there is an upper bound, you know, to abide by the desires 11 and recommendations of the specification to make the ring 12 comfortable. 13 So it would be unreasonable to include a massive 14 cavity in the ring and expect the user to wear this and be 15 comfortable with it. 16 Q. But what upper bound did you apply in your 17 analysis of these claims? 18 ATTORNEY PLUTA: Object to form. Foundation. 19 THE WITNESS: I didn't find it necessary to do 20 that analysis. I think, if I were in the business of 21 designing smart rings, I would, you know, go through some 22 calculations and maybe some user experiments to determine 23 what maximum thickness is, you know, most comfortable and 24 appropriate for users. 25 But as part of my -- you know, I was asked to, you	Page 36 1 done some exploration on what would need to go into, you 2 know, the design of such a ring to make it small and 3 comfortable and so on for a user to wear. 4 And I very quickly concluded that the most logical 5 way to build such a device was to follow the prior art, 6 including Professor Asada's and the other art that I found 7 in the literature on this topic, and place the battery at 8 the top of the device, as all the other prior art did, 9 simply because there's just not enough room in kind of the 10 body, if you will, of the ring that goes around the sides 11 and the bottom of the finger, while making the user 12 comfortable. 13 And so that's a very long answer to your question. 14 But what I can say is that a POSITA who was, you know, 15 exactly in this space at the time of invention had 16 considered various different ways of building a smart ring, 17 and I concluded, at the time, that I wasn't able to make it 18 sufficiently small. And so, as a result, you know, I 19 didn't proceed further in that project. 20 I can say my colleagues ended up continuing to 21 work on a wearable smart ring device, including my center 22 codirector Joseph Wang, who's my closest collaborator, and 23 he continued on this project direction and ended up 24 publishing a peer-reviewed paper on his smart ring design. 25 And, ultimately, it resulted in a -- you know, a thin ring
Page 35 1 know, look at these patents in view of the prior art and so 2 on, and I didn't find the need to do that analysis here. 3 BY ATTORNEY HABER: 4 Q. So when you were considering the prior art as 5 applied to these claims, you didn't have a particular size 6 of the cavity that you considered as within or without the 7 scope of the claims? 8 ATTORNEY PLUTA: Object to form. 9 THE WITNESS: So I can actually answer that 10 question a little bit more detailed. So -- although, for 11 this exercise, I didn't feel the need to do those sort of 12 calculations, I actually have done similar calculations in 13 my pursuit of research in the Center for Wearable Sensors 14 that I codirect here at the University of California, San 15 Diego. 16 And in the 2012-2013 time frame, as I was 17 beginning to launch the center, we were looking at all 18 sorts of different types of wearable device form factors. 19 I was aware of smart ring designs, including, you know, the 20 designs by Professor Harry Asada at MIT, in part because 21 that's where I went to grad school, and I met with him 22 there. 23 And when I was trying to look at different types 24 of wearables I could potentially make within my center, I 25 had considered designing a wearable smart ring, and I had	Page 37 1 with a large box on top that house the battery and the 2 electronic components and so on. 3 And so, you know, that was the conclusion of that 4 work, which, I believe, if memory serves, was published 5 circa 2017. And so, again, you know, as a POSITA in this 6 space, I didn't feel the need to do this analysis directly 7 for this patent, because I had considered these sort of 8 things previously and came to the conclusion that a small 9 battery inside the body of the ring, not on the top, was 10 not practical at the time. 11 Q. You didn't feel the need to do the analysis 12 directly for this patent regarding the size of a cavity 13 that would be sufficient to house a battery because you had 14 previously looked into those issues; is that correct? 15 A. That's correct. 16 Q. And when you previously looked into those issues, 17 you said that -- and I might be paraphrasing, but you 18 weren't able to make the ring sufficiently small; is that 19 right? 20 A. Yeah. I was unable to conceive of a design that 21 would be satisfactorily small. 22 Q. Okay. 23 A. And comfortable. 24 Q. Right. And so, when you looked into those issues 25 outside of the context of this patent, what did you

Page 38 1 consider to be sufficiently small to suit the purposes that 2 you were looking into? 3 A. So the ring needed to be small enough to be kind 4 of wearable on a daily basis such that the user wouldn't be 5 bothered or hindered by the presence of the ring or by the 6 aesthetics of the ring. And, you know, if you look at the 7 prior art that I cite in, you know, my expert declaration, 8 as well as if you look at that peer-reviewed paper that my 9 colleague Joseph Wang ended up publishing as a result of 10 our initial investigations into this space, the top side of 11 the ring was rather large. And, you know, for a scientific 12 apparatus for experimentation, sure, that's fine. But for 13 translation to daily life where someone would want to wear 14 a ring like that, none of the prior art really cut it. 15 And, again, after I did my investigation, I came 16 to that conclusion, which is why I decided not to continue 17 to pursue that research direction in my lab. 18 Q. So the patent at issue here specifically requires 19 cavity, and part of the task, I think, of applying the 20 prior art to these claims is to have some sort of an 21 objective measure of whether or not the prior art satisfies 22 the claims. 23 And so is it fair to say that, in your analysis of 24 the '178 patent, you did not attempt to objectively 25 quantify the size of the cavity that's recited in the	Page 40 1 thicknesses, and the result would be the available height, 2 I guess, of the cavity. 3 Q. So if you divide the range that's given here by 2, 4 you get .75 and 1.5 millimeters; is that -- is my math 5 right there? 6 A. Yes. 7 Q. Is it your opinion that the cavity that's recited 8 in claim 1 must be .75 to 1.5 millimeters? 9 ATTORNEY PLUTA: Object to form. 10 THE WITNESS: No. Because, as I mentioned, the 11 internal and external housing components occupy space, and 12 so that would take away from the area available inside that 13 cavity. And, you know, it depends on the types of 14 materials and the thicknesses of those materials, but at 15 least, you know, several hundred micron, if not more, for 16 each of those components, leaving, you know, I would 17 estimate -- and, again, I don't like doing this analysis on 18 the fly, but certainly, I would estimate less than a 19 millimeter of space in the cavity. Possibly much less than 20 a millimeter. 21 And I reserve the right to update those values 22 after I've done some proper analysis. 23 ATTORNEY HABER: Fair. And -- 24 ATTORNEY PLUTA: Sorry. We've been going over -- 25 about an hour. When you get a chance --
Page 39 1 claims? 2 ATTORNEY PLUTA: Object to form. 3 THE WITNESS: You know, I'm not quite sure I'm 4 understanding your question. Can you maybe paraphrase so I 5 make sure I get it? 6 BY ATTORNEY HABER: 7 Q. Sure. I'll try again. 8 The claims recite, a battery comprises a shape and 9 size configured to fit within the cavity, and in 10 determining whether or not a system that's described by a 11 prior art patent fits within the cavity, you would need to 12 understand some size or dimensions of that cavity, right? 13 A. Yes. And I have a general idea of the size and 14 dimensions of that category based on my prior experience in 15 this area as well as some of the numbers that were given to 16 us in the specification of the '178 patent. 17 Q. So what is your general idea of the size and 18 dimensions of that cavity? 19 A. Well, again, as we discussed in column 17, line 12 20 or so, the specification describes a range of diameters, D1 21 and D2, and the thickness between them, 1.5 to 3 22 millimeters. Again, you'd have to divide that by 2 to 23 account for one side of the ring and then account for the 24 thickness of the internal and external housing components, 25 which would occupy, you know, space between those diameter	Page 41 1 ATTORNEY HABER: Just give me a couple more 2 minutes along this line. 3 ATTORNEY PLUTA: Sure. 4 BY ATTORNEY HABER: 5 Q. So the -- the -- again, the specification says 6 that those diameters can vary widely, and so you would 7 agree that even the ranges that are provided could be 8 something bigger, could be something smaller, correct? 9 A. They -- so, again, I think the specification talks 10 a lot about user comfort and so on. Rings require 11 different, you know, diameters, period, you know, just to a 12 accommodate for different people's finger sizes and ring 13 sizes and so on, right? 14 And so certainly diameters D1 and D2 vary widely 15 to account for different finger ring sizes. And, you know, 16 the thickness is a design choice that a POSITA would have 17 to make and possibly make for each and every single 18 different size of ring. 19 In general, though, the specification discusses 20 rings that need to be, you know, small and comfortable for 21 all day, all -- you know, 24/7 use. And a POSITA reading 22 this would understand that, you know, there's -- there's 23 some reasonable upper limit over which it would be 24 unreasonable to ask, you know, a person to wear that ring 25 continuously, or if they did, it wouldn't be as comfortable

Page 42 1 or as aesthetically pleasing as they would like. And so, 2 you know, a POSITA would have to take that into account 3 when making their design. 4 Q. You would agree that the thickness of the ring is 5 a design choice that a POSITA would make bounded by 6 principles of user comfort, correct? 7 A. Yeah. I think that's fair. And then, to add on 8 to that, the '178 patent does describe, you know, 9 approximate ranges for these values. 10 Q. Okay. 11 A. Or typical approximate ranges. 12 ATTORNEY HABER: Okay. If you want to take a 13 quick break, I think we can do that. 14 THE WITNESS: Great. 15 ATTORNEY HABER: Go off the record. 16 THE VIDEOGRAPHER: Going off the record at 17 approximately 9:27 a.m. 18 (Recess taken.) 19 THE VIDEOGRAPHER: We are back on the record at 20 approximately 9:36 a.m. 21 BY ATTORNEY HABER: 22 Q. All right. Before we went on the break, we were 23 talking about '178 patent claim 1, and I want to go back to 24 claim 1. Towards the bottom of the claim at the end of the 25 page, there is recited, a printed circuit board.	Page 44 1 definition recited in paragraph 121 of your declaration is 2 consistent with how a POSITA would understand the term 3 "printed circuit board," correct? 4 (Clarification by the certified stenographer.) 5 THE WITNESS: Yes. 6 BY ATTORNEY HABER: 7 Q. When looking at the '178 patent, the '178 patent 8 also describes that the printed circuit board is flexible, 9 correct? 10 A. Correct. 11 Q. If you look at figure 14B of the '178 patent -- 12 let me know when you get there. 13 A. Okay. 14 Q. Is this an example of a flexible printed circuit 15 board? 16 A. So, again, it's important to view figures in light 17 of the written specification as well, and the caption of 18 the specification says that it's a perspective view of a 19 PCB and stiffener elements. As a POSITA viewing this, I 20 see a piece of, you know, some sort of substrate with some 21 thickness associated with it. I see components on there. 22 I don't see any wiring between the components, which would 23 be normally necessary for a PCB. But this might be just a 24 simplified diagram and didn't need to show the wiring. 25 And, furthermore, we can see that there is some
Page 43 1 Do you see that? 2 A. Yes. 3 Q. What is a printed circuit board? 4 A. So I've provided a definition on paragraph 121 of 5 my report. I can wait for everyone to get there. 6 Q. Yeah. I'm there. 7 A. Okay. So, actually, this definition is -- sorry. 8 One moment. 9 Yeah. This is a definition that Dr. Anthony 10 adopted in his report, and so I'm just repeating it here. 11 It came from Wikipedia (as read): 12 A printed circuit board, or PCB, also called a 13 printed wiring board, or PWB, is a laminated 14 sandwich structure of conductive and insulative 15 layers, each with a pattern of traces, planes, or 16 other features, similar to wires on a flat 17 surface, etched from one or more sheet layers of 18 copper laminated onto or between sheet layers of a 19 nonconductive substrate. 20 Q. I understand that definition is from Wikipedia, 21 right? 22 A. It appears to be so. I -- I just took this from 23 Dr. Anthony's declaration, but I agree with this definition 24 of a printed circuit board. 25 Q. Okay. So, in essence, you agree that the	Page 45 1 flex or some bend associated with the device. So, yes, I 2 would consider this, in light of what is written in the 3 specification, a flexible PCB. 4 Q. And there are parts between the flexible elements 5 where the PCB is substantially flat, correct? 6 ATTORNEY PLUTA: Object to form. 7 THE WITNESS: That is -- that is correct. That's 8 kind of a common design in flexible PCBs where you have 9 rigid flat chips that need to be mounted on the PCB. And 10 so those regions of the flexible PCB need to be relatively 11 flat. And then the regions outside where the chips are 12 mounted can be made to be more flexible, and that's where 13 they curve. 14 BY ATTORNEY HABER: 15 Q. And so would you agree that the flexible shape of 16 the PCB is defined with a series of flat segments that are 17 kind of curved at flexible joints? 18 A. I'm not certain that's a necessary condition, but 19 at least as it relates to figure 14B, that is the way it 20 was -- it appears to be implemented. 21 Q. If you look in figure 4 -- 22 A. The figure what? Sorry. 23 Q. Figure 4. 24 A. Figure 4. 25 Q. There is an element 415. Do you see that?

Page 46 1 A. I do. 2 Q. And element 415 is substantially flat, correct? 3 A. Well, I mean, element 415 is shown in two forms, 4 one when it's unrolled and one when it's rolled into the, 5 you know, circular form factor. 6 Q. And so, when it's rolled into the circular form 7 factor, it has a specific curvature? 8 A. Right. Yeah. 9 Q. And when it's unrolled, it is substantially flat? 10 A. Yes. 11 And I should note that that's how flexible PCBs 12 are traditionally manufactured. They're manufactured flat, 13 and then, you know, for applications that require some 14 curvature, they're then, you know, curved in accordance 15 with the mechanical flexibility offered by the substrate. 16 Q. And just to be clear, the curvature that's 17 provided when the flexible PCB is rolled, it still allows 18 for or accommodates some substantially flat portions of the 19 PCB, correct? 20 A. It could. Yes. Again, I'm not sure that's a 21 universal truth. But it could. 22 Q. I want to go back to your declaration at 23 paragraph 204 under a heading called nexus. Let me know 24 when you're there. 25 A. Okay.	Page 48 1 Q. And there's a term, I think, you used in 2 paragraph 71 of your declaration, "a Super Bowl ring 3 design" when describing the generation 1 product. 4 Do you recall using that term? 5 A. Yes, I do. 6 Q. And what do you mean by a Super Bowl ring design 7 for the generation 1 product? 8 Well, what I mean by that is, you know, after a 9 football team wins the Super Bowl, they tend to get these 10 championship rings, and it's usually, you know, a ring with 11 a rather large head or crown on the top of it. And, you 12 know, on the bottom is kind of a normal ring shape form 13 factor, and the Oura generation 1 design kind of reminded 14 me of that with kind of a large head and a normal ring body 15 underneath. 16 Q. Is it your opinion that a Super Bowl ring would be 17 uncomfortable to wear? 18 A. Yeah, for long periods of time, I would say so. 19 Certainly less comfortable than a thin wedding band, for 20 example. 21 Q. Well, I've seen Tom Brady wear six Super Bowl 22 rings. He seemed pretty comfortable. Beside the point. 23 ATTORNEY PLUTA: Probably comfortable for other 24 reasons. 25 ATTORNEY HABER: Yeah.
Page 47 1 Q. There are recited there, in paragraph 204, four 2 generations of Oura Ring: generation 1, generation 2, 3 generation 3, and generation 4. 4 Do you see that? 5 A. I do. 6 Q. In your declaration, you offer opinions that the 7 generation 3 and generation 4 for Oura products practice 8 certain claims of the '178 patent, right? 9 A. That's right. 10 Q. And I believe the claims that you specifically 11 opine on are claims 1 and 12, and it's your opinion that 12 the generation 3 product practices claims 1 and 12, right? 13 A. That's correct. 14 Q. And similarly, the generation 4 product, in your 15 opinion, practices claims 1 and 12, right? 16 A. That's correct. 17 Q. And you don't offer any opinions that the 18 generation 3 or 4 products practice any other claims? 19 A. I don't offer opinions one way or the other. 20 That's correct. 21 Q. Okay. And you don't offer any opinions that the 22 generation 1 or generation 2 products practice any claims 23 of the '178 patent, correct? 24 A. I didn't offer opinions one way or the other. 25 Correct.	Page 49 1 BY ATTORNEY HABER: 2 Q. Okay. Is it your opinion that Oura's gen 1 3 product does not practice any claim of the '178 patent? 4 A. I mean, I didn't do that analysis in my report. 5 Q. Do you have an opinion one way or the other, 6 sitting here today, whether the gen 1 product practices any 7 claim of the '178 patent? 8 A. I would need to sit down and do those -- do that 9 analysis. So I don't have an opinion sitting here today 10 one way or the other. 11 Q. And you met with an Oura engineer to discuss 12 specifically the gen 1 product, correct? 13 A. I met with an Oura engineer, and we discussed the 14 gen 1 product and some of the other -- and the other 15 generations as well. 16 Q. And as a result of those discussions, you don't 17 have an opinion one way or the other whether the gen 1 ring 18 practices any claim of the '178 patent? 19 A. No. That I -- no. 20 Q. If you go to page 33 of your declaration, there's 21 an image, appears to be a 3D model of the Oura gen 1 ring 22 product. Are you there? 23 A. Yes. 24 Q. And looking at this particular model, are you able 25 to tell one way or the other whether the gen 1 product

Page 50 1 practices any claim of the '178 patent? 2 A. Again, I think, you know, these are complex 3 designs, and I would need to spend some time to do some 4 analysis to make an opinion on that. 5 Q. What additional information do you think you would 6 need? 7 A. I'm not sure. I hadn't considered it. I'd need 8 more details of the construction and internal design 9 elements and things like this. 10 Q. As shown in this image on page 31 of your 11 declaration, there appears to be a flat battery positioned 12 at the top of the ring. 13 Do you see that? 14 A. I do. Yes. 15 Q. Does the presence of that flat battery affect your 16 opinion one way or the other as to whether or not the gen 1 17 Oura Ring satisfies any claim of the '178 patent? 18 ATTORNEY PLUTA: Object to form. Lack of 19 foundation. 20 THE WITNESS: Again, I'm not really comfortable 21 doing this analysis in real time. 22 BY ATTORNEY HABER: 23 Q. Well, you would agree that claim 12 of the '178 24 patent requires a curved battery, right? 25 A. Right.	Page 52 1 ring. This is just, you know, a picture with no labels or 2 anything like this. I'd really feel more comfortable if I 3 had more information and time to do this analysis. I don't 4 feel comfortable doing this in real time. 5 Q. I think that's fair. 6 And the question that I have for you is, what more 7 information do you think you would need? 8 A. Well, I would need labeled drawings with different 9 components and just more details about what went into this 10 ring design. 11 Q. When you spoke with the Oura engineer in 12 preparation for your deposition today, did he provide you 13 with any of those details? 14 A. I did view some pictures of the gen 1 design in 15 various states of disassembly, which did show a flat 16 battery. But, again, these are kind of just pictures. It 17 would be better to get more information about, you know, 18 various components and so on that are on the device. 19 Q. And based on the information that was provided to 20 you by Oura's engineers, you still did not have sufficient 21 information to determine whether or not Oura's gen 1 22 practiced the claim 1 of the '178 patent? 23 A. I mean, yeah. Like I said, I -- if I wanted to do 24 that analysis, I would have to take time and do that 25 analysis offline.
Page 51 1 Q. And what's shown in this figure, at least, is not 2 a curved battery, is it? 3 A. That is correct. 4 Q. And so the gen 1 Oura Ring would not satisfy 5 claim 12, correct? 6 A. I think that analysis is easy enough to do. Yes. 7 Q. And the analysis for claim 1 is a little bit more 8 difficult, right? 9 A. Right. 10 Q. Because claim 1 doesn't specifically exclude a 11 flat battery from its scope, correct? 12 (Clarification by the certified stenographer.) 13 THE WITNESS: That's not what I was intending to 14 mean by saying it's more complicated. Simply saying that 15 claim 1 has a lot of elements to it and there's a lot of 16 elements in this ring and there would be a lot of matching 17 up of things to do the analysis for, and like I said, I'm 18 not comfortable doing that in real time. 19 BY ATTORNEY HABER: 20 Q. Okay. Well, can you say, just with the 21 information that you have in front of you, based on the 22 fact that the Oura gen 1 ring has a flat battery in it, 23 that it does or does not satisfy claim 1? 24 A. Again, claim 1 is just -- you know, there's a lot 25 of other things in there. There's a lot of details in this	Page 53 1 Q. And just to be clear, the fact that Oura's gen 1 2 device has a flat battery was not sufficient, in and of 3 itself, to determine that the device is outside the scope 4 of the claims, right? 5 A. I didn't say that. I think I just need to think 6 about it and do the analysis carefully before providing an 7 answer. 8 Q. Well, so I'm asking you now this simple question, 9 you know, and the answer, I think, is yes or no. Looking 10 at the flat battery in the gen 1 device, can you say 11 definitively that that device is outside the scope of the 12 claims? 13 ATTORNEY PLUTA: Object to form. 14 THE WITNESS: So I'm a little uncomfortable doing 15 this analysis in real time. I -- it's my opinion, without 16 doing more detailed analysis, that, yes, this would fall 17 outside of the scope. 18 BY ATTORNEY HABER: 19 Q. And is the basis for that opinion the fact that it 20 has a flat battery? 21 A. Yes. 22 Q. There was submitted with your declaration 23 Exhibit 2034, which is some additional details of the Oura 24 Ring gen 1 structure. Do you have that document with you? 25 A. I don't think I have that with me. Would you mind

1 putting it into the chat?

2 ATTORNEY HABER: And just for the record, this is
3 a confidential document. I'll just put it into the chat.

4 ATTORNEY PLUTA: I'd ask that we mark the
5 transcript confidential, then, at this point since you're
6 going to get into confidential information.

7 ATTORNEY HABER: Sure. I suspect this is -- would
8 likely be the only confidential document that I use, and I
9 think we're going to just need to redact out a portion of
10 the transcript so that we can share the rest of the
11 transcript. We can deal with that later.

12 I dropped the document in the chat. I think it
13 should be being shared, if my computer will allow it.

14 (Exhibit 2034, previously marked, was
15 presented.)

16 BY ATTORNEY HABER:

17 Q. [REDACTED]

1 [REDACTED]

1 [REDACTED]

[illegible][illegible]

1 [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
9 A. So I think what might help is if we refer to
10 paragraph 187 of my expert declaration.
11 Q. 187. Okay.
12 A. So let me just read this so we're all on the same
13 page. It says (as read):
14 As shown in figure 22 of Niwa, unit 20 --
15 (Clarification by the certified stenographer.)
16 THE WITNESS: Sure. Thank you.
17 (As read):
18 As shown in figure 22 of Niwa, N-i-w-a,
19 unit 20 contains battery 24, but the unit is not
20 disposed between outer and inner circumferential
21 surfaces of Niwa. Rather, the battery is located
22 between two flat surfaces of the housing
23 protrusion, as shown below in red --
24 Where it refers to a figure that I've reproduced
25 from Niwa.

1 And then I go on to summarize that (as read):
2 Dr. Anthony agrees the surfaces around unit 20
3 appear to be planar.
4 And so the drawing in Niwa is a little bit
5 different than what we're looking at here with the
6 generation 1 design. The generation 1 design has a
7 circumferential outer surface, and it does have a planar
8 part in the inner surface.
9 Niwa has this protrusion at the top of the ring
10 that is flat on both sides. So whatever is in between
11 there, I think, is not disposed between circumferential
12 surfaces, we'll say.
13 In the generation 1 design, whether or not these
14 show internal and external housing components -- and,
15 again, it's my opinion that Niwa does not show that. It's
16 a unitary construction. I don't have an opinion one way or
17 the other on the generation 1 design about that.
18 But in this case, the external surface is
19 circumferential; the internal surface may or may not be
20 circumferential. I hadn't done that analysis.
21 But in Niwa's case, it's flat on both sides, and
22 so I would say it's not disposed between two
23 circumferential surfaces.
24 Q. Okay. I understand that that's your opinion
25 regarding Niwa in paragraph 187. I think I'm asking you

1 for a slightly different opinion regarding the figure on
2 page 7 of 2034. [REDACTED]

6 [REDACTED]

24 Q. [REDACTED]

1 [REDACTED]

20 Q. With regard to the gen 3 product, was it important
21 to your opinion that whatever bumps or protrusions were
22 present on the inner surface were, themselves, curved?

23 It's been a second. Are you looking at anything
24 in particular to answer the question?

25 A. Yeah. I'm reading my declaration just to see

1 if -- just to refresh my memory on this.

2 So I think, in answering this question, I want to
3 first start by saying that, you know, engineering is a
4 science and an art, and, you know, designing devices such
5 as these is an exercise in many, many different trade-offs.
6 And, you know, engineers have to make these trade-off
7 analyses when they're doing their design in order to come
8 up with the best possible solutions to meet the needs of
9 the application.

10 In this case, for example, for the Oura gen 3, as
11 you're asking me about, you know, I think it's certainly my
12 opinion that the internal housing component is
13 circumferential. And, you know, there are these small
14 bumps which also happen to be circumferential. So from
15 that perspective, I think it fully meets the definition.

16 But, also, those small bumps are pretty small
17 portions of the overall ring. And, you know, a designer
18 may have needed to make those for certain sensing or
19 mechanical reasons.

20 But overall, a POSITA looking at this would
21 understand that, you know, the bulk, if not the entirety of
22 the surface, is circumferential, and that's a little
23 different from -- for example, in Niwa, where it's a pretty
24 substantial portion of both sides of the surfaces that are
25 flat, and so a POSITA looking at Niwa would not consider

Page 66 1 them to be -- you know, those portions to be 2 circumferential. 3 If there were a tiny, small portion of the 4 internal surface that were flat, say, for example, in 5 that -- in that picture of the Oura gen 1, would that make 6 the entirety of the device noncircumferential internal 7 surface? I don't know. I'd have to spend more time 8 thinking about that to come to an answer. 9 Q. Okay. Let me just break that answer down a little 10 bit. The design of these internal and external surfaces 11 is, you said, I think, an exercise in engineering 12 trade-offs, right? 13 A. Yeah. 14 Q. And those engineering trade-offs regarding the 15 particular shape or curvature of internal and external 16 surfaces, that's part of routine engineering work, correct? 17 A. Well, engineers have to design the shape of 18 physical objects that they make, so, from that sense, yes. 19 Q. And there's nothing particularly unique about, you 20 know, a shape that is curved versus flat versus that has 21 bumps on it, correct, from an engineer perspective? 22 A. I mean, that's a very broad question. Can you 23 narrow that down a little bit? 24 Q. Sure. 25 If an engineer was setting out to design surfaces	Page 68 1 A. It did. 2 Q. What additional information would you have needed 3 regarding the gen 2 device to determine whether or not it 4 satisfies claim 1 of the '178 patent, for example? 5 A. I mean, I didn't do a teardown of the generation 2 6 device like I did for the generation 3 device. So that 7 would be a good start. 8 Q. Is there any particular reason why you did that 9 for the gen 3 device and not the gen 2 device? 10 ATTORNEY PLUTA: Object to form. I'm just going 11 to caution the witness not to reveal any attorney work 12 product or communications. 13 THE WITNESS: The generation 3 and 4 devices are 14 currently available on the market, and I was offered the 15 opportunity to tear them down, and I took up on that 16 opportunity to tear them down. 17 BY ATTORNEY HABER: 18 Q. So you were not offered an opportunity to tear 19 down a gen 2 device? 20 A. No. 21 Q. Are you aware of the fact that the '178 patent is 22 a continuation patent? 23 A. Yes. 24 Q. And if you look at the patent, you can see, on the 25 back page of the cover, it's a continuation of -- the
Page 67 1 for a ring, for example, it would be a matter of trade-offs 2 and design choice for an engineer to pick any particular 3 shape, correct? 4 A. Right. 5 Q. And if a shape had a flat area or a curved area or 6 a bump or a protrusion, an engineer would simply select the 7 appropriate shape for whatever application they were 8 designing, correct? 9 A. In general, yes. 10 Q. The opinions that we were talking about with 11 regard to nexus refer to gen 1, gen 2, gen 3, and gen 4. 12 We've spoken about gen 1 a bit. You don't have any 13 opinions in your declaration on whether or not the gen 2 14 device practices any claim of the '178 patent, do you? 15 A. I don't one way or the other. Yeah. 16 Q. When you were speaking with an Oura engineer in 17 preparation for your deposition today, did you require any 18 additional information about the gen 2 device? 19 A. Not that would have -- not in a -- in sufficient 20 detail to make me -- to allow me to form an -- you know, an 21 opinion about -- about the generation 2 ring. 22 Q. Are you aware of the size or shape of the battery 23 of the gen 2 device? 24 A. Generally, yes. 25 Q. Did the gen 2 device have a curved battery?	Page 69 1 earliest continuation is U.S. patent number 9,582,034. 2 Do you see that? 3 A. Yes. 4 Q. Did you review U.S. patent number 9,582,034? 5 A. I mean, I did review the prosecution history of 6 the '178 patent. I can't recall if that included that 7 other patent or what was in the exact file history. 8 Q. Let me ask you a different question. Go ahead. 9 A. No. Please go ahead. 10 Q. If you can flip ahead to paragraph 232 of your 11 declaration. This is relating to limitation 1[d]. Let me 12 know when you're there. 13 A. Okay. 14 Q. I'll bring it up on the screen as well. 15 (Clarification by the certified stenographer.) 16 BY ATTORNEY HABER: 17 Q. (As read): 18 Limitation 1[d] requires, among other things, 19 a printed circuit board. 20 Do you see that? 21 A. Yes. 22 Q. And you identified a printed circuit board in the 23 Oura gen 3 product on the subsequent page, page 114. 24 Do you see that? 25 A. Yes.

Page 70 1 Q. How do you know that that is a printed circuit 2 board? 3 A. Well, you can see in the cross section that there 4 is multiple layers associated with that board. There are 5 components that are soldered onto that board. You can 6 actually very clearly see the solder balls of the flip chip 7 module that's on the underside of the board, which is very 8 cool. So, you know, this looks, to me, very much like a 9 printed circuit board. 10 Q. Okay. So the fact that it has multiple layers 11 with multiple different components attached to it is 12 indicative of the fact that it's a printed circuit board. 13 Is that fair? 14 A. And I would add to that and say not only are the 15 components attached, but they're wired together on the 16 circuit board. 17 Q. Why is that important? 18 A. Well, I mean, you can place devices on anything 19 and -- but that doesn't make it a circuit board -- a 20 printed circuit board. 21 Q. You would agree that the printed circuit boards 22 that we looked at in the '178 patent -- they didn't 23 specifically show the wiring between the components, right? 24 I think you called that out in one of the figures. 25 A. That's right. And those figures are not, you	Page 72 1 you see the individual layers of the printed circuit board 2 in this one? 3 A. You can if you look pretty closely at the cross 4 section. It's not quite as high resolution of a picture, 5 but you can see it. I should also say that I was 6 physically present for this teardown, and I actually looked 7 at it under a microscope as well. 8 Q. In the -- I have on the screen page 114, which 9 is -- seems to be a different cross section of the -- of 10 the device. You have there identified a printed circuit 11 board. Again, based on what's shown in the image on 12 page 118, how can you tell that that's a printed circuit 13 board? 14 A. If I'm not mistaken, I believe that's the same 15 image as we looked -- we were looking at before. 16 Q. So -- 17 A. So these are -- if you go back to page 115, these 18 are two identical rings that we cut in two different 19 dimensions to be able to show two different cross sections. 20 But they're otherwise the same ring -- well, not physically 21 the same, but same -- you know, a copy of each other. And 22 so the image on page 118 is, I believe, the same image 23 shown on page 115, with the same cross section. Actually, 24 I didn't realize it's on page 119. 25 Q. Yeah. I think you're right.
Page 71 1 know, engineering true or true-to-scale diagrams with full 2 depictions. They're cartoons. Illustrative cartoons. 3 Q. Okay. 4 (Clarification by the certified stenographer.) 5 BY ATTORNEY HABER: 6 Q. One of skill in the art would have understood that 7 the components on a printed board, in order to be 8 electrically connected to each other, are wired together in 9 some way, right? 10 A. Through the printed conductive traces on the 11 printed circuit board itself, yes. 12 Q. Okay. So what's shown here on page 114 is a 13 printed circuit board, in your opinion, because it has 14 multiple layers and it has components that are attached to 15 that printed circuit board and those components are wired 16 together through traces in the circuit board; is that fair? 17 A. That's right. 18 Q. And if you go to the next page, page 115 of your 19 declaration, there's another cross section, and you have 20 identified a printed circuit board there as well. Same 21 question. How do you know that what's shown there is a 22 printed circuit board? 23 A. Yeah. For the same reason I said on the previous 24 page. 25 Q. This one seems to be a little bit less clear. Can	Page 73 1 So let's just stick on page 115. There is a cross 2 section showing the width of the ring, and then there's 3 another cross section that appears to be longitudinal, and 4 the printed circuit board is identified in each one of 5 these figures. 6 The figure on the top, how can you tell that that 7 is -- what's identified there is the printed circuit board? 8 A. Well, again, you know, I've physically inspected 9 these under the microscope and so on. And even if you zoom 10 in, you can see that, you know, there's a multilayer 11 substrate. We have electrical components that are 12 connected to that substrate, soldered onto the substrate. 13 In order to solder something, it needs to have a conductive 14 interface that it solders to. 15 And if you look very closely -- and under the 16 microscope this was more obvious -- there's traces, 17 metallic traces, on the surfaces of the printed circuit 18 board. So this is very clearly a printed circuit board. 19 Q. Okay. And it appears to be located in the cavity 20 between an inner and outer surface. Did you measure the 21 size of the cavity? 22 A. I don't recall if I did. I don't believe -- if I 23 did, I have that information in the report. 24 Q. Is it fair to say that, for purposes of your 25 analysis in determining whether or not this device

Page 74 1 satisfied claims, it was not necessary for you to measure 2 the size of the internal cavity? 3 A. That's fair to say. Yes. 4 ATTORNEY PLUTA: Can we take a break when you have 5 a chance? 6 ATTORNEY HABER: Sure. Why don't we take a break. 7 ATTORNEY PLUTA: That's fine. 8 ATTORNEY HABER: All right. That's good. 9 THE VIDEOGRAPHER: Going off the record at 10 approximately 10:50 a.m. 11 (Recess taken.) 12 THE VIDEOGRAPHER: We are back on the record at 13 approximately 10:58 a.m. 14 BY ATTORNEY HABER: 15 Q. Welcome back. 16 A. Thank you. 17 Q. I'd like to go to your declaration, paragraph -- 18 starting at paragraph 89. You reference a prior art 19 reference called Schroder. 20 ATTORNEY HABER: I'll pull that up on the screen 21 as well so we can have it. 22 (Exhibit 1007, previously marked, was 23 presented.) 24 THE WITNESS: If you could put it in the chat, 25 too, as well, that would be great.	Page 76 1 A. That's correct. 2 Q. Starting with limitation 1[c], it's recited in 3 full in paragraph 90 of your declaration, but this is the 4 claim element that relates to the battery with particular 5 size and shape, correct? 6 A. That's right. 7 Q. And in paragraph 97, you have a figure from 8 Schroder. It's figure 3. 9 A. Yes. 10 Q. Okay. Now, turning to Schroder itself, Schroder 11 has an example shown in figure 3, and there is also an 12 example shown in figure 4. Do you see that? It's on the 13 screen here. 14 A. That's right. 15 Q. And you don't discuss anywhere in your declaration 16 Schroder's figure 4; is that correct? 17 A. I'm not sure. I have a pretty lengthy discussion 18 about Schroder. I don't know if I specifically refer to 19 figure 4 or not. 20 Q. I did a word search, and I'll represent to you 21 that I didn't find reference to figure 4 anywhere in your 22 declaration. 23 A. Okay. I'll take your word for it. Certainly, I 24 have seen figure 4 and understand what it's attempting to 25 represent.
Page 75 1 ATTORNEY HABER: I can do that. 2 BY ATTORNEY HABER: 3 Q. All right. I dropped it into the chat, and I have 4 it on the screen. Just -- do you have it in front of you 5 as well? 6 A. Yes. 7 Q. Okay. Again, you can refer to whatever you would 8 like, but what's shown on the screen is U.S. patent 9 number 10,303,867 to Schroder, which is entitled external 10 secure unit and has previously been introduced as 11 Exhibit 1007. 12 Again, if I refer to this patent as Schroder, 13 you'll understand what I'm referring to? 14 A. Yes. 15 Q. All right. So regarding claim 1, in your 16 declaration, you only dispute that Schroder discloses 17 elements 1[c], 1[d], and 1[e]. Is that correct? 18 A. As far as claim 1 goes, that's correct, although I 19 should emphasize that that doesn't mean I don't dispute -- 20 I don't necessarily dispute -- I have no stated opinion in 21 here on the other claim elements. 22 Q. That's fair. 23 So you dispute claim elements 1[c], 1[d] and 1[e], 24 and you don't offer an opinion one way or another on the 25 other elements of claim 1, correct?	Page 77 1 Q. Figure 4 is a different embodiment than the 2 embodiment shown in figure 3, correct? 3 A. I would just like to see what Schroder says. 4 Q. Sure. 5 I can direct you to a couple parts of Schroder if 6 it's helpful. Feel free to look at whatever you'd like to 7 look at. On page 3, column 45, Schroder says that figure 3 8 shows a finger ring according to the invention having an 9 insertable chip module with a cover. 10 Do you see that? 11 A. Yes. 12 Q. And what's shown in figure 4 doesn't have an 13 insertable chip module or a cover, correct? 14 A. Correct. 15 Q. And so would you agree that the figure 4 16 embodiment is a different embodiment from the figure 3 17 embodiment? 18 A. Yeah. It would -- it would have to be. 19 Q. And go to Schroder. Schroder describes in the 20 context of figures 4 through 10 construction variance. Do 21 you see that? It's at column -- the top of column 10, 22 lines 1 and 2. 23 A. Yeah. So, here, Schroder discusses figures 4 24 and 5 in -- well, at the very top, it says -- yeah, 25 possible construction variance. He then goes on to say

Page 78 1 that figure 4 and 5 correspond to one another. And then he 2 says figure 6 through 10 show different cross sections 3 through a finger ring. So it's not clear if 6 through 10 4 are different variants or not. 5 Q. Okay. You would agree that what's shown in 6 figure 3 has a replaceable chip module, right? 7 A. Yes. 8 Q. And the embodiment described by Schroder in 9 figure 4 doesn't have a replaceable chip module, correct? 10 A. Figure 4 only shows a ring half, an inlay. Yeah, 11 it shows a ring half and an inlay. That's all that 12 figure 4 shows. 13 Q. So in the description of figure 4, in column 12 14 around line 4 through line 42, describes the embodiment of 15 figure 4, and nothing in figure 4 describes a replaceable 16 chip module as opposed to the replaceable chip module of 17 figure 3, correct? 18 A. So confusingly -- and just to make my opinion 19 clear, it's my opinion that Schroder is, at best, extremely 20 unclear about what it's disclosing. In the description of 21 figure 4, Schroder talks about chip module 10, but it's not 22 shown in figure 4. 23 Q. Right. 24 It's not shown in figure 4, and it is shown in 25 figure 3, correct?	Page 80 1 BY ATTORNEY HABER: 2 Q. Would you agree that, in the figure 4 embodiment, 3 the chip module is not specifically shown in the figure, 4 but Schroder explains that the chip module may be 5 permanently connected to the inlay, correct? 6 A. In reference -- in the paragraph in which he's 7 describing figure 3, he says that. Yes. 8 Q. Let me go back to column 12 regarding figure 4, 9 around line 9. There's reference to an inlay 12. 10 Do you see that? 11 A. Yes. 12 Q. And down a little bit further in column 9. 13 A. Back to column 9. Sorry. 14 Q. I'm sorry. I'm sorry. 15 Down a little bit further in column 12. 16 A. Okay. 17 Q. Around line 27, it says (as read): 18 The inlay 12 consists of preferably flexible 19 carrier material, e.g., PET, Kapton, et cetera. 20 Do you see that? 21 A. Yes. 22 Q. PET, Kapton, et cetera, are carrier materials that 23 would have been understood as materials that are used for a 24 printed circuit board, correct? 25 A. They could be, but not necessarily so. Printed --
Page 79 1 A. Correct. Yeah. 2 Q. And specifically, the chip module in figure 3 is a 3 replaceable chip module, right? 4 A. Yeah. So Schroder refers to item element 10 in 5 figure 3 as both. He refers to it as a replaceable chip 6 module 10 as well as chip module 10. 7 Q. And Schroder explains, with regard to chip 8 module 10, that it may be replaceable or it may be firmly 9 connected to the ring, and that's at the top of column 9 10 around line 4. 11 (Clarification by the certified stenographer.) 12 BY ATTORNEY HABER: 13 Q. Correct? 14 A. I -- so yeah. On the top of column 9, he says the 15 chip module is replaceable and can also be firmly 16 connected. 17 Q. And down a little bit further in column 9, around 18 line 14, chip module 10 -- sorry. Strike that. Wrong 19 line -- 13 (as read): 20 It's possible to connect chip module 10 21 permanently to the contacts of the inlay 12, e.g., 22 by soldering, crimping, gluing, et cetera. 23 Do you see that? 24 A. Yes. 25 (Clarification by the certified stenographer.)	Page 81 1 flexible printed circuit boards often use polyimide and 2 other materials as well. But despite that, you know, 3 there's things like Kapton tape that I've used in my own 4 work that I don't use for printed circuit boards but just 5 as thin, you know, substrates on which to place for items 6 or stick things together, for example. 7 Q. Okay. But you don't disagree that PET and Kapton 8 are materials that could be used for printed circuit 9 boards, correct? 10 A. That's right. They could be used. 11 Q. Now, down a little bit further in column 12, it 12 says that chip module 10, at least one further -- 13 A. Sorry. What line are you reading? 14 Q. Column 12, line 40. 15 A. Thank you. 16 Q. It says (as read): 17 Chip module 10: At least one further 18 electronic component can also be located on the 19 carrier, e.g., a display unit or a further antenna 20 coil. 21 Do you see that? 22 A. Yes. 23 Q. And the carrier that's being referred to there is 24 the carrier that is inlay 12, correct? 25 A. Correct.

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1 Q. And so the chip module is located on the carrier
2 that forms inlay 12, right?

3 A. Correct.

4 Q. And in the figure 4 embodiment, back up a little
5 bit further in column 12, the structure is made of ring
6 halves 16 and 18, respectively, that have a recess into
7 which the inlay 12 is inserted.

8 Do you see that?

9 A. Yes.

10 Q. And so inlay 12, with chip module 10 and various
11 other components on it, is inserted into a recess between
12 ring halves 16 and 18 in Schroder, right?

13 A. Yes.

14 Q. And if you look at figure 4, you see the space for
15 inlay 12. You see ring half 18. You see an inner ring
16 which isn't labeled, but that inner ring, you would agree,
17 corresponds to inner half 16, right?

18 A. I don't agree with that, actually.

19 Q. Okay. That inner ring, what, in your opinion,
20 does it correspond to?

21 A. So the word "half," I think, means something here.
22 And half of something should be, you know, half of it. And
23 so my opinion and my interpretation of reading Schroder --
24 which, again, I should emphasize is, at best, unclear -- is
25 that figure 4 is showing one half of the ring sliced down

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1 the middle.

2 And a good analogy for this would be thinking like
3 a bagel. The normal dimension that you would cut a bagel
4 is in half. You would open up the bagel. To complete the
5 analogy, maybe you'd use your finger and dig a little
6 trench into one half of the bagel or possibly both sides of
7 the bagel, put some cream cheese in here, which would
8 correspond in this analogy to the inlay, and then take
9 those two halves and bring them back together.

10 That's my interpretation of the ring halves of
11 figure 4.

12 Q. I think that's what's shown here in figure 5.
13 This is kind of the bagel interpretation.

14 A. Exactly.

15 Q. I see.

16 And then --

17 A. And I should note that figure 5 corresponds to
18 figure 4 as discussed in the paragraph that introduces
19 figure 4 and figure 5.

20 Q. Okay. Would you agree, looking down at figure 7,
21 that this is a slightly different slice of the bagel?
22 There is an outer half, 18, and an inner half, 16, which
23 are a little bit different than what's shown in figure 5.

24 A. So, again, here is where Schroder is, you know, in
25 many places, unclear here, especially so. But I should

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1 note that Schroder does specifically refer to the
2 components in figure 7 as components 18 and 16, which are
3 two ring halves. Figure 4 shows one ring half.

4 And I should note that Schroder specifically does
5 not call out the inner -- inner surface of this ring as
6 being element 16, which I think is what perhaps Dr. Anthony
7 and -- was trying to suggest and maybe what you're trying
8 to suggest now, in light of figure 7. But Schroder does
9 specifically say it's elements 18 and 16 that come
10 together, and he does explicitly show elements 16 and 18 in
11 figure 5 as being two halves of the ring in a bagel-cut
12 configuration.

13 And so my interpretation of figure 7 is it's --
14 you know, if -- I'm going to use my hands here. I
15 apologize for the videographer -- or the notetaker, but
16 figure 5 is a cross section right down the middle of
17 this -- of these two ring halves. And figure 7 might be
18 perhaps an angled cross section. So we still have the two
19 ring halves coming together, but in between them, we have
20 the inlay 12 -- inlay 12.

21 What makes this difficult to interpret is that
22 Schroder's disclosure is not very detailed, and these are
23 just two-dimensional drawings of a three-dimensional
24 object. And so, you know, again, at best, it's very
25 unclear. But that is my interpretation as a POSITA in

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1 reading figure 7 in light of the other figures and what's
2 described in the specification.

3 Q. So kind of flipping between figure 5 and figure 7,
4 would you agree that the halves appear to be oriented
5 differently between figure 5 and figure 7?

6 A. Yes.

7 Q. And --

8 A. It appears that they're rotated by 90 degrees.

9 Q. And so would you agree that, at least in figure 7,
10 what's shown as element 18 would correspond to an outer
11 half and what's shown in element 16 would correspond to an
12 inner half?

13 A. No, I wouldn't agree with that. I think
14 element 18 and 16 in figure 7 are the same as element 18
15 and 16 in figure 5. And they're the two halves of the
16 bagel. And so, you know, in the context of the '178
17 patent, we have an external surface and internal surface
18 which is very clearly defined in that patent.

19 And here, it's my opinion that figure 7 is simply
20 just showing figure 5 rotated by 90 degrees and with a
21 different cross section through the ring. So it's actually
22 showing the two ring halves with the carrier foil in
23 between them.

24 Q. I'm not sure I'm understanding. When you say that
25 it appears to be rotated 90 degrees, I mean, the -- what's

Page 86 1 shown as inlay 12 doesn't appear to be rotated. It just 2 appears that the halves are rotated. 3 A. So, again, this is why -- where Schroder is, at 4 best, unclear. And Schroder is trying to depict a 5 three-dimensional object in two dimensions. And so what 6 figure 5 is depicting is -- if you have your ring and you 7 slice it, you know, down the middle and you look at it from 8 the side, inlay 12 is coming at you at the top. It's 9 coming at you, at the bottom. And then 18 and 16 are kind 10 of curving away from the page, if you will. That's my 11 interpretation of figure 5, and I think we agree on that. 12 Figure 7, again, at best, is extremely unclear, 13 but what it's depicting, in terms of three-dimensional 14 object in two dimensions -- but given that Schroder is 15 specifically calling out ring half 18 and 16 as coming 16 together, my interpretation of figure 7 is that he's taken 17 this ring, and instead of cutting it right down the middle, 18 he's cut it at some sort of angle here, and then we're 19 looking at it from that angle. And in that case, you would 20 see the inlay in the middle going between the two ring 21 halves. 22 Does that make sense? 23 Q. I think I understand your opinion. If you were to 24 do that, wouldn't -- if you took some different cross 25 section, wouldn't the shape of the inlay change? I mean,	Page 88 1 construction variants, right? 2 A. That's right. 3 Q. And so would you agree that a possible 4 construction variant would be, instead of slicing the ring 5 like a bagel, like you're suggesting, having an inner 6 surface and an outer surface as a slice? That's a 7 straightforward construction variant, isn't it? 8 A. Well, first of all, I think it's a construction 9 variant informed, by hindsight, of the '178 patent. And, 10 second, if that were the case, which I don't agree with, 11 why would Schroder call unit 16 a ring half and use the 12 same nomenclature as he used in figure 5 to denote a ring 13 half? 14 Q. Well, I think that you would agree that Schroder 15 uses the same element identifiers for different things in a 16 few places. For example, there's a removable unit 10, 17 right, and then there's just the regular circuit board 10. 18 They're each identified as element 10. 19 A. I'm sorry. I'm not sure what you mean. 20 Element 10 is -- is only shows up in figures 2 and 3, I 21 believe, right? And there's not -- I mean, he discusses 22 that element 10 could be permanently attached to the ring 23 or removable, but that doesn't necessarily change its 24 geometry or location. 25 Q. So is it your opinion, then, that the transition
Page 87 1 when I go from figure 5 to figure 6, the inlay doesn't look 2 to be rotated, but the halves look to be rotated. 3 A. Yeah. So, again, I think it depends on the 4 construction, and so it's -- you know, I looked at this for 5 a very long time and reread and reread the declaration and 6 so on, and, you know, keep in mind I'm well beyond a POSITA 7 in this area, and I struggled to come up with a 8 understanding of what exactly Schroder is trying to show 9 here. 10 But focusing on figure 7, which was the closest 11 embodiment to what was described in the text, again, 12 it's -- it's -- if he were describing an inner and outer 13 housing component, it puzzles me as to why he would label 14 two ring halves in 18 and 16 as two completely separate 15 things now, compared to what's shown in figure 5, using the 16 same labels. And so that really struck me as instructive 17 as to what Schroder was trying to intend to convey to the 18 reader here. 19 And so, yeah, my interpretation, after considering 20 that and considering the material written inside of 21 Schroder, is that unit 16 was just the other half of the 22 ring, and he's just taking a strange cross section through 23 the ring. 24 Q. Okay. So you would agree -- I think we just 25 read -- that Schroder describes its figures 4 through 10 as	Page 89 1 from figure 5 to figure 7, which I think you testified 2 earlier was -- appeared to be a 90-degree rotation -- is it 3 your opinion that dividing the ring halves differently is 4 outside of the level of skill in the art? 5 ATTORNEY PLUTA: Object to form. 6 THE WITNESS: So in coming to my opinions, I 7 analyzed this as a -- in view of a POSITA's experience, 8 and, again, I just want to emphasize, you know, I was and 9 am beyond a POSITA, according to Dr. Anthony's definition, 10 at the time of invention and today. But putting myself in 11 the shoes of an engineer, two years out of their 12 undergraduate degree, working on biomedical electronics, as 13 many of my own graduate students are today, you know, I 14 would be reading this patent -- and I did many, many 15 times -- looking at figures 3, 4, and 5, and seeing some 16 degree of self-consistency between figures 3, 4, and 5, of 17 course, with the exception that figure 3 is the only one 18 that actually shows the chip module, and then coming to 19 figure 7 and requiring a lot of kind of reading and 20 interpretation to come to a realization of what figure 7 21 was. 22 But as a POSITA, I don't think that I would look 23 at figure 7 and assume that this is some new ring 24 construction that uses ring halves in kind of a new and 25 unexpected way that wasn't introduced before. In

Page 90 1 particular, the word "half" doesn't really mean something 2 clear here because they are not really half of one another. 3 They're, you know, pieces that are of totally different 4 sizes. 5 So, no, I don't think a POSITA reading this would 6 have jumped to that conclusion. I think that would be 7 something that would be easy to come to in hindsight of 8 the '178 patent. 9 Q. So in your opinion, if we took figure 7 and kind 10 of assumed that these were the ends of a curvature and 11 placed them at the corresponding ends where figure 5 is, 12 one of skill in the art wouldn't have been able to 13 understand that, in that configuration, what's identified 14 as 18 would be the outer surface of a ring and what's 15 identified as 16 would be the inner surface of the ring? 16 A. Well, I think it's presumptuous to assume that 17 figure 7 is the end of -- you know, of a cross section or 18 the end of a ring that's been cut in half like it was in 19 figure 7 -- sorry, figure 5, I mean -- 20 Q. Certainly looks like the end, one of the ends, 21 doesn't it? 22 ATTORNEY PLUTA: I think you cut off the witness. 23 ATTORNEY HABER: I'm sorry. I didn't mean to cut 24 you off. 25 THE WITNESS: It's okay. Thank you.	Page 92 1 BY ATTORNEY HABER: 2 Q. The end of column 12, around line 55, Schroder 3 explains (as read): 4 The component 16 and 18 of the finger ring can 5 be manufactured from like or different materials. 6 The materials that can be used are plastic or 7 carbon. 8 Do you see that? 9 A. Yes. 10 Q. Regardless of how elements 16 and 18 are sliced, 11 they could generally be constructed in a similar fashion, 12 right? 13 ATTORNEY PLUTA: Object to form. Lack of 14 foundation. 15 THE WITNESS: I mean, meaning that ring half 16 16 and 18 could be of different or similar materials? Sure. 17 Schroder allows for that. 18 BY ATTORNEY HABER: 19 Q. Is there anything regarding Schroder's teaching 20 that would preclude the understanding of element 18 kind of 21 being an outer edge and element 16 being an inner edge, 22 that's shown in figure 7? 23 A. Well, I mean, I would point to figure 5 where it 24 clearly shows it as not that, right? And it uses the same 25 element markings. If Schroder intended to mean that 16 was
Page 91 1 Because, you know, yes, the inlay looks similar, 2 but the construction of the two ring halves are the 3 opposite of what's shown in figure 5. So that -- that 4 wasn't -- even in light of the '178 patent, which I could 5 use hindsight to interpret this patent for, when I was 6 reading this, I didn't, at first, assume that it was, you 7 know, just one piece of -- looking at one piece of the 8 ring, because, when Schroder does describe a cross section 9 of, you know, half of a ring, he shows the whole ring, and 10 then suddenly, in figure 7 -- 6 through 10, he's only 11 showing part of it. I assumed that this was a cross 12 section of the entire ring when I first looked at this, and 13 even now, after further analysis. 14 BY ATTORNEY HABER: 15 Q. Whether halves 16 and 18 are kind of sliced like a 16 bagel, as you say, with regard to figure 5 or constructed 17 differently, you know, with an inside and outside surface, 18 they would generally be constructed the same way and 19 Schroder describes how such materials could be constructed, 20 right? 21 ATTORNEY PLUTA: Object to form. Lack of 22 foundation. 23 THE WITNESS: I'm not -- I'm quite sure what you 24 mean. Could you perhaps rephrase? 25 /////	Page 93 1 an inner housing component, if I were Schroder, I would 2 have used a different element number and called it so. 3 Q. But Schroder refers to those component as ring 4 halves, right? 5 A. Right. 6 Q. And it wouldn't make sense, in your mind, for 7 Schroder to refer to an inner half and an outer half? 8 A. I mean, that wouldn't be -- I mean, the inner half 9 would be less than the outer half in terms of size and 10 volume. Those aren't really halves of each other, right? 11 If you do a bagel cut, they're very cleanly two halves of 12 equal size, right? 13 Q. So in your opinion, when Schroder uses the term 14 "half," you think he means literally identically half? 15 Like in volume and mass and everything? 16 A. Well, in looking at figures 4 and 5, that would be 17 my interpretation, yeah. 18 Q. And looking at figure 7, which, I think you read 19 earlier, appears to be rotated 90 degrees because 20 element 16 would be a little bit smaller as the inner half 21 than element 18 as the outer half, that isn't what Schroder 22 means by half? 23 A. Yeah. I mean, again, at best, Schroder is very 24 unclear about all of this. But, yeah, that would be my 25 interpretation because figure 7 is just, you know, a

Page 94 1 two-dimensional image, and if it were referring to an 2 external and internal component, you know, first of all, he 3 wouldn't have used the term "half." Second, he wouldn't 4 have used the same element 16. And, third, presumably, he 5 would have tried to show, you know, the curvature of the 6 device and/or indicated that this was a cross section of 7 only, you know, one part of the ring and not the whole ring 8 structure. 9 So there's a lot that, you know, Schroder could 10 have and -- done and didn't do if he were trying to intend 11 to refer to something different. But there's a lot that he 12 did do to make it seem and sound like it's just referring 13 to two ring halves, as depicted in figure 5. So that's 14 ultimately how I came to my conclusion. 15 Q. I think you testified earlier that, in your 16 opinion, figure 7 is some different cross section of what's 17 shown in figure 5, right? 18 A. Right. 19 Q. What cross section would result in the shape shown 20 in figure 7? 21 A. Yeah. So I tried to illustrate this with my 22 hands, and I realize this may not come out very well, but, 23 you know, if you have a circle -- let me put it right here 24 (demonstrating) -- figure 5 is a cross section right 25 through the middle of the circle, and then you look at the	Page 96 1 A. So one thing I'd further like to point out is, in 2 reading Dr. Anthony's declaration carefully, he refers to 3 the inlay 12 as having both components inside of it and on 4 it. And so I was confused with his interpretation of what 5 element 12 meant. You know, an inlay, which might be, you 6 know, the thin piece of Kapton tape, maybe 100 microns in 7 width -- or in thickness, for example, couldn't possibly 8 have components fitted inside of it but could certainly 9 have components on it. 10 And so -- but, yeah, my read of Schroder is that, 11 you know, there's certainly a recess in which an inlay 12 exists. Yes. 13 Q. Okay. And what Schroder says is that the inlay, 14 made of some carrier material, could include components 15 such as chip module 10, antenna coil 8, and at least one 16 further electronic component, right? 17 A. Sorry. Can you point me to where you're reading? 18 (Clarification by the certified stenographer.) 19 BY ATTORNEY HABER: 20 Q. Column 12, line 40. 21 A. Yes. It says, you know (as read): 22 One further electronic component can also be 23 located on the carrier. 24 Yes. 25 Q. Right. And would you agree that Schroder
Page 95 1 device from the side. I'm looking at it, you know, from 2 the side. 3 My best guess is -- to figure 7 is you take a 4 cross section at an angle like so (demonstrating), and then 5 you look at it from the -- from that perspective. And if 6 you take it at just the right position and angle, you would 7 see -- and you represent it as a two-dimensional drawing, 8 you would see the two ring halves coming together with the 9 inlay kind of in between, but, of course, you can't see the 10 curvature of that inlay in this simple two-dimensional 11 drawing. 12 Q. Is that -- that cross section you're describing -- 13 is that a standard cross section that you would see in 14 engineering design work? 15 A. It could be. I -- you know, again, I think 16 Schroder didn't describe what cross section he was 17 referring to in figure 7, and so I'm just using my best 18 judgment to come to a conclusion here. 19 Q. Okay. Regarding what's identified as 12 in 20 figure 4 and figure 5, figure 6 through 10, you don't 21 dispute that there is a recess between these two ring 22 halves, right? 23 A. That's right. 24 Q. And the inlay 12 is fitted into that recess, 25 correct?	Page 97 1 describes an energy storage device, e.g., an accumulator or 2 a battery? It's at column 11, line 47. 3 A. Yes. Schroder does disclose in the written 4 specification an accumulator or battery. 5 Q. You would agree that -- I'm sorry. I didn't mean 6 to cut you off. 7 A. I'm sorry. Just to continue that. I would agree 8 it's disclosed in the written specification. It is not 9 disclosed in the figures. 10 Q. Okay. You would agree that a accumulator or a 11 battery is an electronic component, right? 12 A. Yes. 13 Q. And so the accumulator or battery is an electronic 14 component that could be located on the carrier, right? 15 A. Could be. But I guess, just to further expand on 16 that, you know, given the knowledge of a POSITA of the 17 dimensions here, it's my opinion that, if the battery were 18 located on the carrier, it would be located in a similar 19 position to where figure 3 indicates where the chip module 20 would be, simply because a battery of sufficient size to, 21 you know, power the device in question here would be too 22 large to fit on a 100-micron-thick carrier. 23 Q. You mentioned certain dimensions. Where are you 24 getting those dimensions from? They're not in Schroder, 25 are they?

Page 98 1 A. No. So Kapton, as an example, is a material that 2 I have some experience with, you know, using Kapton tape 3 and stuff in various experiments, and, you know, usually 4 those are pretty thin; 100 micron is a very, very rough 5 estimate, but I think a good one. And, actually, I did 6 read the ITC case public summary, and one of the other 7 experts that was quoted in that case, Dr. Rossing, also 8 used 100 micron for the thickness of the carrier. So I 9 think that's a good, consistent number here. 10 Q. The recess that's shown in figure 4, figure 5, 11 figure 7, are there particular dimensions identified for 12 that recess? 13 A. Not in Schroder. 14 Q. And so the assumption that you're making that a 15 battery or a chip would not fit in Schroder's recess is not 16 based on any dimensions that are provided by the Schroder, 17 right? 18 A. I mean, Schroder doesn't -- to the best of my 19 recollection, doesn't provide dimensions in anything. 20 Q. And so Schroder says that inlay 12 can have on it 21 at least chip module 10, further antenna coil 8, and at 22 least one or more electronic component, such as a battery, 23 right? 24 A. Yes. And to further that, in figure 3, you know, 25 which is the -- well, figure 2 and 3, which are the only	Page 100 1 module, just as all the prior art in smart rings had done 2 up until this time. 3 Q. So you, again, referred to figure 3. Figure 3 4 doesn't appear to show the recess. The recess is shown in 5 figure 4, right? 6 A. Well, let's be careful here. Figure 4 points to 7 element 12, which is described as an inlay, which is shown 8 in figure 3. Figure 12, I don't believe, is referred to as 9 a recess. If it is, please let me know. 10 Q. I can direct you to column 12, line 8, which says 11 (as read): 12 The two ring halves 16 and 18, respectively 13 have a recess into which inlay 12 is inserted. 14 And that's talking about figure 4. 15 And so -- I mean, is it your opinion that what's 16 shown in figure 4 is not a recess? 17 A. Well, figure 4 is specifically only -- the only 18 noted elements in figure 4 are ring half 18 and inlay 12, 19 which -- if we go back up to figure 3, figure 3 also refers 20 to inlay 12, which I understand is inserted into a recess 21 between the ring halves. So I think they're describing the 22 same thing. 23 (Clarification by the certified stenographer.) 24 BY ATTORNEY HABER: 25 Q. Well, I think -- and you can correct me if I'm
Page 99 1 figures that actually show the chip module, they show it as 2 protruding through the surface of the ring into -- I mean, 3 figure 3 shows this into the -- you know, past the exterior 4 surface of the ring. 5 And so -- and a chip module, based on my 6 experience designing small devices, is likely to be much 7 smaller than a battery would be to power said chip module, 8 if it's not being powered by RFID or NFC or something like 9 this, which is the principle embodiment or the main 10 embodiment that Schroder talks about throughout the patent. 11 If -- if a battery were needed to operate this 12 device, I believe -- it's my opinion that a POSITA would 13 consider that the battery is likely to be larger than the 14 chip module. 15 And so, in coming to the conclusions that I came 16 to, Schroder already shows that the chip module is too 17 large to reside inside the housing of the ring -- inside 18 the curved housing of the ring, we'll say, and so it needs 19 to protrude through the top. And as a result, my opinion 20 would be that, although no battery is shown in Schroder and 21 no guidance is given in Schroder as to its location or 22 approximate size or really anything other than just simply 23 disclosing that there could be a battery, I believe a 24 POSITA reading this would understand to locate that battery 25 on the top of the ring, perhaps on top or next to the chip	Page 101 1 wrong, but I think there is an important distinction 2 between figure 3 and figure 4. Figure 3 doesn't describe 3 inlay 12 being inserted into a recess between the ring 4 halves. That's in figure 4, right? 5 A. So as it relates to his description, beginning 6 with figure 3 up until where he begins to talk about 7 figure 4 -- and, again, there's quite a bit of text here. 8 I haven't reviewed all of it, again, looking for this. But 9 I don't believe he uses the word "recess." So, you know -- 10 but, I mean, he's describing an inlay inside a ring. I 11 mean, it must go inside a recess, right? 12 Q. I think -- you tell me. I mean, is that -- is 13 that true? Does it have to be a recess anytime there's an 14 inlay? 15 A. I think so. I mean, how else is it going to get 16 in there? It needs space to exist, right? 17 Q. So figure 4 talks about a recess in which inlay 12 18 is inserted. Right? Kind of implies that there's a recess 19 that exists, and then inlay 12 is put into that recess, 20 right? 21 A. That's right. 22 Q. It's possible that you could design a ring that 23 doesn't have a preexisting recess and have the different 24 halves injected, molded, or built around the component, 25 right?

Page 102 1 A. I'm trying to think this through in real time, 2 but, I mean, the inlay depicted in figure 3 exists inside 3 of the device. The inlay can't occupy the same physical 4 volume as something inside the device. It's a separate 5 element. So I think, necessarily, it must be in the 6 recess, and if I'm not mistaken, I think Dr. Anthony said 7 the same thing, although I'll have to double-check that. 8 (Clarification by the certified stenographer.) 9 THE VIDEOGRAPHER: There's a new videographer 10 coming for after lunch. That's just him. 11 BY ATTORNEY HABER: 12 Q. I mean, if we're just going by kind of a straight 13 literal reading of the figures that you're reading, 14 figure 3 doesn't depict ring halves at all. It doesn't 15 show 16 or 18 in it. 16 A. Yeah. That's right. 16 and 18 are not mentioned. 17 Q. And so there's a very clear difference between the 18 embodiment in figure 3 and the embodiment in figure 4, 19 right? 20 A. So the clear difference between figure 3 and 21 figure 4 is that figure 3 is the only one that explicitly 22 shows the chip module and, of course, the replaceable -- or 23 the hinged cover. Both depict inlay 12. 24 Q. In figure 4, inlay 12 is depicted with, you know, 25 a certain volume. Figure 3, it's showing just a single	Page 104 1 the inlay. 2 And I should note that I do presume that figure 3 3 and figure 4 are showing rings of approximately the same 4 dimensions. And figure chip module 10 is indicated as 5 being much larger than the thickness of the alleged recess 6 shown in figure 4. So if it was his intention to show that 7 chip module 10 would fit inside the recess allegedly shown 8 in figure 4, I don't see how it could fit. 9 Q. So that opinion that you're offering that 10 element 10, as shown in figure 3, is much larger, that's 11 just based on the figure alone, right? There's nothing in 12 the specification that identifies how large element 10 is, 13 correct? 14 A. That's right. And -- yeah. That's right. 15 Q. Is it your opinion that figure 3 is drawn to 16 scale? 17 A. Schroder gives no indication that that is the 18 case. 19 Q. So you would agree figure 3 is not necessarily 20 drawn to scale? 21 A. Correct. Nor, in that case, would figure 4 be 22 drawn to scale, or any other figure in Schroder, for that 23 matter. 24 Q. Okay. But the specification does describe a 25 recess with regard to figure 4, and while we can't
Page 103 1 line, right? 2 A. Yes. 3 Q. And so you would agree that, in figure 4, there is 4 some extra space of volume where inlay 12 is identified. 5 If that space or volume was sufficient -- 6 (Clarification by the certified stenographer.) 7 BY ATTORNEY HABER: 8 Q. If that space was sufficient, electronic 9 components, chips, batteries could be inserted, correct? 10 ATTORNEY PLUTA: Object to form. 11 THE WITNESS: I mean, I don't know. You know, I 12 don't know why Schroder decided to indicate inlay 12 as 13 being one solid line in figure 3 and two lines in figure 4. 14 If that isn't his intention, I should note that the line 15 inside identified element 12 is unmarked, and so it's not 16 actually totally clear what that's depicting. 17 If we assume that the space between what's marked 18 as inlay 12 and the next line is a recess, Schroder also 19 doesn't give any guidance as to the height or thickness or 20 whatever dimension, any dimension of this recess, nor does 21 Schroder actually show any electronic components arrayed 22 inside this recess. 23 The only electronic component he shows in the 24 entire disclosure is in figure 3 -- well, I guess, in 25 figure 2 where he shows the chip module residing on top of	Page 105 1 potentially get dimensions of the recess, what's shown in 2 figure 4 at least appears to be a recess, correct? 3 A. I'm not -- I mean, Schroder doesn't really say. I 4 mean, it's not labeled, right? So Schroder discloses a 5 recess, but in the -- in the text, but he doesn't point to 6 what is the recess on the ring. You know, I think that's a 7 reasonable interpretation that that could be a recess. But 8 it's not 100 percent clear. 9 Q. So I think we already pointed to a portion in 10 column 12 which identifies inlay 12 that consists of 11 preferably a flexible carrier material. You see that? 12 (Clarification by the certified stenographer.) 13 THE WITNESS: Line 28 or so. Yeah. 14 BY ATTORNEY HABER: 15 Q. Yeah. 16 There's -- if you continue on to line -- I'm 17 sorry -- column 13, starting around line 23, there's a 18 discussion of carrier foil. 19 Do you see that? 20 A. Yes. 21 Q. The inlay 12, which begins with a carrier material 22 like PET or Kapton, could it have carrier foils laid on top 23 of it? 24 A. I'm sorry. I'm not sure I got that question. 25 Q. Inlay 12, which is identified in column 12 as

Page 106 1 being formed with a carrier material like PET or Kapton, 2 could it be layered with additional carrier foil layers on 3 top of it? 4 A. I don't -- yeah. I would assume that -- I mean, 5 that could be possible. Sure. 6 Q. It says, further down on column 13, line 35 7 (as read): 8 The carrier foil itself consists of a flexible 9 plastic material, e.g., PET or Kapton. 10 Do you see that? 11 A. Yeah. 12 Q. And this whole paragraph, starting from column 13, 13 line 22 to line 45, is describing how different components, 14 such as chip module 8, antenna coil 8, and further 15 electronic devices, can be printed on a carrier foil. 16 Do you see that? 17 A. Well, I see they say that the antenna coil 8 can, 18 for example, be printed on the carrier foil by means of 19 conductive paste. I don't see reference to printing of 20 other devices onto the carrier foil. 21 Q. But you see how the carrier foil may have 22 depressions manufactured into the carrier foil, for 23 example, by milling, lasering, and etching. 24 Do you see that? 25 A. I do.	Page 108 1 and you have a chip that's 1 millimeter in height. You 2 could make a depression of 25 micron into the -- into the 3 carrier foil and place the chip module in that depression, 4 so you've saved 25 micron on a 1-millimeter tall device. 5 It puzzles me as to what's being -- what the 6 intention here -- or what the advantage of doing this is. 7 Q. What Schroder is saying is that you can have 8 multiple layers, right? 9 A. Yes. 10 Q. And what Schroder is saying is that the purpose of 11 these depressions -- this is reading from column 13, 12 line 30 (as read): 13 The depression has the purpose that the 14 devices to be inserted into the depression should 15 not protrude beyond the carrier foil, if possible, 16 so that even -- so that an even surface is present 17 on the carrier foil to facilitate a later 18 processing of the carrier foil with inserted 19 devices. 20 Do you see that? 21 A. I do. 22 Q. So what Schroder is saying is that you can build 23 up these multilayer carrier foils with appropriate space 24 for electronic components to be inserted into them, right? 25 (Clarification by the certified stenographer.)
Page 107 1 Q. And electronic devices can be inserted into those 2 depressions. 3 Do you see that? 4 A. Yes. And I have to say this is something that, as 5 a POSITA or at the time of invention or even myself today, 6 as someone well beyond the definition of a POSITA, frankly, 7 I don't understand what Schroder is intending here. 8 Because, again, this -- this flexible carrier foil 9 necessarily must be thin in order to impart flexibility, 10 and now Schroder is talking about creating a depression 11 through lasering or etching or something like this into the 12 foil for the purposes of placing components, which, to me, 13 doesn't make sense, because these components are going to, 14 themselves, be much, much thicker than a carrier foil that 15 would be engineered to be flexible. 16 So I was very confused as a beyond-POSITA, as it 17 were, in reading this section as to what Schroder was 18 intending. 19 Q. So what Schroder is saying is that there are 20 depressions and the electronic components are inserted into 21 depressions in this carrier foil, right? That's what he's 22 saying? 23 A. Yes. Again, with what I said before where I'm not 24 sure, you know, if -- to take an example, let's say you 25 have a 100-micron-thick Kapton tape as your carrier foil,	Page 109 1 THE WITNESS: So, again, I retain my puzzled 2 thought process here. And it might help if we go back to 3 my disclosure, my report, and let's look at -- let's say 4 page -- sorry. One moment. 5 ATTORNEY PLUTA: While he's looking for that, 6 Counsel, when you get to a stopping point, let's break for 7 lunch. 8 ATTORNEY HABER: Yep. Fine. 9 THE WITNESS: Let's look at page 114. 10 BY ATTORNEY HABER: 11 Q. Page 114 or paragraph 114? 12 A. Page 114. 13 Q. Okay. 14 A. And so, if you look at the top figure, you can see 15 a printed circuit board that has components mounted onto it 16 and the printed circuit board -- sorry. I'll let you get 17 there. 18 Q. Okay. 19 A. So you can see the printed circuit board which 20 kind of encompasses the labeled second portion of the 21 cavity. You can see this kind of almost copper-looking, 22 thin, flexible substrate that goes through the entire lower 23 arc of the ring there. And at various different places, 24 there are mounted components on top of the -- on top and 25 bottom of this flexible printed circuit board. And you can

Page 110 1 see here the thickness of those components is quite a bit 2 thicker than the thickness of the flexible printed circuit 3 board. 4 And so, again, this is, you know, a design that is 5 current as of Oura generation 3, which was released in 6 2001, so well beyond the invention date here where 7 technology has matured over at least a decade of time -- or 8 about a decade of time. And you can see that these 9 components are much thicker than the flexible printed 10 circuit board here. 11 And so -- and this is a circuit board, presumably 12 multilayer and so on. Not just a carrier foil. And so, 13 again, it puzzles me when Schroder is referring to putting 14 a recess -- or not a recess -- a depression into the 15 carrier foil such that components would be, you know, even 16 height with the carrier foil. It puzzles me what he's 17 referring to here when we can see state-of-the-art 18 technology as of 2001 -- 2021 not being able to do that. 19 Q. So is it your opinion, then, that what Schroder is 20 suggesting is not possible? One of skill in the art 21 couldn't do what Schroder is suggesting here? 22 A. So, I mean, at best, Schroder is unclear 23 throughout the disclosure of what exactly he's intending 24 here. But, yes, that would be my opinion, that, when he's 25 talking about having one or more foils stacked on top of	Page 112 1 was to make it such that the devices would be kind of even 2 with the rest of the surface of the carrier foil, I didn't 3 see that -- how that was possible. 4 Q. Would you agree that Schroder is at least 5 suggesting an approach to kind of minimize the usage of 6 space and save space in internal components? 7 ATTORNEY PLUTA: Object to form. 8 THE WITNESS: It seems like that's the intent of 9 this writing, yeah. 10 BY ATTORNEY HABER: 11 Q. Let me share my screen. 12 All right. Can everyone see my screen? 13 A. Yes. 14 Q. Okay. So I have on the screen a paragraph -- or 15 an image from your expert report. It's on page 110. And 16 this is a cross section of the Oura gen 3 device, correct? 17 A. Yes. 18 Q. And looking at this image, is it correct that one 19 of skill in the art would have understood that the upper 20 part corresponds to the external part of the ring and the 21 lower part corresponds to the internal part of the ring or 22 contacts the user's skin? 23 A. So we were using a definition of person of 24 ordinary skill of the art of a hypothetical person that 25 existed in 2013, or whatever the earliest priority date of
Page 111 1 each other and then a depression manufacturing into them 2 such that components could be of even height with the -- 3 with the foil is not something a person of skill of the 4 art, certainly as of 2013, with two years' experience out 5 of their undergraduate degree would be able to do. 6 ATTORNEY HABER: All right. Why don't we -- it's 7 a good time to take a break for lunch. 8 (Clarification by the certified stenographer.) 9 ATTORNEY PLUTA: Yes. 10 THE VIDEOGRAPHER: Going off the record at 11 approximately 12:10 p.m. 12 (Lunch recess taken.) 13 THE VIDEOGRAPHER: We are now on the record. The 14 time on the monitor is 12:52 p.m. 15 BY ATTORNEY HABER: 16 Q. Great. Welcome, everyone, back from lunch. 17 We were talking about Schroder before we broke for 18 lunch. And a few more questions on Schroder to continue 19 with. 20 I have Schroder in front of you. I was asking you 21 about the paragraph in column 13, around line 22 through 22 47. And I believe your testimony earlier was that, in your 23 opinion, one of skill in the art would not have been able 24 to do what Schroder is suggesting here; is that right? 25 A. Yeah. I said that if the intention of Schroder	Page 113 1 the patent was, and now we're looking at a device that was 2 released in 2021. So what definition of POSITA should I be 3 using to answer that question? 4 Q. You should use the definition that is applicable 5 in this case, which is, I think, the definition in 2013. 6 A. So if that same person, I guess, time-traveled to 7 2021 and then looked at this picture? 8 Q. Right. It's hard to put yourself in the shoes of 9 this hypothetical person, but that is -- that is the task. 10 So the hypothetical person is as defined kind of in your 11 declaration as a person of ordinary skill in the art in 12 2013. And so that's the framework of this question. 13 A. Got it. Okay. 14 And so -- yeah. I mean, as I kind of illustrated 15 on the figure, there's an external housing component of one 16 material. There's an internal housing component of another 17 material, and in this case, there's a component in the form 18 of a battery that's in between those two. 19 Q. And that POSITA, looking at this figure, would 20 have understood that the -- kind of the bottom component 21 identified in purple as internal housing -- that would be 22 the internal half of the ring that corresponds to the part 23 that touches the user's finger, correct? 24 A. Right. Yeah. 25 Q. And a person of skill in the art looking at this

Page 114 1 figure would look at the outside of that cross section and 2 say that that's the external housing that is kind of facing 3 away from the user's skin, correct? 4 A. Right. 5 (Clarification by the certified stenographer.) 6 THE WITNESS: I just said yes. 7 BY ATTORNEY HABER: 8 Q. What is it about this cross section that would 9 have informed a POSITA of kind of those respective internal 10 and external paths? 11 ATTORNEY PLUTA: Object to form. 12 THE WITNESS: Well, I mean, I think it's important 13 that the POSITA also views the other figures that I've 14 presented on the previous page, 109, that show, you know, 15 the full form and function of the ring. This is just, you 16 know, one other cross section of, you know, effectively the 17 same device, showing that, you know, there's an extern- -- 18 outer circumferential surface, an inner circumferential 19 surface, as annotated there. 20 And then, in the figure that you reference on 21 page 110, we see that cross section, and we also see the 22 curvature of the ring, you know, going through underneath. 23 So it's clear that this is corresponding to a -- to a, you 24 know, a three-dimensional ring object. 25 Q. Now, when I look at figure 7 with Schroder, it	Page 116 1 say, well, it's only showing this top piece, but in my 2 report, it was kind of very clear what exactly I was doing 3 and showing. But, unfortunately, that's just not the case 4 in Schroder. 5 Q. Is it your opinion, then, that figures in Schroder 6 are not sufficiently detailed to determine whether or not 7 the cross section shown in figure 7 is similar to the cross 8 section that you've shown here in the paragraph -- on 9 page 110 of your report? 10 A. Yes. 11 Q. Would you think that is a reasonable assumption, 12 that figure 7 could correspond to a similar cross section? 13 A. Well, again, that actually wasn't my conclusion, 14 based on my analysis of figure 7, for reasons I stated 15 earlier, including the fact that it's specifically 16 referring to ring half 16 on the bottom of figure 7 there. 17 And then so that, and accord- -- in addition to all the 18 other analysis I presented earlier, led me to my 19 conclusion. 20 Q. Well, to be clear, when we're talking about 21 figure 7, 16 isn't referred to as a ring half. It's 22 referred to as ring-shaped components. And you can see 23 that at column 12, line 45 -- 44, right? 24 A. Yes. But item 16 and 18 are also other -- 25 elsewhere described as ring half.
Page 115 1 looks very similar to the cross section as shown here, 2 doesn't it? 3 A. Well, I mean, figure 7 of Schroder, first of all, 4 is a two-dimensional diagram with very little details 5 corresponding to it. And, you know, if it were the -- I 6 think, the cross section that you're intending to refer to, 7 you know, it would have been helpful to see the rest of the 8 ring curving down. Not clear why that's not shown. 9 If Schroder had, you know, labeled this as being 10 only looking at the cross section, you know, and nothing 11 else, you know, not ignoring the rest of the ring, as it 12 were, then perhaps that would have been more clear. But, 13 unfortunately, Schroder was silent with regard to all of 14 that. He just said this is a cross section and didn't show 15 any other -- or didn't express any other details beyond 16 that. 17 Whereas, in my report, I'm referring to, you know, 18 my teardowns of the Oura gen 3, you know, showing the 19 physical embodiment, which is a three-dimensional object. 20 You can see the curvature underneath the cross section, or 21 as, you know, extruding from the cross section, and you can 22 see the other cross section that I took that kind of very 23 clearly depicts what's going on. 24 So I understand it's tempting to kind of, you 25 know, put figure 7 next to this figure in my report and	Page 117 1 Q. Okay. So your reading of Schroder, where 2 elsewhere it talks about ring half 16, is that item 16 3 actually has to be literally half of the ring, right? 4 A. That was my interpretation. I don't know if 5 it's -- you know, if it were referring to something 6 different, if I were writing the patent, I would have 7 called it something different and used a different number 8 to indicate what I was talking about to make things clear. 9 Q. Well, Schroder did use -- he did call it something 10 different, right? He called it just a ring-shaped 11 component, right? 12 A. Which is also descriptive of a ring half, right? 13 Or it's -- you know, it -- a ring-shaped component could be 14 a ring half, right? So he's -- yeah. You're right. He's 15 using a different word, but he's using the same element 16 number and that the wording that he used, you know, falls 17 under the umbrella of the earlier word that he used to 18 describe the same element number. 19 Q. Would you agree, then, that the component 16 could 20 be a ring half, could be ring shaped? Right? That's 21 what -- that's what he says. It doesn't necessarily have 22 to be exactly literally half of the device. 23 A. Again -- but, you know, that's how he's referring 24 to element 16 everywhere else in the patent. And so, just 25 because he used a different word here but still pointing to

Page 118 1 the same element, I came to the conclusion that he was 2 describing the same thing. 3 I mean, again, if I were the author, I would have 4 used a different element number and -- to indicate that I 5 was talking about something different. 6 Q. And you understand that -- that -- you understand 7 that Samsung's expert in this case came up with a different 8 understanding of Schroder. Is it your opinion that that 9 understanding, while reasonable, is wrong, or is it your 10 understanding that that -- is it your opinion that 11 understanding is completely unreasonable? 12 A. I mean, I think what you're asking me is is there 13 a level of disagreement that I'm having with the -- with 14 the other expert, and I don't know how to classify my level 15 of disagreement. I either agree, or I disagree. And in 16 this case, I disagree with his assessment. 17 Q. Fair. 18 A. Or with his interpretation, I should say. 19 Q. Now, putting aside your opinion that one of skill 20 in the art wouldn't actually be able to do what Schroder 21 suggests in column 13, you would agree that Schroder 22 suggests that the carrier foil is kind of flat to begin 23 with and then rolled into a ring shape, right? 24 A. I mean, I think that's a reasonable way to make a, 25 you know, circular-shaped carrier foil. I -- I'm trying to	Page 120 1 (Clarification by the certified stenographer.) 2 THE WITNESS: Yes. 3 BY ATTORNEY HABER: 4 Q. And so is it fair that what Schroder -- what 5 Schroder is describing is a carrier that has multiple 6 components on it; it's rolled into a ring shape and then 7 inserted into a recess between the ring components? 8 A. Yes. That is what it says. And I'd just like to 9 point out that that doesn't preclude -- in fact, in my 10 opinion, it suggests the depiction shown in figure 3 where 11 you have your carrier foil; you've, you know, coiled it so 12 it's circular; inserted into the recess. But as depicted, 13 the chip module is too big to fit fully in the recess, and 14 so it sticks out, you know, through part of the ring. 15 Q. But the extra bits you added on there about the 16 chip module being too big to fit into the recess, that 17 isn't in Schroder itself, not in those passages that we 18 read, right? 19 A. Can you -- sorry. I lost my place here. Can you 20 redirect me to the passage we just read? 21 Q. Sure. 22 It's column 15, around line 20. 23 A. Thank you. 24 So yeah. The line that we just rode -- read in 25 column 15, around line 20, is silent about the location
Page 119 1 find a -- some text in Schroder that explicitly says that. 2 I can't do it. I can't find it, you know, in real time at 3 the moment here, but I think that would be -- 4 (Clarification by the certified stenographer.) 5 THE WITNESS: -- a reasonable way to do it. 6 BY ATTORNEY HABER: 7 Q. I can direct you to column 14, around line 14 8 through 20, if that helps. 9 A. Okay. 10 Q. So what Schroder is describing there is, you know, 11 the carrier with these components on it rolled up to obtain 12 the form of a finger ring, right? 13 A. Well, the paragraph that you cited is specifically 14 referring to a ring blank, which is singled out of the 15 carrier foil. So I think that's -- what you're saying is 16 fair. Yes. 17 Q. Then, in column 15, around line 20, it's 18 describing (as read): 19 The chip module 10 and antenna coil 8 and 20 possibly further electronic devices arranged into 21 a carrier, as described above. 22 Then it continues (as read): 23 The carrier is preferably inserted into a 24 recess in the second component. 25 Do you see that?	Page 121 1 of -- the relative location of the chip module in this 2 arrangement. But, again, I think a POSITA reading this and 3 understanding the relative size of chip modules to carrier 4 foils, in addition to the disclosure taught in figure 3 of 5 Schroder, would come to the conclusion that the chip module 6 is probably extruding from the -- from the recess. 7 Q. Okay. And so I understand that's your opinion. A 8 POSITA might implement it according to the embodiment in 9 figure 3. Is it your opinion that a POSITA would not be 10 able to implement it according to the embodiment of 11 figure 4? 12 A. You know, to answer your question, I really wish 13 that Schroder was more descriptive about what's going on in 14 his drawings and in his written disclosure here because 15 it's -- it's -- you know, figure 4 doesn't show any 16 components. It doesn't even really show the carrier foil 17 other than just one solid line that wraps around the -- an 18 internal perimeter of the ring. And so I think this places 19 a big burden on the POSITA to figure out where and how to 20 place all of these elements to make it work in, you know, 21 one small finger-worn ring. 22 Q. Okay. And so -- but I think my question is a 23 little bit more specific. Is it your opinion that one of 24 skill in the art would not be able to implement the carrier 25 that's described in Schroder in figure 4 where it calls out

Page 122 1 to place the inlay? 2 (Clarification by the certified stenographer.) 3 THE WITNESS: It's my opinion that a person of 4 skill in the art reading this -- and, again, putting myself 5 in the lens of, you know, one of my graduate students who 6 just finished two years of master's degree or work 7 experience and is coming to do research -- would have 8 picked up Schroder and read it, read all of the prior art 9 and ring design and -- that existed, you know, as of -- as 10 of 2013, and came to the -- and would come to the 11 conclusion that, okay, yeah, you can build a carrier foil. 12 You can place components on the carrier foil. You can 13 insert the carrier foil itself into the recess, and the 14 devices that you'd have to add to it that are of, you know, 15 large height would go on the top of the device as depicted 16 in figure 3, and all of the other prior art in ring design 17 as of 2013. 18 BY ATTORNEY HABER: 19 Q. Now, the '178 patent -- strike that. 20 What teaching in the '178 patent would have 21 instructed that same POSITA to do something different than 22 what's suggested in Schroder? 23 ATTORNEY PLUTA: Object to form. 24 THE WITNESS: I mean, I think there's a massive 25 difference between the '178 patent and Schroder. The '178	Page 124 1 see anything in the literature that had everything in a -- 2 in a circular recess around the -- around the entire ring. 3 Q. Now, focusing on figure 4, you would agree that 4 there's nothing in figure 4 that suggests anything 5 protruding from the otherwise circular shape of the ring in 6 the inlay, correct? 7 A. That's correct. 8 Q. And would you also agree that Schroder discloses a 9 number of components that it instructs should be part of 10 its ring device? 11 A. In the written disclosure, Schroder does describe 12 a number of components that could go into a ring device in 13 various exemplary embodiments. But, again, unfortunately, 14 in figure 4 and figure 5 and figure 6 through 10, there's 15 no such disclosure of those components, of their relative 16 size, location, arrangements or anything like that. 17 The only such disclosure in the figures is in 18 figures 2 and 3. And so, again, in coming to my 19 conclusions, I feel like we're placing a great deal of 20 expertise on this POSITA to fill in the blanks that 21 Schroder doesn't adequately describe. 22 Q. The specific details that, in your opinion, 23 Schroder doesn't adequately -- adequately describe, such as 24 the size and the internal components and the size of the 25 recess or cavity, those aren't specifically recited in the
Page 123 1 patent has 49 figures, a very extensive written disclosure 2 showing a lot of mechanical and electronic detail about how 3 to arrange components, where to arrange components, and so 4 on. That's just not present in Schroder. And so, if I 5 were to give a graduate student of mine a copy of the '178 6 patent, you know, I think they would -- they would be able 7 to follow what's written here. 8 But if I gave them a copy of Schroder, it's not my 9 opinion that they would come up with a design that fits 10 everything inside the recess. 11 BY ATTORNEY HABER: 12 Q. You would agree that, at the very least, Schroder 13 suggests fitting all of the electronic components in the 14 recess. It's just your opinion that one of skill in the 15 art would not have had the engineering capability to do so; 16 is that right? 17 A. No. That's not what I was saying. I was saying 18 that, yes, you can fit the carrier foil in the recess, but 19 that doesn't mean that all of the components would be 20 neatly located in that recess. But, rather, most likely, 21 the -- some of the components would stick out of the recess 22 as depicted in figure 3 and is in all of the prior art in 23 the literature for smart rings up until 2013. 24 And, actually, to take that a step further, in my 25 research of smart ring design, even after 2013, I didn't	Page 125 1 claims of the '178 patent, right? 2 A. I mean, the claims of the '178 patent describe, 3 you know, a lot of the features and components that would 4 go into a ring design. It does describe and disclose a 5 curved battery that would fit within -- you know, between 6 the external and internal housing components, but more 7 importantly, to answer your question, you know, the claims 8 are read in light of the specification, and the 9 specification has a lot of detail about, you know, relative 10 sizing and placement and so on and arrangements of various 11 different components. 12 But your -- I mean, in the claims, you know, are 13 there exact words in the claims that describe sizing? No. 14 But, again, the claims need to be read in light of the 15 specification, and a POSITA reading the specification would 16 understand some of the relative sizing, positioning, and 17 arrangements and so on, being referenced in the claims. 18 ATTORNEY HABER: Bring up another document. I'll 19 drop into the chat. It's the Niwa patent. 20 (Exhibit 1005, previously marked, was 21 presented.) 22 BY ATTORNEY HABER: 23 Q. Do you have the document? 24 A. Yes. I have it in front of me. 25 Q. So it's actually a patent publication, U.S. patent

Page 126 1 publication number 2012/0016245, to Niwa, submitted as 2 Exhibit 1005 in this proceeding. 3 Again, if I refer to this as the Niwa patent, 4 you'll understand that I'm referring to this patent 5 publication? 6 A. Yes. 7 Q. Now, Niwa has an embodiment of a finger ring, 8 correct? 9 A. Yes. 10 Q. And in the finger ring embodiment of Niwa, there 11 is a component that's identified as a battery, correct? 12 A. Yes. 13 Q. I'm looking at figure 28, identified there as 14 battery 24, right? 15 A. That's correct. 16 Q. Does Niwa provide size or dimensions for this 17 battery? 18 A. I'm just doing a scan of the written specification 19 in Niwa. There is no size indicated on figure 28 or 20 figure 29, and a quick scan doesn't reveal anything, but 21 it's possible I may have missed something. 22 Q. So it's a long specification. I'll direct to you 23 paragraph 201. 24 A. Oh. There we go. Okay. 25 Q. So the thickness of the battery in Niwa is	Page 128 1 A. I think we're doing an apples-to-oranges 2 comparison here because the battery in the Oura Ring is 3 curved, whereas the battery in Niwa is specifically 4 indicated in the specification of Niwa as being highly 5 flat. 6 Q. Okay. 7 A. And so, you know, looking to figure 28, in 8 addition to the battery, there's many other components 9 depicted stacked on top of the battery which Niwa further 10 discloses is a good arrangement of components and a good 11 use of space. All of those components on top of each other 12 would not fit in the Oura Ring. 13 And, furthermore, if it was just the battery, 14 while the thickness may be of similar size as in the -- as 15 in the Oura Ring, it's highly flat, and so the diameter of 16 a battery of this hypothetical situation where we want to 17 take Niwa's battery and put it into an Oura Ring would have 18 to be extremely small, to the point where I think a POSITA 19 would understand that it would not offer sufficient peak or 20 capacity capabilities to run all of the devices disclosed 21 in Niwa or the '178 patent. 22 Q. And, again, just to be clear, you pointed out that 23 Niwa's battery is flat and not curved. Is it your opinion 24 that a curved battery is necessary to practice claim 1 of 25 the '178 patent?
Page 127 1 between 2 millimeters and 5 millimeters. 2 A. I see that. 3 Q. The curved battery that is in the Oura gen 3 4 product that you analyzed, do you know how thick that is? 5 A. I -- I don't, off the top of my head, know. 6 Q. You didn't measure it? 7 A. I didn't. 8 Q. You didn't think you needed to measure the 9 thickness of that battery to determine whether or not it 10 satisfied the claims? 11 (Clarification by the certified stenographer.) 12 THE WITNESS: I did not. 13 BY ATTORNEY HABER: 14 Q. The battery in the Oura gen 3 or gen 4 device, 15 would you say that it is on the order of 2 millimeters? 16 A. Approximately. 17 Q. And so the battery of thickness that's described 18 in Niwa on the order of 2 millimeters, at least in some 19 commercial -- 20 (Clarification by the certified stenographer.) 21 BY ATTORNEY HABER: 22 Q. Let me ask my question again. 23 So the battery in Niwa that is on the order of 2 24 millimeters is on the same order of thickness as at least 25 some embodiments that practice the claims, correct?	Page 129 1 A. Well, I think we've -- we've discussed this prior, 2 and my opinion is that a POSITA would understand that a 3 curved battery is necessary to meet the capacity and peak 4 power demands of the constituent components that the other 5 claims -- or the rest of claim 1 and the rest of the claims 6 in the patent, the '178 patent, require. And going to a 7 substantially smaller battery that is highly flat, as 8 disclosed in Niwa, a POSITA would understand, would not 9 offer sufficient peak power capabilities and energy 10 capacity to run the ring. 11 Q. Where in the '178 patent is there any teaching of 12 a battery specifically with peak power capabilities and 13 energy capacity to run the components of the ring? 14 A. So if you refer to -- sorry. I lost my place. 15 If you refer to column 15, line 16, of the '178 16 patent. 17 Q. Okay. 18 A. Let me know when you're there. 19 Q. Yeah. I'm here. 20 A. Okay. It says (as read): 21 The battery can provide power to any of the 22 components described above. 23 And described above are many different components, 24 and so this is where the knowledge of a POSITA has to come 25 into play here. And unlike some of the other burdens that

Page 130 1 were -- that were placed on the POSITA in some of the 2 arguments as it relates to Schroder and other embodiments, 3 in this case, I think this is a very reasonable burden to 4 place on the POSITA. 5 Again, I teach and mentor students who fit the 6 definition of POSITA in my lab and in my courses every day. 7 And having them do a power budget of a device that has a 8 Bluetooth radio, a PPT sensor, accelerometer, 9 microprocessor, and things like this is a pretty standard 10 thing that one would do when constructing a device like 11 this. 12 And so it would be a relatively straightforward 13 exercise for a POSITA to undergo that analysis and then use 14 the results of that analysis to determine if, you know, the 15 battery that's been selected can meet the peak power 16 demands and the energy capacity required for that 17 application. 18 Q. Okay. So it's fair to say, then, that a POSITA 19 would be able to look at the components that need to be 20 powered and do a routine engineering exercise to determine 21 the proper power supply and other features of the battery, 22 correct? 23 A. Yes. In fact, if you read some of the prior art 24 literature described in -- from Professor Harry Asada and 25 orders, they do similar types of analysis.	Page 132 1 the device. So just picking up Schroder, it would be hard 2 for a POSITA to do that analysis, in my opinion. 3 Q. And if, for example, one of skill in the art 4 wanted to do that analysis and implement a curved battery 5 to -- for whatever reason they had, you know, that is 6 within the level of skill in the art, correct? 7 A. So, again, putting myself in the shoes of a POSITA 8 circa 2013, looking at smart rings, it's not my opinion 9 that it would have been obvious to consider a curved 10 battery, for multiple reasons. Reason number 1 is that the 11 state of the art, as of 2013 and beyond -- all the prior 12 art in smart ring designs did not consider a curved battery 13 and instead located the battery on the top surface of the 14 battery in a -- or a top surface of the ring, building, 15 ultimately, a Super-Bowl-style-sized ring. And so a POSITA 16 would have been motivated by that prior art to do something 17 similar. 18 And, furthermore, it's my understanding, based on 19 my research and my knowledge of the art at that time, is 20 that there were no curved batteries of appropriate size to 21 fit into a small finger-worn smart ring. 22 Q. You would agree that curved batteries existed 23 previously, correct? 24 A. I do. 25 Q. And I think there's an example that's provided in
Page 131 1 Q. And similarly, a POSITA would be able to do that 2 analysis, to properly size a curved battery, if that's what 3 was called for, correct? 4 ATTORNEY PLUTA: Object to form. 5 THE WITNESS: Yeah. After doing the power 6 analysis, they would understand the peak and average power 7 needs of the device and would use that information to, you 8 know, select an appropriate battery. 9 BY ATTORNEY HABER: 10 Q. And that analysis isn't really described in 11 the '178 patent because one of skill in the art would have 12 understood how to do that and used basic engineering 13 principles to do so, correct? 14 A. Correct. 15 Q. And then, when I look at Schroder, for example, 16 and I have a particular space where a battery might want to 17 go and a certain number of components that I want to power 18 with that battery, it would be within the level of skill in 19 the art to figure out the particular implementation details 20 for such a battery, right? 21 A. I think, if Schroder was more expressive about 22 what exactly is going into the chip module and the various 23 features that he's intending to put into the ring, one 24 could do that analysis. Again, unfortunately, Schroder is 25 very unclear and/or silent about the electronic features in	Page 133 1 one of the secondary references, I think it's Mestas, which 2 teaches to use a curved battery, right? 3 A. That's right. Teaches to use a curved battery in 4 a wrist-worn device, to be clear. 5 Q. And so the curved battery that's in Mestas is 6 larger than would fit into a ring, correct? 7 A. Yes. And Dr. Anthony mentioned it would be about 8 five to ten times too big, and I agree with that. 9 Q. But you would also agree that the act of taking a 10 curved battery and making it smaller and appropriately 11 sized for whatever devices you seek to power with it is an 12 exercise of ordinary engineering effort, right? 13 A. I don't agree with that. 14 Q. And so is there any teaching in the '178 patent of 15 taking curved batteries that may be too big to fit in a 16 ring device and providing the implementation for how such a 17 curved battery would be reduced in size to fit in a 18 ring-worn device? 19 ATTORNEY PLUTA: Object to form. 20 THE WITNESS: So in answering that question, I, 21 first, want to, again, point out that Dr. Anthony did agree 22 that the battery design -- that battery design was beyond 23 the skill of the ordinary person that -- using the 24 definition he provided and I generally agree with. And I 25 agree with that statement, that battery design is beyond

Page 134 1 the skill of that ordinary person. 2 The '178 patent, you know, has a lot of 3 descriptive drawings of, you know, the ring geometries, the 4 batteries, the arrangements, and packaging and so on. So 5 the '178 patent gives a lot of technical details and 6 blueprints about how a POSITA, you know, might go about 7 designing one of these smart rings. Does it offer or teach 8 on how to do battery manufacturing? No, it does not. 9 Q. If you agree that curved batteries of the size to 10 fit in a ring-worn device didn't exist at the time of 11 the '178 patent and the '178 patent says to use a curved 12 battery of a size to fit in a ring-worn device, how would 13 one of skill in the art know how to do that if the '178 14 patent doesn't teach them? 15 ATTORNEY PLUTA: Object to form. Relevance. 16 THE WITNESS: So that's not something that I was 17 asked to analyze. I was asked to analyze, you know, the 18 prior art and see if it would have been obvious from what 19 was stated in the prior art to arrive at the innovations in 20 the '178 patent. 21 And my conclusions from that analysis were that it 22 was not obvious from the prior art that it would be 23 possible to do that. I was not asked to analyze how a 24 POSITA would take the '178 patent and then implement a 25 ring. I didn't find it necessary to do that analysis	Page 136 1 elaborate? 2 Q. What I mean is -- I think we looked at an example 3 in figure 14B of the '178 patent where there are 4 substantially flat portions of a PCB that are flexibly 5 attached to roll up into a generally arced or curved 6 surface, right? 7 A. I see. 8 Yeah. I see what you're referring to in 9 figure 14B, and then your question was? 10 Q. My question was, would you agree that one of skill 11 in the art could flexibly attach otherwise flat batteries 12 that are then kind of rolled or arced in a curved fashion, 13 like what's shown in figure 14B? 14 A. Yes. I mean, of course that's possible. You can 15 make -- you can take flat batteries or flat components, put 16 them on a flex PCB with some rigid areas and some flexible 17 areas, and arrange them in a proximate curve. That's 18 always possible. But I guess I would caution someone 19 making a design like this with batteries that -- for 20 example, in comparison to a curved battery, a small -- 21 let's say they're using coin cell batteries, have quite a 22 significant packaging overhead. And, in fact, that's shown 23 in some of the cross sections of the curved battery itself. 24 It has, you know, some volume of the battery that's 25 occupied by the pouch and, you know, the ceiling of the
Page 135 1 because we have evidence in the form of Oura gen 2, 3, 2 and 4 rings that this was possible. 3 BY ATTORNEY HABER: 4 Q. You would agree that the specific steps required 5 from going from a larger curved battery to a ring-sized 6 curved battery are not taught by the '178 patent, right? 7 ATTORNEY PLUTA: Object to form. Relevance. 8 THE WITNESS: I mean, yeah. The '178 patent is 9 not -- is not a manufacturing recipe for batteries. So, 10 no, that's not disclosed. 11 BY ATTORNEY HABER: 12 Q. And you would agree that a specific manufacturing 13 recipe, as you called it, going from a flat battery to a 14 curved battery is not disclosed by the '178 patent, right? 15 ATTORNEY PLUTA: Object to form. Relevance. 16 THE WITNESS: Again, it's -- the '178 patent is 17 not disclosing battery manufacturing steps. 18 BY ATTORNEY HABER: 19 Q. A battery in Niwa is flat. I believe Niwa says 20 that it's highly flat, right? 21 A. That's right. 22 Q. Would you agree that one of skill in the art could 23 make a generally curved surface by flexibly attaching 24 certain flat components? 25 A. I guess I'm not sure what you mean. Can you	Page 137 1 pouch and so on that's not occupied by battery chemistry. 2 Now -- and that's, you know, unfortunate. We'd 3 love to have the entirety of the volume of the battery 4 simply just be battery chemistry, but we don't live in an 5 ideal world. We live in the real world where packaging and 6 assembly are important considerations in design. 7 And so this hypothetical situation, which I should 8 note I'm not aware of any prior art that practices this or 9 suggests this in the literature prior to 2013 -- but in 10 this hypothetical situation, if you take small coin cell 11 batteries and arrange them on a flexible PCB, say, you 12 would lose quite a bit of energy -- of total energy 13 density, because each individual battery must now be 14 packaged, and now you also need space and volume between 15 each battery in order to allow for the flexing at the 16 circuit and, you know, allowing for angles and so on for 17 things to bend. 18 And so, comparing a -- this hypothetical solution 19 with a curved battery, you would get a lot less energy 20 capacity and a lot less peak power-handling capabilities, 21 which may not meet the needs of the wearable ring. 22 Q. So those considerations of energy capacity and 23 power-handling capabilities, power budgeting, you testified 24 earlier that those are standard design considerations that 25 an engineer would use in designing a battery, correct?

Page 138 1 A. Yes. That's right. 2 Q. Now -- 3 A. Sorry, one other thing just to add to my 4 explanation is not only do you need space between the 5 batteries; you now need a PCB to mount the batteries onto, 6 and so all of these things add, I'll say, horizontal 7 spacing between the batteries and also increase the 8 thickness of the entire assembly, both of which ultimately 9 result in significantly reduced battery -- total battery 10 volume for the same occupied total volume of the device. 11 Q. Okay. I'm looking at Niwa paragraph 15 -- 215. 12 And you would agree that Niwa provides a specific teaching 13 to locate the battery kind of away from sensitive 14 electronic components, right? 15 A. Let me just read the paragraph. 16 Yes, that appears to be what Niwa says. 17 Q. So following Niwa's teaching, you would want to 18 have, for example, a battery on one side of a device and 19 the electronics kind of directly opposing it as far away as 20 you can get it from the battery, right? 21 A. That's what Niwa teaches. 22 Q. The battery in Niwa is a lithium ion battery, 23 right? 24 A. Is there somewhere in Niwa in which this is 25 disclosed that you can point me to?	Page 140 1 And this statement here is, in sum, nothing 2 similar to the design implemented in the '178 patent had 3 ever been seen before. And then there's a figure from the 4 patent, figure 3B. 5 Do you see that? 6 A. Yes. 7 Q. When you're referring to the design implemented in 8 the '178 patent having not been seen before, are you 9 specifically referring to the fact that the ring doesn't 10 have bumps or protrusions on the outer surface? 11 A. What I'm referring to there is kind of -- you 12 know, if we scan through the prior pages where I'm 13 discussing the state of the art of wearable rings up until 14 2013, what you find in all of the art that I'm aware of and 15 I was able to find is you have, you know, a ring that goes 16 around the finger, and then, on the top, you have, you 17 know, a large housing with a lot of components, you know, a 18 big battery and so on at the top. 19 And, again, that includes art after 2013, 20 including the Oura generation 1 ring, in which it kind of 21 captures the same design methodology, if you will, about 22 wearing smart rings. And so, when I was referencing that 23 we had never seen anything like what happened in the -- you 24 know, what's shown in the '178 patent, what I meant is, you 25 know, all the prior art had these large housings and
Page 139 1 Q. Paragraph 179, for example, there's a lithium ion 2 battery recited. 3 A. Okay. 4 Q. And that is the same battery chemistry that's 5 discussed in the '178 patent, right? 6 A. Yeah. Lithium ion is, I believe, one of several 7 options possible or cited in the '178 patent, if I recall 8 correctly. 9 ATTORNEY HABER: Actually, I need to take a 10 five-minute break, bio break, if we can. 11 ATTORNEY PLUTA: Sounds good. 12 THE WITNESS: Sounds good. Thank you. 13 (Clarification by the certified stenographer.) 14 THE VIDEOGRAPHER: Going off the record. Time on 15 the monitor is 1:56 p.m. 16 (Recess taken.) 17 THE VIDEOGRAPHER: We're now back on the video 18 record. Time on the monitor is 2:04 p.m. 19 BY ATTORNEY HABER: 20 Q. Let me share my screen again. 21 All right. Can you see my screen? 22 A. Yes. 23 Q. All right. I'm looking at your declaration in 24 paragraph 72 on the screen. It's page 33 of your 25 declaration.	Page 141 1 protrusions at the top of the ring. 2 Q. Okay. And so what's shown at the bottom of 3 page 33 doesn't have the large housing or protrusion, and 4 that's the design that you're referring to that hadn't been 5 seen before, right? 6 ATTORNEY PLUTA: Object to form. 7 THE WITNESS: That's correct. 8 BY ATTORNEY HABER: 9 Q. And the Oura Ring generation 1 came out after 10 the '178 patent was filed, right? 11 A. That's right. 12 Q. And Oura Ring generation 1 didn't actually 13 implement the design of the '178 patent, right? 14 A. That's right. 15 Q. Is there a reason why Oura Ring generation 1 16 didn't implement the design of the '178 patent for several 17 years after the patent was filed? 18 ATTORNEY PLUTA: Object to form. 19 THE WITNESS: So my understanding is that Oura, at 20 some point, acquired the patents through acquisition of 21 other companies and their associated IP. But at the time 22 of designing the generation 1 ring, they didn't have that 23 IP and so they were just kind of doing design as POSITAs at 24 the time would have done by looking at the prior art and 25 replicating some of those strategies.

Page 142 1 BY ATTORNEY HABER: 2 Q. Do you know when Oura acquired the patents at 3 issue? 4 A. I don't -- I don't recall the exact date. 5 Q. If we take Schroder and its figure 4 at face 6 value, that it doesn't have any particular bump or 7 protrusion on the surface, isn't that similar to the design 8 that's shown here at the bottom of page 33? 9 A. So let me perhaps answer this by first saying 10 that, you know, I'm an engineer and I'm a practical person, 11 and, you know, when I look at Schroder's figure 4, I see an 12 extremely simple diagram that looks, you know, to my eye, 13 very hypothetical with very little detail. 14 And so, when I look -- when I looked at this, I 15 don't kind of see an actual implementation. I see some 16 hypothetical idea. 17 And looking at Schroder with a lens of the state 18 of the art as of 2013, I would understand that figure 3 is 19 kind of more -- is representative of the type of 20 application that Schroder was envisioning. 21 Now, with that said, Schroder's main -- and 22 according to Dr. Anthony -- sole purpose is security. And 23 so -- and, furthermore, most of the disclosure about 24 Schroder is related to RFID- and NFC-based systems. Those 25 systems provide their own power to an external device like	Page 144 1 Q. But it was still measuring kind of a biological 2 aspect, correct? 3 A. A biological aspect. Yeah, I wouldn't say 4 Schroder doing vein pattern imaging is measuring a 5 biological signal, but a biological aspect, I think, is a 6 fine way to say that. 7 Q. I'm going to go to paragraph 107. It says here 8 Schroder does not disclose any details of the battery 9 shape, size, or location within the housing structures of 10 Schroder. 11 Do you see that? 12 A. Yes. 13 Q. Well, Schroder does describe that electronic 14 components such as a battery would be located on inlay 12, 15 right? 16 A. Schroder describes electronic components located 17 on inlay 12. I should note I don't believe that he 18 specifically identifies batteries as being one of those 19 components. A battery is an electronic component, of 20 course, but Schroder doesn't, I believe, specifically say 21 that a battery is one of those. 22 Q. When Schroder says that electronic components are 23 located on inlay 12, do you have any reason to believe that 24 that's not referring to electronic components like 25 batteries?
Page 143 1 this ring. 2 And so the base implementation of Schroder is 3 basically just an RFID identification kind of system, which 4 is significantly less complicated to the prior art smart 5 ring designs referenced in my report and in the literature, 6 which include batteries and sensors and wireless 7 communication circuits and so on. 8 And so, again, putting my view as a POSITA at the 9 time of 2013 in light of Schroder's objectives and, you 10 know, discussion and its specification, no, I don't view 11 figure 4 as being like the '178 patent because, A, there's 12 not enough detail to actually understand what's going into 13 figure 4, and, B, it's for a totally different application. 14 Q. Well, the '178 patent has security applications 15 described, right? 16 A. It does. 17 Q. And Schroder also describes biometric sensors, 18 doesn't it, right? 19 A. Well, let's be a little bit clear here. When 20 Schroder is referring to biometric sensors, he's 21 specifically referring to vein pattern matching, which is 22 quite a bit different than, for example, PPG sensing, as an 23 example. And so vein pattern matching is for secure 24 authentication purposes rather than health monitoring, for 25 example.	Page 145 1 A. Well, as a POSITA, I -- a POSITA would be aware of 2 the relative size of batteries compared to, say, chips, for 3 example, understanding that batteries are significantly 4 larger than most chips. And referring to figure 3 of 5 Schroder, Schroder is showing a chip module 10 as being 6 quite large and extruding past the circular geometry of the 7 ring. 8 And so, you know, my interpretation of what 9 Schroder is referring to -- which I should say Schroder 10 just kind of, almost in passing, refers to a battery could 11 be, you know, added to the system, without any kind of 12 explicit details about how -- my understanding is that that 13 battery would very likely be located, you know, on top of 14 chip module 10, maybe beside chip module 10, at which point 15 it could be located on the inlay. 16 But, nevertheless, it would most likely be located 17 in a similar arrangement where chip module 10 in figure 3 18 is presented. 19 Q. And referring to page 54 of your declaration, you 20 have an annotated figure that shows the battery placed on 21 top of chip module 10. 22 Do you see that? 23 A. Yes. 24 Q. You just testified you would agree that it could 25 be placed on the side of chip module 10, right?

Page 146 1 A. It could be. I mean, it depends on the width of 2 chip module 10, the width of the battery, and so on. 3 Personally, I find that a little unlikely. Especially in 4 light of looking at things like Niwa and so on, which, you 5 know, give good reasons why a person of skill of the art 6 would be motivated to stack components on top of each 7 other, including on top of the battery, I'd be inclined as 8 a POSITA to listen to those teachings. But, again, this 9 all depends on the relative sizing of the components. 10 Q. And in making your figure 3, did you have some 11 assumptions on the relative sizing of these components? 12 A. My assumption -- and I think this is well placed 13 based on my experience in the art, as well as a POSITA -- 14 would understand that the battery is likely as large, if 15 not larger, than the chip module. And that's further 16 supported by essentially all the prior art in the smart 17 ring literature, which used relatively large circular 18 batteries on the top housing of the device where then a 19 bunch of different chips were placed, you know, on PCBs and 20 so on. 21 Q. The configuration that I think you've explained as 22 being well known and the way that the prior art was -- was 23 doing things -- that configuration of stacking things on 24 top of each other is not what's shown in Schroder figure 4, 25 right?	Page 148 1 semiconductor industry has benefited tremendously from 2 Moore's law, which is a scaling law that suggests that 3 the -- you know, the number of transistors you can fit on a 4 chip doubles every roughly 18 months. It's a beautiful 5 exponential law that increases computing and electronic 6 capabilities massively every year, which, you know, is used 7 to improve computing capabilities but can be also 8 potentially used to miniaturize electronics. But, 9 unfortunately, there's no kind of equivalent Moore's law 10 for battery design that I'm aware of. And my understanding 11 of batteries is that they scale extremely slowly over time. 12 Q. Okay. But you would agree that there was kind of 13 a general pressure in the industry around 2013 to attempt 14 to miniaturize batteries, correct? 15 ATTORNEY PLUTA: Object to form. Object to form. 16 THE WITNESS: I do. And one other piece of 17 information I can help with this discussion here is, in 18 Dr. Anthony's deposition, he discussed, you know, battery 19 miniaturization, and he discussed that it could take years 20 in reference of taking something like the battery from 21 Mestas and shrinking it down. 22 (Clarification by the certified stenographer.) 23 BY ATTORNEY HABER: 24 Q. Do you know when the first curved batteries 25 started becoming available?
Page 147 1 A. Yeah. I mean, Schroder figure 4 doesn't show much 2 of anything other than one ring half and an inlay inside of 3 it. 4 Q. When -- you testified earlier that you were 5 involved to one degree or another in attempting to 6 implement ring-sized wearable devices, correct? 7 A. Yes. 8 Q. And was that work done around 2013 or before? 9 A. Yeah. Around that time frame, I was establishing 10 the Center for Wearable Sensors at the University of 11 California, San Diego. And during that time, my codirector 12 Joseph Wang and I considered many different wearable form 13 factors, including rings. I was aware generally at that 14 time of Professor Asada's work in smart ring design. 15 And so we had discussed different ways that we 16 could look at constructing different wearable devices. I 17 considered the design of the smart ring at that time. Yes. 18 Q. What time frame would you say that was? 19 A. That was circa 2013. 20 Q. And would you agree that around 2013 there was a 21 general drive towards making electronic components smaller? 22 A. Yes. 23 Q. And would you agree that there was a general drive 24 around 2013 towards making batteries smaller? 25 A. Yes. And to add a little bit to that, the	Page 149 1 A. The first curved batteries in general, I'm not 2 aware. No. 3 Q. Do you know when curved batteries began being used 4 for wearable devices? 5 A. I'm not certain. 6 Q. Would you agree that curved batteries were known 7 for several years before the '178 patent? 8 A. Likely, but I haven't done the historical 9 background research on availability of curved batteries 10 beyond my analysis of what was available in ring-shaped 11 form factors and -- as of 2013. 12 Q. Well, assuming that curved batteries were 13 available for some number of years before the '178 patent, 14 would you agree that the general drive towards 15 miniaturization would have motivated folks to try to make 16 those curved batteries a little smaller? 17 ATTORNEY PLUTA: Object to form. Lack of 18 foundation. 19 THE WITNESS: So I think my answer to that 20 question is going to be informed by the ITC transcript that 21 I read of the inventor of the '178 patent where he 22 describes his engineering exercises in, you know, looking 23 for a small curved battery that would fit within the ring 24 form factor. 25 And according to his testimony, he traveled to

Page 150 1 many different battery manufacturers, and none apparently 2 were interested in manufacturing a battery of the size that 3 he was looking for to put into a ring. 4 BY ATTORNEY HABER: 5 Q. Was that for economic reasons, or was that for 6 technical reasons? What was the reason for that? 7 A. I'm not sure. 8 Q. Is it possible that there simply wasn't sufficient 9 demand for a small-sized curved battery and so there's no 10 economic incentive to do so? 11 A. I would hate to speculate on something that I 12 wasn't part of. 13 Q. Okay. But you can envision potential nontechnical 14 reasons for why any particular battery manufacturer might 15 not be inclined to produce a small curved battery. 16 A. Again, I don't really want to speculate on what 17 happened. I can imagine many technical and nontechnical 18 reasons why vendors might decline to work on this. 19 Q. If you look at paragraph 155 of your declaration, 20 I think here is some reference to some of that testimony 21 that you were referring to. Let me just bring it up on the 22 screen. Reference to testimony from named inventor Curt 23 von Badinski. Do you know Mr. von Badinski? 24 A. In the sense that I've read the '178 patent and 25 his testimony here, yes. But I've not met him.	Page 152 1 ordinary skill in the art independent of his inventorship 2 status. 3 BY ATTORNEY HABER: 4 Q. And there's a quote from some testimony where he 5 says he researched flexible cells but testified, quote 6 (as read): 7 We weren't actually able to validate that any 8 of the flexible cells that were available would 9 work for us. 10 Do you see that? 11 A. I do. 12 Q. Do you know what it is in particular about the 13 flexible cells that were available that would not work for 14 the application he was considering? 15 A. I'm not sure. I don't recall if he elaborated on 16 that during testimony. I don't have it in front of me, so 17 I can't confirm either way. 18 Q. Do you know how exhaustive Mr. von Badinski's 19 search was for potential vendors for curved batteries? 20 A. Based on my reading of the ITC transcript, it 21 appeared to be quite exhaustive. He discussed flying to 22 China and going to multiple different battery vendors and 23 writing emails to different battery vendors and so on. It 24 appeared, based on his testimony, that he did a fairly 25 exhaustive search.
Page 151 1 Q. You haven't spoken with Mr. von Badinski in 2 connection with this case? 3 A. I haven't. 4 Q. Do you know whether or not Mr. von Badinski is a 5 person of ordinary skill in the art? 6 A. He would be likely well beyond a person of 7 ordinary skill in the art. 8 Q. And then on what are you basing that opinion? 9 A. On the fact that he invented this technology. 10 Q. So other than the fact that he's the inventor of 11 the '178 patent, is there any basis for you to believe that 12 Mr. von Badinski is a person of ordinary skill in the art? 13 A. I would have to go back and reread the transcript, 14 but my understanding is that he had worked in the industry 15 for many years, and I believe he had, you know, a degree, 16 and so I think that would qualify him. Again, I'm trying 17 to remember the details of that, and I can't recall them 18 off the top of my head, but I'm quite -- I'm fairly certain 19 that was the case. 20 Q. Do you understand that the inventor of a patent 21 need not be a person of ordinary skill in the art? 22 ATTORNEY PLUTA: Object to form. 23 THE WITNESS: I'm not sure. I hadn't considered 24 that thought. But I guess, in this case, it's irrelevant 25 because I do believe that he would fit the person of	Page 153 1 Q. Do you know whether Mr. Badinski focused on 2 off-the-shelf components as opposed to specifically kind of 3 manufactured for his implementation components? 4 A. My understanding of his testimony is that he went, 5 you know, to battery manufacturers directly to talk to them 6 and see if they were able to manufacture a battery to his 7 specifications. A person of ordinary skill of the art 8 wouldn't take that step if there were a commercial 9 off-the-shelf part available for them to start with, to 10 use. So, in other words -- and, again, I'm speculating a 11 bit based on what I've read in that transcript -- that it 12 sounds like he explored commercial off-the-shelf options 13 and custom manufacturing options. 14 Q. If you look to paragraph 164, there's a annotated 15 drawing. It shows on one side figure 6 from Mestas and on 16 the other side figure 3 from Schroder. 17 Do you see that? 18 A. Yes. 19 Q. The battery is highlighted in blue. Right? 20 A. That's right. 21 Q. And in Mestas, there are two curved batteries, one 22 on either side of the wrist-worn device, right? 23 A. Yes. 24 Q. Do you have information regarding the thickness of 25 the battery that's shown here in Mestas?

Page 154 1 A. Should we introduce Mestas into the record? 2 Q. Sure. Let me do that. 3 (Clarification by the certified stenographer.) 4 ATTORNEY HABER: I think I just uploaded it to the 5 chat. There is Mestas. 6 THE WITNESS: I can't see it in the chat. I'm 7 sorry. 8 ATTORNEY HABER: Let me try again. 9 All right. I think it should be in the chat. 10 THE WITNESS: Thank you. 11 ATTORNEY HABER: And that's U.S. patent 12 publication U.S. 2014/0244009, Mestas, previously marked as 13 Exhibit 1010. 14 (Exhibit 1010, previously marked, was 15 presented.) 16 BY ATTORNEY HABER: 17 Q. The annotated figure in your report is figure 6, 18 and the batteries that are colored in blue are 19 elements 142. 20 (Clarification by the certified stenographer.) 21 ATTORNEY HABER: Are colored in blue in your 22 declaration on page one -- page 79 are identified in 23 figure 6 as elements 142. 24 BY ATTORNEY HABER: 25 Q. Mestas is a very long patent but --	Page 156 1 date for Mestas is only a few months before the priority 2 date for the '178 patent. And then, yeah, you'd probably 3 need to adjust the curve to match the radius of curvature 4 to the ring. 5 Q. Is it your opinion that taking a curved battery 6 and making it slightly more curved is something that is 7 outside the level of skill in the art? 8 A. Again, I think we've determined and Dr. Anthony 9 agrees that battery design or battery manufacturing is 10 outside of the skill of the ordinary person. 11 Q. '178 patent, in its figure 4, for example, shows a 12 curved battery generally of a size and shape that 13 corresponds to a ring form factor, right? 14 A. It does. 15 Q. And is there -- other than the size and curvature 16 that's shown here, is there any particular instruction 17 provided by the '178 patent on how to construct such a 18 curved battery as shown in figure 4? 19 A. Well, no. As we've discussed, the '178 patent 20 is -- doesn't have instructions on battery manufacturing. 21 Q. The -- when we go back to what's shown on page 79 22 of your declaration, there's a arrow and a question mark 23 that's pointing to Schroder's figure 3. 24 You didn't attempt to answer that question as 25 shown by that question mark by looking at Schroder's
Page 155 1 A. It is, yes. 2 Q. Instead of reading 216 pages, I can direct you to 3 paragraph 168 -- 4 A. Okay. 5 Q. -- about the battery. 6 A. Okay. Paragraph 168, which is, itself, a very 7 long paragraph, Mestas describes that the batteries are -- 8 have a thickness that generally corresponds to the depth of 9 the recess 50 and 52. 10 Q. And so Mestas doesn't give specific dimensions, 11 but Mestas explains that its curved batteries generally 12 conform to a recess inside the device, right? 13 A. From what I'm reading in Mestas in that paragraph 14 you identified, I agree. The other relative sizing that we 15 can infer about Mestas comes from Dr. Anthony, who said 16 that it would be about five to ten times too big to fit 17 into the finger ring. Those are, I think, the two relative 18 sizing information that I'm aware of. 19 Q. And in order to take the curved batteries of 20 Mestas and kind of shrink it down to the size of the finger 21 ring, you would have to make the battery smaller and likely 22 more curved, correct? 23 A. Yes. You'd likely have to reduce its size by five 24 to ten times and -- which, again, Dr. Anthony says could 25 take years, and I'd like to point out that the priority	Page 157 1 figure 4, correct? 2 A. Correct, because Schroder's figure 4 certainly 3 doesn't teach how to insert a battery into a ring. 4 And one further point I'd like to make about this 5 figure that you're referencing in my report is that the 6 U.S. patent office did look at this kind of issue with 7 respect to Weast, which I understand shares the same 8 specification as Mestas. And the U.S. patent office agreed 9 with the patent owner that the battery for a bracelet, 10 whether it's curved or otherwise, would not be of a 11 dimension to be fitted within the confines of a cavity of a 12 ring, nor is there any teaching within Weast as to how such 13 a battery can be reconfigured to do so. 14 And so the U.S. patent office looked at this and 15 came to the conclusion, which I agree with, that it would 16 not be obvious to take the batteries from Weast, or, in 17 this case, Mestas, and simply miniaturize them and place 18 them inside of a smaller device. 19 Q. The concern I have with that patent office 20 statement is that the particular teaching that it says is 21 not found in Weast doesn't appear to be found in the '178 22 patent either, does it? 23 ATTORNEY PLUTA: Object to form. 24 (Clarification by the certified stenographer.) 25 ATTORNEY PLUTA: And a relevance objection.

Page 158 1 THE WITNESS: Again, the '178 patent is not 2 describing how to manufacture batteries. 3 BY ATTORNEY HABER: 4 Q. Right. 5 And so you would agree that what the office said 6 was missing from the prior art that was in front of it, the 7 Weast patent, is also not found in the disclosure of 8 the '178 patent, right? 9 ATTORNEY PLUTA: Same objections. 10 THE WITNESS: My understanding of what the patent 11 office was saying here is that it wouldn't be obvious to 12 just look at Weast or Mestas and say, ah, there's a curved 13 battery here; I could just put that into a small ring. And 14 so the obviousness argument, I think, falls apart because 15 of that. That's my understanding of why the patent office 16 was making this statement. 17 BY ATTORNEY HABER: 18 Q. Would you agree that the specific teaching the 19 patent office appeared to be looking for in Weast regarding 20 how to take a battery and put it into a ring form factor 21 and the changes that would be necessary to do that is not 22 in the '178 patent either, right? 23 ATTORNEY PLUTA: Object to form. Relevance. 24 THE WITNESS: But what the '178 patent does show 25 is a battery that is of the appropriate size and shape to	Page 160 1 device and methods of operating the same. 2 And you would agree that Yuen suggests a fairly 3 small form factor in the form of a toe ring, right? 4 ATTORNEY PLUTA: Object to form. 5 THE WITNESS: I actually wouldn't because the 6 precise language that Yuen uses is a toe band, not a toe 7 ring. 8 BY ATTORNEY HABER: 9 Q. Okay. I'll get back to the exact language so we 10 can be precise. 11 Okay. So 24 column, 35 -- column 24, line 35, the 12 biometric monitoring device that present inventions may be 13 integrated and worn: a necklace, chest band, bra, patch, 14 glasses, earring, or toe band. 15 Is there a difference, in your mind, between a toe 16 band and a toe ring? 17 A. Well, words have meaning, I think, right? And, to 18 me, the word "ring" means something that would go onto one 19 digit, you know, a single finger, a single toe, something 20 like this. 21 The word "band" is, you know, not ring, first of 22 all. And, in fact, Yuen uses the word "band" elsewhere as 23 a chest band, you know, some sort of flexible thing that 24 goes around the chest to wear this device, perhaps near the 25 heart, for example.
Page 159 1 fit into -- into a ring. And so there's no -- it's not the 2 same type of argument that one would need to make is my 3 understanding. 4 BY ATTORNEY HABER: 5 Q. It shows a cartoon, right. It doesn't show how to 6 actually make it. It shows, essentially, that you would 7 want to take a battery and make it small enough to fit in 8 the ring; doesn't teach you how to do it, right? 9 ATTORNEY PLUTA: Object to form. Mischaracterizes 10 evidence. Relevance. 11 THE WITNESS: Yeah. Again, the '178 patent does 12 not describe battery manufacturing techniques. 13 BY ATTORNEY HABER: 14 Q. There's one other reference we talk about. Just 15 for completeness, I'll introduce it. 16 (Clarification by the certified stenographer.) 17 ATTORNEY HABER: Yuen. Yuen -- I'm sorry. 18 Y-u-e-n. I'll put it in the chat. 19 (Exhibit 1006, previously marked, was 20 presented.) 21 BY ATTORNEY HABER: 22 Q. In the chat I've dropped -- hopefully it's 23 there -- U.S. patent number 8,954,135 to Yuen, previously 24 marked as Exhibit 1006. 25 Yuen discloses a portable biometric monitoring	Page 161 1 And so that imagery kind of comes up in my mind. 2 So, again, this is the only -- I believe this is the single 3 reference to toe in Yuen, although I'd like to double-check 4 that just to be sure. And he only describes it as a band. 5 So it could be a band that goes around all of the toes, for 6 example. It's, you know -- I wish there were more details 7 in Yuen about what they intended here, but, unfortunately, 8 it's just these two words. 9 Q. You understand that, you know, there are times 10 when a wedding ring is called a wedding band, right? 11 A. Yes. 12 Q. So, at least in common parlance, a ring and a band 13 can mean the same basic form factor? 14 A. They could. 15 Q. And you would agree that a toe ring -- if it had 16 said the word "ring" -- at least of the same size as a 17 finger ring if not smaller? 18 A. Depending on the toe and one's relative big toe 19 versus little toes, but we'll call it similar. 20 Q. Is the -- 21 A. I think I -- sorry. I didn't mean to interrupt. 22 Q. Just a few words to the left is earring, right? 23 An earring is a ring. It goes in your ear, right? 24 A. That's right. 25 Q. And so Yuen, at least, envisions form factors that

Page 162 1 are, again, small in size compared to a watch or other 2 larger wearable devices, right? 3 A. Well, again, not necessarily right. So necklace, 4 you know, you could have a relatively large necklace; chest 5 band, this is large; bra, large. Patch, could be, you 6 know, likely large. Glasses are relatively large. 7 Earrings could be large, right? You can have long hoop 8 earrings or very elaborate dangling earrings and so on. 9 Toe band, you know, if this is something going 10 over a single large toe -- I don't know about you, but my 11 toe is larger than any of my fingers -- my large toe, I 12 should say. 13 But, again, this could be describing something 14 that goes around multiple toes at once. So, again, this is 15 the one kind of throwaway description of other embodiments 16 or other possible locations, and simply no additional 17 detail beyond this is given in Yuen. 18 Q. So what -- in your opinion, if we accept that 19 Schroder described the ring form factor and Yuen describes 20 the ring form factor, and maybe there are other references 21 out there that also describe kind of a ring form factor, 22 what in 2013 was the primary driver of any sort of 23 impediment to shrinking components to fit into that form 24 factor? 25 ATTORNEY PLUTA: Object to form.	Page 164 1 on the top of the wrist. I really struggled to see how one 2 could take all of that electronics package and miniaturize 3 it to fit on a -- on the top of a single toe in a way 4 that's not very, very uncomfortable for the person wearing 5 it, especially with shoes. 6 Q. You mentioned crude prototypes, and there are a 7 number of images that are shown in your report. For 8 example, page 27, 28, 29. Those are prototype designs. 9 Those were never intended to be commercial designs, right? 10 A. Well, I'm not sure I want to place myself in the 11 shoes of the inventors of these various different 12 components. You know, I think engineers aspire to take 13 their inventions and bring them to bear in the world. And, 14 you know, some of these are in various different forms of 15 being prototypes. Some of these are shown as patents, 16 which, if you're filing a patent, implies that you have 17 commercial aspirations and so on. 18 And even in the patents, we're still seeing these 19 kind of large extruding form factors on the top of the -- 20 on top of the rings. And, furthermore, pointing to the 21 Oura generation 1 device, which, again, was released circa 22 2014-ish, they are following that same kind of prior art -- 23 those same prior art teachings. 24 ATTORNEY HABER: Why don't we take a quick break. 25 And I know that it's almost 3:00, and I know that you have
Page 163 1 THE WITNESS: I mean, I think that's a pretty 2 loaded question. These are very complex, nuanced designs 3 with many engineering trade-offs and exercises that need to 4 be executed even to make a crude prototype. And if you 5 look at the prior art as of 2013, what you'll see is that 6 all of the prior art that does things like physiologic 7 monitoring located all of the electronic -- or the bulk of 8 the electronics in a large housing. They put the battery 9 in that large housing and so on. 10 And so, you know, from that perspective, as of 11 2013, power was certainly a big consideration, battery size 12 a big consideration; number of components needed to impart 13 certain functionality was a big consideration. And just to 14 be clear, when I say power, I mean both peak power and 15 average power of the -- of the electronics. Both are 16 important considerations, particularly as batteries get 17 very small. And they're not able to -- small batteries 18 aren't able to easily provide large peak powers needed by 19 things like Bluetooth radios and so on. 20 And so I think this -- I think these were many of 21 the big challenges. There's also challenges with respect 22 to manufacturing and packaging and integration and so on. 23 And if I look to Yuen, which is describing a, you know, 24 wrist-worn wearable device, Yuen has this relatively large 25 electronics package that happens to be flat and is located	Page 165 1 a cutoff later today. I think it makes sense to just kind 2 of end for the day and pick up tomorrow so that we can, you 3 know, not get halfway into something and then have to stop. 4 ATTORNEY PLUTA: We're amenable to that provided 5 that you're committing to end, you know, around a similar 6 time or, you know, just being mindful of Dr. Mercier's time 7 tomorrow. 8 ATTORNEY HABER: Yeah. Understood. Understood. 9 Frankly, I expect tomorrow will likely be shorter than 10 today, but I'm not sure yet exactly where that will be. 11 ATTORNEY PLUTA: You want to just take a short 12 break, then, now? Or do you -- 13 THE WITNESS: Yeah. Can we take a short break and 14 discuss time and stuff? 15 ATTORNEY PLUTA: Yeah. Sure. Let's go off the 16 record. 17 THE VIDEOGRAPHER: Going off the video record. 18 Time on the monitor is 2:59 p.m. 19 (Recess taken.) 20 (Attorney-client discussion.) 21 (Discussion held off the record.) 22 THE VIDEOGRAPHER: We're now back on the video 23 record. Time on the monitor is 3:04 p.m. 24 ATTORNEY HABER: All right. So we are going to 25 continue the deposition until tomorrow. So the deposition

Page 166 1 is still open until we conclude tomorrow. 2 I'll remind you that, you know, you should not 3 talk with anyone about the substance of your testimony, and 4 then we will come back tomorrow. 5 THE WITNESS: I understand. Thank you. 6 CERTIFIED STENOGRAPHER: Before we go off, Robert, 7 did you want a copy -- yes, you are getting a copy of the 8 transcript. Did you want a rough transcript tonight as 9 well? 10 ATTORNEY PLUTA: A rough transcript. Yeah. 11 (Clarification by the certified stenographer.) 12 THE VIDEOGRAPHER: Going off the video record. 13 This concludes today's video deposition. Time on the 14 monitor is 3:04 p.m. 15 (Proceedings adjourned at 3:04 p.m. PDT.) 16 ---000--- 17 18 19 20 21 22 23 24 25	Page 168 1 REPORTER'S CERTIFICATE 2 I, JULIE RUMSEY, CSR 14144 do hereby certify that 3 the foregoing deposition of PATRICK P. MERCIER, Ph.D., 4 was taken on JUNE 24, 2025 via zoom videoconference before 5 me at 8:15 A.M. for the purpose in the caption stated; that 6 the Witness was first duly sworn to tell the truth, the 7 whole truth, and nothing but the truth; that the deposition 8 was taken before me stenographically and afterwards 9 transcribed under my direction; that the foregoing is a 10 full, true, and correct transcript of the said deposition 11 so given; that counsel for all parties were present at 12 the time of the deposition; that there was a request that 13 the witness read and sign the transcript. 14 I further certify that i am neither of counsel nor 15 of kin to any of the parties to this action, and am in 16 no way interested in the outcome of said action. 17 18 19 Witness My Signature on June 27, 2025. 20 21 22 23 24 25
Page 167 1 ---000--- 2 3 I, PATRICK P. MERCIER, Ph.D., do hereby declare 4 under penalty of perjury that I have read the foregoing 5 deposition; that I have made any corrections as appear 6 noted, in ink, initialed by me, or attached hereto; that my 7 testimony as contained herein, as corrected, is true and 8 correct. 9 EXECUTED on this ____ day of _____, 10 2025, at _____, _____. 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	Page 169 1 Errata Sheet 2 3 NAME OF CASE: SAMSUNG ELECTRONICS CO., LTD. vs OURARING, INC. 4 DATE OF DEPOSITION: 06/24/2025 5 NAME OF WITNESS: PATRICK P. MERCIER, Ph.D., VOLUME I 6 Reason Codes: 7 1. To clarify the record. 8 2. To conform to the facts. 9 3. To correct transcription errors. 10 Page ____ Line ____ Reason ____ 11 From ____ to ____ 12 Page ____ Line ____ Reason ____ 13 From ____ to ____ 14 Page ____ Line ____ Reason ____ 15 From ____ to ____ 16 Page ____ Line ____ Reason ____ 17 From ____ to ____ 18 Page ____ Line ____ Reason ____ 19 From ____ to ____ 20 Page ____ Line ____ Reason ____ 21 From ____ to ____ 22 Page ____ Line ____ Reason ____ 23 From ____ to ____ 24 25

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