

1 UNITED STATES PATENT AND TRADEMARK OFFICE 2 BEFORE THE PATENT TRIAL AND APPEAL BOARD 3 4 5 SAMSUNG ELECTRONICS CO., LTD., 6 Petitioner 7 v. 8 RJ TECHNOLOGY LLC, 9 Patent Owner 10 11 Case IPR2023-01183 12 Patent No. 7,749,641 13 14 15 16 DEPOSITION OF MARC JUZKOW 17 TAKEN REMOTELY BY VIDEOCONFERENCE 18 May 3, 2024 19 20 21 22 23 24 Reported by: Mary Ann Payonk 25 Job No. 1403	Page 1 1 APPEARANCES: 2 ON BEHALF OF PETITIONER: 3 ANDREW SOMMER, ESQ. 4 GREENBERG TRAURIG, LLP 5 1750 Tysons Boulevard 6 Suite 1000 7 McLean, VA 22102 8 United States 9 10 STEPHEN E. PULLEY, ESQ. 11 GREENBERG TRAURIG, LLP 12 222 South Main Street, 13 Suite 1730 14 Salt Lake City, UT 84101 15 16 ON BEHALF OF PATENT OWNER 17 GEORGE STAMATOPOULOS, ESQ. 18 KOBRE & KIM 19 800 Third Avenue 20 New York, New York 10022 21 22 MINGHUI YANG, ESQ. 23 CARMICHAEL IP, PLLC 24 8607 Westwood Center Drive, Suite 270 25 Tysons, VA 22182 Page 3
1 2 3 4 May 3, 2023 5 7:00 a.m. Pacific 6 7 DEPOSITION OF MARC JUZKOW taken remotely by 8 videoconference pursuant to Notice and agreement of 9 counsel, stenographically reported by Mary Ann Payonk, 10 Shorthand Reporter and Notary Public, CA CSR No. 13431. 11 All attorneys participating in this deposition 12 acknowledge that the reporter is not physically present 13 in the deposition room and there is no objection to the 14 oath being administered remotely. 15 16 17 18 19 20 21 22 23 24 25	Page 2 1 Appearances (Cont'd.): 2 ROBERT ZHOU, ESQ. 3 KOBRE & KIM 4 43rd Floor 5 HKRI Centre One, HKRI Taikoo Hui 6 288 Shimen Yi Road 7 Shanghai, 200041 8 People's Republic of China (PRC) 9 10 ALSO PRESENT: 11 Deric Shults, videographer, BlueBear Law 12 Annliese Coleman, BlueBear Law 13 14 15 16 17 18 19 20 21 22 23 24 25 Page 4

1 THE VIDEOGRAPHER: We are now on the record. 2 The time is 7:02 AM Pacific Standard Time. Today's date 3 is May 3, 2024. This begins the remote video-recorded 4 deposition of Marc Juzkow in the matter of Samsung 5 Electronics Co., Ltd., versus RJ Technology LLC filed in 6 the United States Patent and Trademark Office, Patent 7 Number 7,749,641. 8 I will be recording this deposition remotely 9 and the reporter will swear in the witness remotely 10 pursuant to Federal Rules of Civil Procedure and the 11 stipulated deposition protocol in this case. 12 My name is Deric Shults, and I'm with BlueBear 13 Solutions. Our court reporter is Mary Ann Payonk. 14 Counsel, please identify yourselves and state 15 whom you represent. 16 ATTORNEY STAMATOPOULOS: George Stamatopoulos 17 with Kobre & Kim for patent owner, RJ Technology. 18 ATTORNEY SOMMER: Andrew Sommer of Greenberg 19 Traurig on behalf of petitioner, Samsung Electronics 20 Co., Ltd. 21 THE VIDEOGRAPHER: Are there any stipulations 22 or announcements from either party? 23 ATTORNEY SOMMER: I'd just like for the record 24 to note that I'm here with my colleague Steve Pulley of 25 Greenberg Traurig. He may be leaving the deposition	Page 5 1 A. Mostly IP-related, but also some product 2 liability cases. 3 Q. Have you ever been deposed in a case before 4 the PTAB before? 5 A. Yes. 6 Q. How many times? 7 A. Seven. 8 Q. And have you ever testified at trial in a 9 District Court case? 10 A. No. 11 Q. Now, you understand that your testimony here 12 today is under oath, just like it would be in court? 13 A. Yes. 14 Q. And you have to give accurate and complete 15 answers to my questions here today. 16 Do you understand that? 17 A. Yes. 18 Q. And is there any reason why you can't give 19 accurate and complete testimony here today? 20 A. No. 21 Q. All right. Now, I'll ask you, when you answer 22 my questions, to answer with words as opposed to 23 gestures or nonwords. That's for the benefit of the 24 record and the court reporter. 25 Is that fair? Page 7
1 early, but he is here at the moment. 2 ATTORNEY STAMATOPOULOS: And I'm likewise here 3 with my colleague Robert Zhou, also of Kobre & Kim. 4 THE VIDEOGRAPHER: Will the court reporter 5 please swear in the witness. 6 THE REPORTER: Yes. I'll first give you my 7 California license number, which is 13431. And now I'll 8 swear the witness. 9 MARC JUZKOW, 10 called as a witness, having been duly 11 sworn, was examined and testified as 12 follows: 13 EXAMINATION 14 BY ATTORNEY STAMATOPOULOS: 15 Q. Good morning, Mr. Juzkow. 16 A. Good morning. 17 Q. How are you today? 18 A. I'm good. Doing good. Yourself? 19 Q. Doing well. 20 Mr. Juzkow, have you ever been deposed before? 21 A. Yes. 22 Q. How many times? 23 A. 10. 24 Q. And in regard to what cases or what types of 25 cases have you been deposed before? Page 6	Page 8 1 A. Yes. 2 Q. And if I ask a question that seems unclear to 3 you, you'll let me know? 4 A. Yes. 5 Q. Great. 6 And at times, your lawyer may object to a 7 question that I've asked. Do you understand that even 8 if your lawyer objects, you should still answer my 9 question unless instructed by your lawyer not to answer? 10 A. Yes. 11 Q. All right. And if I ask a question and you 12 provide an answer and you can think of something later 13 that's relevant to a question that I've asked you, let 14 me know so that we can go back to that question. 15 Is that fair? 16 A. Yes. 17 Q. Great. 18 And, sir, other than your laptop, do you have 19 anything, any other electronic devices with you in the 20 room today? 21 A. I have my phone, and I have a second laptop, 22 which is for a different purpose. 23 Q. Is that second laptop off? 24 A. Yes. 25 Q. And you understand that during the course of

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1 this deposition, you should not be communicating with 2 anybody else outside the room? 3 A. Yes, I understand. 4 Q. Do you have any notes with you? 5 A. No, I don't. 6 Q. Do you have the exhibits? So let me back up. 7 You provided a declaration in this case. 8 Correct? 9 A. Yes. 10 Q. And there were a number of exhibits attached 11 to the declaration. 12 A. Yes. 13 ATTORNEY SOMMER: Object to form. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. And do you have those exhibits with you here 16 today or in the room with you today? 17 A. Yes. 18 Q. Do you have them in electronic form? 19 A. Yes. 20 Q. Okay. 21 Sir, what did you do to prepare for your 22 testimony today? 23 ATTORNEY SOMMER: I'm going to caution the 24 witness not to reveal the substance of any discussions 25 that he may have had with counsel, but you may answer in	1 Correct? 2 A. Yes. 3 Q. And those documents included your declaration? 4 A. Yes. 5 Q. What other documents did you review? 6 A. Only the documents within -- that were 7 provided within my declaration. 8 Q. Okay. So no documents other than those listed 9 in your declaration. Fair? 10 A. Fair. 11 Q. Okay. Now, you submitted a declaration in 12 this case. Can you walk me through the process at a 13 high level of how you prepared your declaration? 14 ATTORNEY SOMMER: I'm going to caution the 15 witness not to reveal the substance of any particular 16 discussions that you've had with counsel regarding the 17 matter. But insofar as you can answer generally about 18 the process, you may do so. 19 A. So in general, I was provided with a number of 20 references. I went through all the references. I 21 examined them. I determined which ones we should use, 22 which ones I should not put in my deposition, which ones 23 I should put in my deposition. And then in writing of 24 the deposition, there was a collaboration effort. 25 BY ATTORNEY STAMATOPOULOS:
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1 terms of general things that you did to prepare. 2 A. Yes, I spoke to counsel several times, and I 3 read through declarations, patents. And that's how I 4 prepared. 5 BY ATTORNEY STAMATOPOULOS: 6 Q. All right. And how many times, approximately, 7 did you speak with counsel? 8 A. Three. 9 Q. And roughly how many hours did those 10 conversations last in total? 11 A. Seven. 12 Q. Roughly seven? 13 A. Uh-huh. 14 Q. Okay. And you met with Mr. Sommer. 15 Is that fair? 16 A. Yes. 17 Q. Did you meet with anyone else? 18 A. Yes. Mr. Colin and -- 19 Q. Okay, and -- sorry. Go ahead. 20 A. Mr. Pulley. 21 Q. Other than those two gentlemen or three 22 gentlemen, did you speak with anybody else? 23 A. No. 24 Q. All right. And you said that you reviewed 25 certain documents in preparation for your deposition.	1 Q. So when you say your deposition, did you mean 2 to say -- 3 A. Sorry. 4 Q. -- your declaration? 5 A. Yes, my declaration. 6 Q. Okay. So to be clear, you were provided with 7 certain documents. Correct? 8 A. Yes. 9 Q. And then you looked at those documents, right? 10 A. Yes. 11 Q. And there were certain documents that you 12 decided to put into your declaration. Correct? 13 A. Yes. 14 Q. And then there were certain documents that you 15 decided not to put into your declaration, right? 16 A. Correct. 17 Q. How did you decide which documents not to 18 include in your declaration? 19 ATTORNEY SOMMER: I'll caution the witness not 20 to identify any particular documents. But you can 21 answer the question generally as long as you don't 22 disclose the identity of the information that you 23 reviewed or discussions with counsel about them. 24 A. When I -- before I read through them, I read 25 through the case, I read through the patents. I got an

1 understanding of what this case was about. Then I went 2 through the documents and I looked at which ones would 3 be useful to include in the declaration and which ones 4 would not be useful to include in the declaration. 5 BY ATTORNEY STAMATOPOULOS: 6 Q. And was that your decision exclusively? Yes 7 or no. 8 ATTORNEY SOMMER: Object to form. 9 A. Yes. 10 BY ATTORNEY STAMATOPOULOS: 11 Q. Okay. So how did you decide which documents 12 were useful to include in your declaration? 13 ATTORNEY SOMMER: Again, I'm going to caution 14 the witness not to reveal the substance of any specific 15 discussions with counsel or the identity of documents 16 that you may have reviewed that are not included in your 17 declaration. But you can answer the question if you 18 can. 19 A. I looked at the documents and I determined 20 whether or not there was any useful information that we 21 could add, if I could add it to my -- to any of the 22 grounds in towards the -- you know, in reviewing the 23 claims and in providing the different grounds based on 24 obviousness and anticipation, I decided which ones would 25 be useful and which ones would provide no value.	Page 13 1 those that are listed in your declaration in the 2 Materials Considered section? 3 A. Yes. 4 Q. Roughly how many more documents did you review 5 in this process that were not included in the Materials 6 Considered section of your declaration? 7 A. Maybe eight to 10. 8 Q. Did any of those documents relate to 9 lithium-ion battery technology? 10 A. Yes. 11 Q. Did any of those documents relate to the 12 charge voltages applied to lithium-ion batteries? 13 ATTORNEY SOMMER: Object to form. 14 A. Not that I recall specifically. 15 BY ATTORNEY STAMATOPOULOS: 16 Q. Do you recall definitively if any of the 17 documents that you reviewed and decided not to include 18 in your declaration related to the charge voltages 19 applied to lithium-ion battery technology? Sorry, to 20 lithium-ion batteries. 21 A. I don't recall specifically. I wrote the 22 declaration one year ago. 23 Q. Did any of the documents that you reviewed and 24 decided not to include in your declaration relate to the 25 capacities of either the anode or the cathode of
1 BY ATTORNEY STAMATOPOULOS: 2 Q. And just to be clear, my questions are not 3 about conversations with counsel. I'm not interested in 4 any of those. 5 My question is exclusively about the way that 6 you personally decided how to include or not to include 7 a particular document in your declaration. 8 Is that fair? 9 Do you understand that? 10 A. Yes. 11 Q. Okay. So when you say certain documents were 12 useful to include in your declaration, what do you mean 13 by that? 14 A. Documents that I was able to use within the 15 grounds to prove obviousness and anticipation. 16 Q. And so to the extent that a document was not 17 useful for you to prove obviousness or anticipation, you 18 decided not to include that in your declaration. 19 Correct? 20 A. Yes. 21 Q. And how many documents in total did you review 22 during the process of deciding whether to include or not 23 to include a particular document in your declaration? 24 A. I don't recall. 25 Q. Fair to say that it was more documents than	Page 14 1 lithium-ion batteries? 2 A. They may have, but I don't recall any specific 3 ratios that were determined within those documents. 4 Q. And you provided a number of opinions in your 5 declaration. Correct? 6 A. Yes. 7 Q. And to the extent that a particular document 8 did not support those opinions, you decided not to 9 include it in your declaration. Fair? 10 ATTORNEY SOMMER: Object to form. 11 A. If they didn't relate to this case, I did not 12 use them. 13 BY ATTORNEY STAMATOPOULOS: 14 Q. My question's a little bit different. 15 If a particular document did not support your 16 opinions, you decided not to include it? 17 ATTORNEY SOMMER: Object to form. 18 A. If I looked at it and realized that it would 19 not be useful towards my opinions, then I did not use 20 it. 21 BY ATTORNEY STAMATOPOULOS: 22 Q. And to be clear, you were asked -- let me back 23 up. 24 Who did you communicate with in connection 25 with providing testimony in this case?

1 A. Mr. Sommer. 2 ATTORNEY SOMMER: Object to form. 3 A. Mr. Sommer, Mr. Colin, Mr. Pulley. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. And you were asked to provide opinions that 6 would show or tend to show that the claims in the '641 7 patent are either obvious or anticipated in light of the 8 prior art? 9 ATTORNEY SOMMER: I'm going to object to the 10 question and instruct the witness not to answer, because 11 he's asking for the substance of a communication. 12 Insofar as the task that you were asked to perform is 13 revealed in your declaration, you can testify as to it. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. So you provided opinions -- I'll withdraw the 16 question. 17 So you've provided opinions concerning whether 18 the claims in the '641 patent are obvious or 19 anticipated. Correct? 20 A. Yes. 21 Q. And you were retained by counsel for Samsung 22 to provide those opinions. Correct? 23 A. Yes. 24 Q. And you decided not to include certain 25 documents that you reviewed in connection with forming	Page 17 1 Q. And when you say "the ratio," what ratio are 2 you referring to? 3 A. Negative electrode versus positive electrode. 4 Q. And why is it that that ratio would be 5 infinite in the case of a lithium anode battery? 6 ATTORNEY SOMMER: Object to form. 7 A. There's a continuous supply of lithium; and 8 therefore, you do not have to worry about what the total 9 capacity of the anode is. 10 It's a very -- it's maybe not infinite, but 11 it's a very large number and there is no irreversible 12 capacity specifically with the lithium metal anode. You 13 always have lithium available to be transferred to your 14 cathode, and it's just not -- it's not part of the '641 15 patent. 16 If I look back at the '641 patent, it most 17 likely -- but I'd have to look back, but it most likely 18 speaks specifically about lithium-ion batteries. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. Now, you mentioned a term, "irreversible 21 capacity" just now, right? 22 A. Yes. 23 Q. What is an irreversible capacity? 24 A. Irreversible capacity is where let's say you 25 move lithium-ions from the cathode into the anode.
1 those opinions in your declaration. Correct? 2 A. Yes. 3 Q. And you decided not to include those documents 4 because they were not useful in forming your opinions. 5 Correct? 6 A. Yes. 7 Q. And so how did you decide whether a document 8 was useful or not? 9 A. As I said, it was over a year ago that I wrote 10 this. One comes to mind. One was a lithium metal 11 battery; and therefore, there was no ratios involved. 12 It was not a lithium-ion battery so I discounted it. 13 Q. What do you mean by a lithium metal battery? 14 A. Lithium metal as the anode. And it was a 15 rechargeable battery. It was a lithium metal anode 16 versus a cathode. And a cathode may be similar to a 17 lithium-ion type cathode. But there was no graphite 18 anode and therefore, no carbon anode. Therefore, there 19 was no ratios involved. And therefore, it was not 20 useful and it did not apply to my work. 21 Q. Why is it that a battery with a lithium anode 22 would not be relevant to your opinions in this case? 23 ATTORNEY SOMMER: Object to form. 24 A. The ratio would be infinite. 25 BY ATTORNEY STAMATOPOULOS:	Page 18 1 Those ions may -- the lithium-ions may react with the 2 anode active material and they may form compounds that 3 will not deintercalate from the anode back to the 4 cathode. 5 So they react. They form other compounds. 6 For example, lithium carbonate is one, just one example. 7 And therefore, that lithium is lost and it will not 8 transfer back and forth during subsequent cycles. 9 Q. Let me try to unpack that a little bit. 10 So you mentioned that the ions, the 11 lithium-ions may react with the anode active material. 12 Did I get that right? 13 A. Yes. 14 Q. What is the active material? 15 A. The active material would be a carbon. 16 Q. So the anode contains a carbon. Fair? 17 A. Yes. 18 Q. And the active material of a lithium-ion 19 battery is -- let me withdraw that question. 20 The active material of the anode of a 21 lithium-ion battery would be a carbon within the anode. 22 Correct? 23 A. Yes. 24 Q. Is there also inactive material in the anode? 25 A. Yes.
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1 Q. And what is the inactive material in the 2 anode? 3 ATTORNEY SOMMER: Object to form. 4 A. Binders. 5 BY ATTORNEY STAMATOPOULOS: 6 Q. To be clear, those -- oh, sorry. Did I cut 7 you off? 8 A. I was just going to say binders. Typically, 9 one binder type. Sometimes -- sometimes two. 10 Q. And what is a binder? 11 A. A binder, you can think of it as an adhesive 12 where it binds, adheres the carbon particles together 13 and it adheres the carbon particles to a metallic 14 current collector. 15 Q. And what is a typical form of binder in an 16 anode of a lithium-ion battery? 17 A. A typical one might be PVDF. All in capitals, 18 P-V-D-F. 19 Q. And when I asked you about the term 20 "irreversible capacity," you mentioned that the 21 lithium-ions may bind to or may react to the active 22 material. Is that a fair summary of what you testified? 23 A. Yes. 24 Q. Could the lithium-ions also react with 25 inactive material in the lithium-ion battery?	Page 21 1 BY ATTORNEY STAMATOPOULOS: 2 Q. I'm sorry, just for the record, your counsel 3 objected. 4 What was your answer? 5 A. No. 6 Q. So you don't have, as you sit here today, a 7 rough estimate of what that percentage might be. 8 Is that fair? 9 A. That's correct. 10 Q. Could it be as high as 50 percent? 11 A. I don't have a number. 12 Q. So you can't say if it could be as high as 13 50 percent as you sit here today. Correct? 14 A. I don't have a number. 15 Q. So is it fair to say that the process of 16 preparing your declaration was collaborative between you 17 and counsel? 18 A. Yes. 19 Q. Can you please describe for me that 20 collaborative process at a high level without divulging 21 any substantive communications between you and counsel? 22 A. We all wrote certain sections, certain pieces 23 of it. And in the end, I did all the final 24 modifications of their work, my work. 25 You could consider them as scribes. We talked Page 23
1 A. They do not react with the binder. 2 Q. Aside from the active material in the 3 lithium-ion battery anode, could the lithium-ions react 4 with any other material in the anode? 5 A. The only other materials would be conductive 6 additives that improve the electrical connectivity of 7 the anode. And it's possible that they could also react 8 with that material. 9 Q. So I want to get a better sense of what the 10 irreversible capacity is. 11 Is it fair to say that the irreversible 12 capacity is a property of the anode that takes 13 lithium-ions out of circulation in subsequent charge and 14 recharge cycles? 15 A. Correct. 16 Q. And is the irreversible capacity attributable 17 exclusively to the active material of the anode? 18 A. I would say primarily. 19 Q. What do you mean by that? 20 A. Primarily for the most part a high percentage, 21 very high percentage. I don't have a number. 22 Q. Do you have an estimate of what that high 23 percentage might be? 24 A. No. 25 ATTORNEY SOMMER: Object to form. Page 22	1 about, you know, the issues. We talked about, you know, 2 a lot of things, and then they helped with the writing 3 of it. And then in the end, you know, all the final 4 modifications to my writings and their writings were 5 done by myself. 6 Q. Roughly how much time would you say that 7 process took to complete? 8 A. Boy, it was a long time ago. If you want an 9 exact number, I could give you a better number after a 10 break. 11 Q. Okay. Let's -- how would you go about 12 determining the number, by the way? 13 A. Oh, by the hours that I prepared and entered 14 into my invoices. 15 Q. That's fair. We may come back to that. 16 A. Okay. 17 Q. Now, other than the materials that were 18 provided to you by counsel in connection with 19 potentially adding as exhibits to your declaration, did 20 you conduct any independent research to identify 21 materials that might be relevant to your declaration? 22 A. Yes. 23 Q. Can you describe to me that process? 24 A. I went through a list of names of people that 25 I worked with and I knew back in the time before the Page 24

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1 writing of this patent, and I looked for documents that 2 were prepared by them. And that's -- that was kind of 3 my process, was to look for experts in the field and 4 look at their documents that they had prepared. 5 Q. And were any of the materials that you 6 identified through this process eventually included in 7 your declaration? 8 A. Yes, at least one. I don't know -- I don't 9 recall exactly how many. 10 Q. And your declaration is Exhibit 1002 in this 11 proceeding. Correct? 12 A. Yes. 13 Q. And do you have your declaration in front of 14 you? 15 A. Yes. 16 (Exhibit No. 1002, previously marked, was 17 referenced and indexed.) 18 BY ATTORNEY STAMATOPOULOS: 19 Q. Would you turn to page 25 of your declaration. 20 A. Yes. 21 Q. And that page 25 includes a section 3 titled 22 Materials Considered. Correct? 23 A. Yes. 24 Q. And in paragraph 30 that's right underneath 25 that heading, you state: In developing my opinions, I	1 BY ATTORNEY STAMATOPOULOS: 2 Q. And you decided not to include them. Correct? 3 A. Yes. 4 Q. Mr. Juzkow, you have worked in the lithium-ion 5 battery space for many years. Correct? 6 A. Yes. 7 Q. And there are different types of lithium-ion 8 batteries commercially available over the years. 9 Correct? 10 A. Yes. 11 Q. One type of lithium-ion battery is referred to 12 as a secondary lithium-ion battery cell. Correct? 13 A. Yes. 14 Q. Have you worked with secondary lithium-ion 15 battery cells? 16 A. Yes. 17 Q. Roughly how many years have you spent working 18 with lithium-ion battery cells? 19 A. 35. 20 Q. Sorry, let me add to my previous question. 21 Roughly how many years have you spent working 22 on secondary lithium-ion battery cells? 23 A. 35 years. 24 Q. And what is the meaning of the term "secondary 25 lithium-ion battery cell"?
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1 have considered and relied upon the materials cited 2 herein, including the following materials. Correct? 3 A. Yes. 4 Q. And you have a list of documents in a table, 5 right? 6 A. Yes. 7 Q. Fair to say that some of the materials you 8 considered in connection with preparing your declaration 9 were actually not included in this table because you 10 determined they were not useful? 11 Is that fair? 12 ATTORNEY SOMMER: Objection to form. 13 A. There were documents that were not useful. 14 They -- as I explained earlier, they may not have been 15 the right type of lithium-ion -- or lithium cell. 16 That's an example. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. You read those documents, right? 19 A. Yes. 20 ATTORNEY SOMMER: Object to form. 21 A. Yes. 22 BY ATTORNEY STAMATOPOULOS: 23 Q. And you considered them. Correct? 24 ATTORNEY SOMMER: Object to form. 25 A. Yes.	1 A. "Secondary" is analogous to rechargeable. 2 "Lithium" is the material that's used in the battery. 3 When you say "lithium-ions," that will mean that you do 4 not use lithium metal anodes. 5 So the difference -- the primary difference is 6 a secondary lithium metal battery versus a primary -- or 7 a secondary lithium-ion battery. 8 Q. And you mentioned the term "primary" there in 9 your response -- 10 A. I -- 11 Q. -- briefly. 12 A. That was -- strike that. 13 Q. Well, my next question was going to be, what 14 is a primary lithium-ion battery? 15 A. That would be a battery that would only 16 discharge one time. 17 Q. So is it fair to say that as long as a -- 18 well, let me withdraw that question. 19 Is it fair to say that it is impossible to 20 recharge a primary lithium-ion battery? 21 A. You can recharge a primary lithium battery -- 22 ion battery. I can't off the top of my head think of a 23 lithium-ion primary battery that's sold on the market. 24 Q. And why is it that primary lithium-ion 25 batteries are not sold on the market?

1 ATTORNEY SOMMER: Object to form. 2 A. There's more value to the end user to have a 3 rechargeable battery that they can reuse over and over. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. You testified just now that you can recharge a 6 primary lithium-ion battery. 7 Did I catch that correctly? 8 A. Yes. I -- any lithium-ion battery could be a 9 primary battery. You can also charge those lithium-ion 10 batteries. The alkaline cells that we use in our 11 standard AA alkaline cells, those are rechargeable. 12 There's many batteries that can be recharged. Even 13 though they're called primary batteries, some of them 14 can be rechargeable. 15 Q. So if both a primary and a secondary 16 lithium-ion battery can be recharged, what is it about a 17 secondary lithium-ion battery that makes it more 18 valuable to the end user? 19 A. The end user does not have to throw the 20 battery out after one use. 21 Q. Well, if a primary lithium-ion battery can be 22 recharged, why would the end user have to throw it out 23 after one use? 24 A. As I said, I don't know of any lithium-ion 25 batteries that have been sold as primary lithium-ion	1 a term of art. Correct? 2 ATTORNEY SOMMER: Object to form. 3 A. You know, I -- in my years, I don't recall 4 seeing any documents or batteries that have been called 5 primary lithium-ion batteries. 6 BY ATTORNEY STAMATOPOULOS: 7 Q. You are familiar with the term, however, 8 right? 9 A. I'm familiar with the term "primary," and I'm 10 familiar with the term "lithium-ion." 11 Q. And you're also familiar with the term 12 "primary lithium-ion battery." Correct? 13 A. You could put the two words together, but it 14 doesn't mean there's a product on the market. 15 Q. Separate and apart of whether there's a 16 product on the market, in the field of -- well, let me 17 back up. 18 What would you consider to be the relevant 19 field that studies the behavior of lithium-ion 20 batteries? 21 ATTORNEY SOMMER: Object to form. 22 THE WITNESS: I'm not sure exactly what your 23 question is. Can you elaborate? 24 ATTORNEY STAMATOPOULOS: Let me try and get a 25 little bit more specific.
1 batteries. 2 Any battery can be a primary battery if you 3 just use it once, but I don't know of any that have been 4 sold on the market as primary lithium-ion batteries. 5 Lithium metal batteries, many lithium metal 6 batteries are sold as primary batteries. 7 Q. I want to focus -- I want to focus a little 8 bit on lithium-ion primary batteries, and here's my 9 question. There exists primary lithium-ion batteries. 10 Correct? 11 ATTORNEY SOMMER: Object to form. 12 A. As I said, I've never heard of a lithium-ion 13 primary battery that -- that's been used on the market. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. What about off the market? 16 A. I mean, any lithium-ion battery can be used 17 one time and stop -- and then thrown away. That's 18 called a primary battery. 19 But lithium-ion batteries, because they're 20 rechargeable, people use them as rechargeable batteries. 21 So when I used the term "primary" previously to your 22 first question, I -- that -- that was a mistake. I 23 should have said the word "secondary lithium-ion 24 battery." I should not have used the word "primary." 25 Q. But the term "primary lithium-ion battery" is	1 THE WITNESS: Uh-huh. 2 BY ATTORNEY STAMATOPOULOS: 3 Q. Are you familiar with a field called 4 electrochemistry? 5 A. Yes. 6 Q. Fair to say that electrochemistry includes 7 within it a study of lithium-ion batteries? 8 A. Yes. 9 Q. In the field of electrochemistry -- let me 10 withdraw that. 11 Are you an expert in the field of 12 electrochemistry? 13 A. I don't have a degree in electrochemistry. 14 Q. You have a degree in chemistry. Correct? 15 A. Yes. 16 Q. You don't have a Ph.D. in chemistry. Correct? 17 A. No, that's -- yes, that's correct. 18 Q. You have a master's degree in chemistry? 19 A. Yes. 20 Q. And you consider yourself an expert in 21 lithium-ion batteries. Correct? 22 A. Yes. I consider myself an expert in 23 lithium-ion batteries, but not an expert of what I would 24 consider an expert in electrochemistry, which involves 25 so many other fields or so many other systems beyond

Page 33 1 lithium-ion batteries that I am not an expert within. 2 Q. And you're an expert in lithium-ion batteries 3 because you have studied lithium-ion batteries as part 4 of your academic and professional experience. Correct? 5 A. In my academic experience, no, I did not study 6 lithium-ion batteries. My academic -- my master's was 7 achieved in 1989, and that was about the year we started 8 working on lithium-ion batteries at the company I was 9 employed at. 10 So I was employed at a company and I was doing 11 my master's degree in parallel, and my -- the work I did 12 was on surface area of materials that were previously 13 used in lithium metal batteries. 14 Q. And what type of work did you do in this 15 particular area? 16 ATTORNEY SOMMER: Object to form. 17 THE WITNESS: In my masters? 18 ATTORNEY STAMATOPOULOS: Let me withdraw that. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. Did you conduct experiments with lithium-ion 21 batteries? 22 ATTORNEY SOMMER: Object to form. 23 A. Not in my master's degree. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. Did you conduct experiments with lithium-ion	Page 35 1 we could think of. 2 BY ATTORNEY STAMATOPOULOS: 3 Q. Have you ever synthesized cathodes for 4 lithium-ion batteries? 5 A. Yes. 6 Q. Can you describe that process for me? 7 ATTORNEY SOMMER: Object to form. 8 A. Typically, you'd start with several components 9 and mix those components up, put them in a tube furnace, 10 run various gases through that tube furnace at high 11 temperatures and form a new compound, a lithium 12 compound. That was one I recall where we had quartz 13 tubes. They were 1,000 degrees Celsius and we had to 14 pull them out when they're red hot out of the oven, 15 hoping -- full of hydrogen, hoping they didn't -- the 16 glass didn't break and explode. So it was -- it was 17 fun. 18 BY ATTORNEY STAMATOPOULOS: 19 Q. Now, you testified just now that you were the 20 first company in North America to actually develop 21 lithium-ion batteries, right? 22 A. You know, there was -- I'm sure there was 23 other people -- there were other people working on 24 lithium-ion batteries at the time. We were the first 25 company to commercialize and sell lithium-ion batteries
Page 34 1 batteries at any other point in time in your career? 2 A. Yes, starting in 1989. 3 Q. What types of experiments did you conduct? 4 A. I prepared electrolytes. I prepared cathode 5 materials. I have over the years prepared anode 6 materials. I have built cells. I have tested cells. 7 I've designed cells and, I mean, anything -- many, many 8 tasks regarding lithium-ion batteries. 9 Q. And what was the objective of your testing of 10 lithium-ion batteries? 11 ATTORNEY SOMMER: Object to form. 12 A. One of the objectives was to make sure they 13 didn't explode, as our original lithium metal batteries 14 did before we had to pull them off the market. 15 The other is testing performance, trying to 16 understand how can we get the most performance out of 17 the various anode and cathode materials and 18 electrolytes. 19 You know, we were the first company in North 20 America to actually develop lithium-ion batteries, so 21 everything we did was completely novel, and we -- 22 basically, starting from scratch. So you can imagine 23 all the work that we did in terms of product testing, 24 being able to find applications for those cells, making 25 sure the cells were safe under every possible condition	Page 36 1 in the market, but there were other people working on 2 lithium-ion batteries. 3 Q. And what company was that? 4 A. One of them was Bell Labs. And some 5 universities, I believe. 6 Q. I'm going to cut you off because I think 7 you've misheard my question. 8 What was your company at the time? 9 Was it Moli Energy? 10 A. That's correct. 11 Q. And is it fair to say that you considered the 12 work that you did at Moli Energy to be innovative? 13 A. Yes. 14 Q. And there were also competitor companies in 15 North America that competed with Moli Energy at the 16 time. Correct? 17 ATTORNEY SOMMER: Object to form. 18 A. Yes. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. And I see here on your CV that there are a 21 number of patents listed. 22 A. Yes. 23 Q. Did Moli Energy at the time try to protect the 24 innovations that it developed in the lithium-ion battery 25 space with patents?

1 ATTORNEY SOMMER: Object to form. 2 A. Yes. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. None of those patents have been included in 5 your declaration. Correct? 6 A. That's correct. 7 Q. And that would have been one repository of -- 8 let me withdraw the question. 9 The patents and patent applications filed by 10 Moli Energy would have been one repository of 11 potentially relevant materials that you had access to 12 when you were preparing your declaration. Correct? 13 ATTORNEY SOMMER: Object to form. 14 A. You know, I did not specifically look for Moli 15 Energy patents. At the time, during my time there, I 16 did not -- I only prepared one patent application while 17 I was there, and we did not pursue it. But other 18 patents, I wasn't familiar and I did not work on any 19 other patents at Moli Energy. 20 Moli was unique. Our head of R&D, he wanted 21 to teach the world about lithium-ion batteries. He 22 wanted to work with other people in the industry and in 23 universities and share information, so there were 24 more -- you know, there were more technical documents 25 that were prepared, I believe, than patents. And this	Page 37 1 Q. The first time that you are encountering this 2 term, "primary lithium-ion battery," is at this 3 deposition? 4 A. Yes, in my recollection, yes. 5 Q. Are there nonrechargeable -- let me withdraw 6 that question. 7 Is it possible to construct a lithium-ion 8 battery that is incapable of being recharged? 9 ATTORNEY SOMMER: Object to form. 10 A. Not -- I can't think of one offhand. 11 BY ATTORNEY STAMATOPOULOS: 12 Q. So it's possible -- so it's possible -- 13 withdrawn. 14 So lithium-ion batteries are always capable of 15 being recharged. 16 Is that fair? 17 A. You can never say always. There may be some 18 that I don't know about, that I've never heard about, 19 that I don't recall. 20 Q. As you sit here today, you can't think of an 21 example of a lithium-ion battery that can't be 22 recharged. Is that fair? 23 A. That's fair. 24 Q. So insofar as a lithium-ion battery can be 25 recharged even once, does that make it a secondary
1 R&D director eventually went to university, became a 2 university professor. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. Did he -- what's the name of the head of R&D 5 of Moli Energy at that time? 6 A. At that time, he wasn't the head of R&D. He 7 wasn't a vice president. He was more of a director. 8 His name was Jeffrey Dahn, D-A-H-N. 9 Q. And you've included one of his documents in 10 your declaration as an exhibit. Correct? 11 A. Yes. 12 Q. This particular document is not one of the 13 prior art references that are asserted against the '641 14 patent claims. Correct? 15 ATTORNEY SOMMER: Object to form. 16 A. That's correct. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. So it sounds like you've had considerable 19 experience with lithium-ion batteries over the years. 20 Fair? 21 A. Yes. 22 Q. And in all of those years, have you 23 encountered the term "primary lithium-ion battery" in 24 any context? 25 A. No, not that I recall.	Page 38 1 lithium-ion battery? 2 A. It would have to be discharged twice, minimum. 3 Q. So as long as a lithium-ion battery can be 4 charged and discharged twice, that makes it a secondary 5 lithium-ion battery? 6 A. Yes, a secondary. "Secondary" refers to more 7 than one. 8 Q. More than one what? 9 A. Discharge. 10 Q. Would a secondary lithium-ion battery that can 11 only be just discharged twice be useful to an end user? 12 A. It's possible. 13 ATTORNEY SOMMER: Object to form. 14 A. It's possible, but I don't know of any 15 lithium-ion batteries that can only be used twice by a 16 user and then thrown away. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. You're familiar with the term "person of 19 ordinary skill in the art"? 20 A. Yes. 21 Q. Now, just to make things a little bit easier 22 in this deposition, unless I specify otherwise, when I 23 ask you about the meaning of a particular term, is it 24 fair for me -- is it fair for us to just understand that 25 we're referring to the understanding of a person of

Page 41 1 ordinary skill in the art with respect to that term? 2 A. I think we'd have to specify based on my 3 answers. 4 Q. Well, unless we specify otherwise, is it okay 5 if, if I ask you about the meaning of a certain term, if 6 I omit that I'm asking about the meaning that a person 7 of ordinary skill in the art would apply? 8 A. Okay. 9 Q. Would a person of ordinary skill in the art 10 understand a secondary lithium-ion battery to include a 11 lithium-ion battery that can only be recharged twice? 12 A. By definition of "secondary" and definition of 13 "rechargeable," yes. 14 Q. Would a person of ordinary skill in the art 15 understand that a battery that can only be discharged 16 twice would be commercially viable as of the 2000 time 17 frame? 18 ATTORNEY SOMMER: Object to form. 19 A. They would likely be believing that it was not 20 commercially viable. 21 BY ATTORNEY STAMATOPOULOS: 22 Q. And why is that? 23 A. If you have a battery that can only be used 24 twice and you -- you're competing against a company that 25 has a battery that can be used hundreds of times, you	Page 43 1 secondary lithium-ion batteries could be charged and 2 discharged? 3 A. It was typically a minimum of 500 cycles to 4 80 percent capacity remaining, if I recall correctly. 5 And we had batteries that would last longer than that, 6 but I don't recall ever showing data for any cell that 7 would be less than 500 cycles that we would put on the 8 market. 9 Q. And you said 500 cycles to 80 percent 10 capacity. What did you mean by that? 11 A. If you discharge the battery 500 times, on the 12 500th cycle, you would have more than 80 percent of the 13 initial capacity. 14 Q. And was 80 percent capacity for 500 cycles an 15 industry standard at the time? 16 ATTORNEY SOMMER: Object to form. 17 A. There was no industry standard. We were the 18 first in North America. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. And roughly what time frame was that? 21 A. 1994. 22 Q. And in the years that followed 1994, let's say 23 through 2000, did an industry standard develop in terms 24 of the number of cycles after which a battery could 25 retain 80 percent capacity?
Page 42 1 know, it's difficult to compete. 2 Q. Did Moli Energy ever commercialize any of its 3 lithium-ion batteries? 4 A. Yes. 5 Q. Did Moli Energy ever commercialize any of its 6 secondary lithium-ion batteries? 7 A. Yes. 8 Q. Do you recall how many times Moli Energy told 9 its customers its batteries could be charged and 10 discharged? 11 ATTORNEY SOMMER: Object to form. 12 ATTORNEY STAMATOPOULOS: Well, let me withdraw 13 that question. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. Moli Energy told its customers about the 16 performance characteristics of its secondary lithium-ion 17 batteries. Correct? 18 A. Yes. 19 Q. And one of those performance characteristics 20 was the amount of times that Moli Energy's secondary 21 lithium-ion batteries could be charged and discharged. 22 Correct? 23 A. Yes. 24 Q. Do you recall what Moli Energy told its 25 customers about the number of times that Moli Energy's	Page 44 1 A. Yes. 2 Q. And what was that standard? 3 A. I'm sorry, I thought you meant industry 4 generic standard that people would use. 5 Q. What's the difference between an industry 6 generic standard and an industry standard? 7 A. Industry standard would be like an 8 International Electrotechnical Commissions document, 9 Underwriters Laboratory document. Those are just two 10 types of documents. 11 Q. So Moli Energy competed with other battery 12 manufacturers in the 1990s. Fair? 13 A. Yes. 14 Q. And you left Moli Energy in 1996. Correct? 15 A. Yes. 16 Q. And as of 1996, Moli Energy was competing with 17 other battery manufacturers. Correct? 18 A. Yes. 19 Q. And one of the things that Moli Energy 20 competed on with other battery manufacturers was battery 21 performance. Correct? 22 A. Yes. 23 Q. And one characteristic of battery performance 24 was the ability of the battery to retain a certain 25 percentage of its capacity after a certain number of

1 charge/discharge cycles. Correct? 2 A. Yes. 3 Q. And Moli Energy's battery could retain 4 80 percent capacity after roughly 500 cycles as of 5 around 1996. Correct? 6 A. Yes. 7 Q. On average, how did Moli Energy's competitors 8 fare with respect to this particular metric? 9 A. I can't give you a specific number. 10 Q. Is it fair to say that competitive batteries 11 also could retain roughly 80 percent capacity after 12 several hundred cycles? 13 A. Yes. 14 Q. Is it fair to say that this was fairly common 15 in the market for commercially available secondary 16 lithium-ion batteries? 17 ATTORNEY SOMMER: Object to form. 18 THE WITNESS: Sorry, what was common? 19 BY ATTORNEY STAMATOPOULOS: 20 Q. Is it fair to say that retaining 80 percent 21 capacity after 500 or so cycles was fairly common in the 22 market for commercially available secondary lithium-ion 23 batteries in the mid '90s time frame? 24 A. That was a long time ago. Our competitors 25 were Sony and a consortium of two companies, Asahi and	Page 45 1 time is 8:21 AM. 2 BY ATTORNEY STAMATOPOULOS: 3 Q. Welcome back, Mr. Juzkow. 4 Did you speak with counsel during the break? 5 A. No. 6 Q. Now, earlier I asked you a question as to 7 whether a person of ordinary skill in the art would 8 understand a secondary lithium-ion battery to include a 9 lithium-ion battery that can only be recharged twice. 10 And I believe you answered by definition of "secondary" 11 and definition of "rechargeable," yes. 12 My question is, what is the definition of 13 "secondary" that you had in mind when you answered my 14 question? 15 A. Rechargeable. 16 Q. So "rechargeable" and "secondary" are 17 synonymous, in your view? 18 A. Yes. 19 Q. And is there a reference or other authority 20 that you have consulted with in forming the opinion that 21 "rechargeable" and "secondary" are synonymous? 22 A. No. 23 Q. This is based on -- what is your basis for 24 saying that the two are synonymous? 25 A. As long as I can remember, this is the way the
1 Toshiba. And I don't recall what the exact numbers 2 were. But I do recall that 80 percent was, you know, a 3 number that people would use, they would use, we would 4 use, and that became used throughout the industry. 5 80 percent was a good number that was used to 6 show that hey, you know, if your application used to run 7 at 10 -- for 10 hours, your phone could run for 10 8 hours, and then if it -- you know, after several years, 9 500 cycles, let's say two years of life, you can still 10 get 8 hours' use, that's pretty good. 11 ATTORNEY SOMMER: Counsel, we have been going 12 about an hour, so when you reach a good stopping point 13 to take a break, that would be great. 14 ATTORNEY STAMATOPOULOS: I think, yeah, I 15 think -- and, Mr. Juzkow, by the way, I forgot to 16 mention if at any point you need a break, let me know. 17 The only thing I ask is that you let me get through that 18 line of questioning, and then at a logical point we can 19 stop. And yes, Andrew, a break right now seems fine. 20 We can go off the record. 21 ATTORNEY SOMMER: Great. 22 THE VIDEOGRAPHER: The time is 8:06 AM. We 23 are off the record. 24 (Recess taken.) 25 THE VIDEOGRAPHER: Back on the record. The	Page 46 1 two words are, you know, put together. 2 Q. So based on your experience, "secondary" and 3 "rechargeable" are synonymous in the space of 4 lithium-ion batteries. Is that fair? 5 A. Yes. 6 Q. And based on your experience, a battery that 7 can only be recharged twice would be considered 8 rechargeable. 9 Do I have that right? 10 A. By the definition of "rechargeable," yes. 11 Q. Again, what definition are you referring to? 12 A. Being able to discharge more than once. 13 Q. So based on your experience, as long as a 14 battery can be recharged or discharged more than once, 15 it is rechargeable. Correct? 16 A. Yes. 17 Q. Are there any batteries that you are aware 18 of -- withdrawn. New question. 19 Are there any lithium-ion batteries that you 20 are aware of as you sit here today that cannot be 21 recharged and discharged more than once? 22 A. No. 23 Q. Mr. Juzkow, I want to switch gears a little 24 bit and talk a little bit about battery performance. 25 Is -- withdrawn.
BlueBear Reporting LLC	Page 47 Page 48 RJ Technology Exhibit 2008 Apple Inc. v. RJ Technology LLC IPR2023-01183, Page 12 of 105

1 What are the characteristics of a battery that 2 are relevant to battery performance? At a high level. 3 And when I say "battery," I mean secondary lithium-ion 4 battery. 5 ATTORNEY SOMMER: Object to form. 6 A. Energy, power, cycle life, the time it takes 7 to charge, thermal stability. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. Is battery capacity a performance 10 characteristic? 11 A. Battery capacity multiplied by voltage gives 12 you energy. So when I said "energy," I am incorporating 13 both voltage and capacity. 14 Q. Okay. And what is the meaning of battery 15 capacity? 16 ATTORNEY SOMMER: Object to form. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. Well, let me actually go back to something we 19 discussed earlier. I'm going to ask you about the 20 meaning of certain terms. And when I ask you about the 21 meaning, I'm referring to the meaning that a person of 22 ordinary skill in the art would apply to these terms as 23 of the time of the invention. Just to avoid putting 24 that prelude into every question, is it okay if I omit 25 it and just ask you about the meaning?	Page 49 1 A. It can refer to the amount, the mass of active 2 cathode material. It could relate to the mass of the 3 total cathode, including the binder and the conductive 4 additives. And it can even refer to the mass of the 5 total battery, including both anodes -- or, sorry. 6 Strike that. Including anode, cathode, electrolyte, 7 separator, current collectors, can. So there's many 8 ways that you can describe per mass. 9 BY ATTORNEY STAMATOPOULOS: 10 Q. So is the specific capacity property of the 11 battery that is independent of its particular mass? 12 A. Yes. 13 ATTORNEY SOMMER: Object to form. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. And the cathode has a specific capacity, 16 right? 17 A. Yes. 18 Q. And the anode too has a specific capacity? 19 A. Yes. 20 Q. And other than the fact that the anode 21 specific capacity pertains to the anode and the cathode 22 specific capacity pertains to the cathode, is there any 23 other distinction with respect to the specific capacity 24 of the anode or the cathode that you're aware of? 25 ATTORNEY SOMMER: Object to form.
Page 50 1 A. Yes. 2 Q. Great. 3 So what is the meaning of battery capacity? 4 A. It's the number of coulombs of electrons that 5 can be transported from the cathode to the anode or the 6 anode to the cathode, coulombs being amp seconds. And 7 we convert that typically to amp hours. 8 Q. And when we're talking about lithium-ion 9 batteries, does the number of lithium-ions that can be 10 transported from the cathode to the anode and vice versa 11 relate at all to battery capacity? 12 A. Yes. 13 Q. In what way? 14 A. The greater the number of lithium-ions you can 15 transport back and forth lead to higher capacity. 16 Q. Are you familiar with a term called "specific 17 capacity"? 18 A. Yes. 19 Q. And what is specific capacity? 20 A. In general, specific capacity is capacity per 21 unit mass. 22 Q. So specific capacity refers to the capacity of 23 a particular cathode that has a particular mass, for 24 example? 25 ATTORNEY SOMMER: Object to form.	Page 52 1 A. No. 2 BY ATTORNEY STAMATOPOULOS: 3 Q. Are you familiar with a term called "specific 4 energy of the secondary lithium-ion cell"? 5 A. Very much so. 6 Q. You say very much so. What is the specific 7 energy of a secondary lithium-ion cell? 8 A. It's the energy per unit mass. And people 9 always get it confused with energy density. Energy 10 density would be the energy per unit volume. 11 And so I also work with a -- I work for a 12 company that makes aircraft, and aircraft mass is the 13 most critical thing. But when people say how much 14 energy density a cell has, it just -- it's not accurate, 15 so I always have to say specific energy, energy by mass, 16 more important for an aircraft than energy by volume. 17 Q. Just to make it a little bit more clear for 18 the record, what is energy density of a lithium-ion 19 battery cell? 20 A. That would be the amount of energy per unit 21 volume. Typically, we would use the units watt-hours 22 per liter. 23 Q. Is it fair to say that energy density is a 24 property of -- withdrawn. 25 Is it fair to say that different lithium-ion

1 batteries will have different energy densities depending 2 on the way in which they're constructed? 3 A. Yes. 4 Q. And would cathodes made of the exact same 5 material have the same specific capacities? 6 ATTORNEY SOMMER: Object to form. 7 A. Yes. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. And why is that? 10 A. It's based on the molecule and the number of 11 lithium-ions that it can transport back and forth. So 12 for a given discharge rate for a given volt -- or for a 13 given voltage, for a given temperature, for a given 14 active material, cathode material, specific capacity 15 would be the same. 16 Q. So all other parameters being equal, the 17 specific capacity of a cathode is a variable that 18 depends upon the particular material from which that 19 cathode is made. Correct? 20 ATTORNEY SOMMER: Object to form. 21 A. Yes, that's true. You can have cathode 22 materials that are monocrystalline or polycrystalline. 23 You can make that material with different surface area. 24 When you discharge it at different discharge rates, you 25 can end up with different specific capacity. If you	Page 53 1 You mentioned that energy is obtained by 2 multiplying battery capacity and voltage. 3 Did I get that right? 4 A. Correct. 5 Q. And what voltage were you referring to? 6 A. That would be the average voltage over the 7 entire discharge. 8 Q. Is that the same as the average operating 9 voltage? 10 A. Marketing terms, when people say "nominal 11 voltage," not so accurate. But when you discharge a 12 battery and you segment it, maybe every one second, you 13 measure the capacity within that one second, you measure 14 the average voltage within that one second, and then you 15 add all of those up throughout the entire discharge, 16 that gives you a more accurate energy. 17 You can do it at one second, you can do it at 18 a tenth of a second. It depends. But that's the way 19 you get your, you know, the accurate energy for a 20 discharge in a cell. 21 Q. And the voltage you're referring to is a 22 voltage between the anode and the cathode? 23 A. Yes. 24 Q. When a battery is not connected to a 25 particular device, is there a voltage between the anode Page 55
1 discharge it at different temperatures, you can end up 2 with different specific capacities, but -- 3 Q. Okay. 4 A. Yeah, done. 5 Q. And if I asked you the same question about the 6 anode, I'd get the same answer? 7 A. Yes. 8 Q. You testified there's a distinction between 9 energy density and specific energy. 10 Did I get that right? 11 A. Yes. 12 Q. In which instances is energy density more 13 relevant than specific capacity in the context of 14 lithium-ion battery applications? 15 A. Automobiles. Electric vehicles. Typically, 16 volume is the most important requirement. 17 Q. What about portable devices? 18 ATTORNEY SOMMER: Object to form. 19 A. Portable devices are a combination. I mean, 20 you don't want a phone that is so large, but you also 21 want a light phone, so it -- portable devices, handheld 22 devices are a combination of. 23 BY ATTORNEY STAMATOPOULOS: 24 Q. You mentioned that battery capacity -- 25 withdrawn. Page 54	1 and the cathode? 2 A. Yes. 3 Q. Are you familiar with the term "open circuit 4 voltage"? 5 A. Yes. 6 Q. Is the voltage between the anode and the 7 cathode when the battery is not connected to any device 8 the open circuit voltage? 9 A. Yes. 10 Q. When a battery has been discharged, is there 11 an open circuit voltage between the anode and the 12 cathode? 13 A. Yes. 14 Q. And to charge that particular battery, would 15 it be possible to simply apply an external voltage that 16 is equal to the open circuit voltage? 17 ATTORNEY SOMMER: Object to form. 18 A. No. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. The reason it would not be possible to charge 21 a battery by applying an external voltage that is equal 22 to the open circuit voltage is because there would be no 23 force leading the lithium-ions from the cathode to the 24 anode. Correct? 25 A. Yes. Page 56

1 Q. So in order to move ions from the cathode to 2 the anode, one would have to apply a voltage external to 3 the battery that is greater than the open circuit 4 voltage. Correct? 5 A. Yes. 6 Q. Once the charge is complete and the external 7 voltage is removed, the battery will have an open 8 circuit voltage. Correct? 9 A. Yes. 10 Q. And the open circuit voltage, upon completion 11 of a charging cycle, will be greater than the open 12 circuit voltage prior to completion of the charging 13 cycle. Correct? 14 A. The open circuit voltage, after charging, will 15 be less than the charge voltage, maximum charge voltage. 16 Q. What do you mean by that? 17 A. Once the -- when you're pushing, using force 18 to put the battery to a higher voltage, you have a 19 voltage maximum, a charge voltage cutoff. There's many 20 terms for it. Once you release -- once you put the cell 21 into open circuit, the voltage will relax, meaning it 22 will drop, and then it will stabilize into an open 23 circuit voltage. 24 Q. So there's a difference between the charge 25 voltage and the open circuit voltage. Correct?	Page 57 1 A. It depends on many factors, including 2 mechanical, what's the thickness of the current 3 collector, what's the length of the current collector to 4 where you're capturing the electrons, what's the 5 thickness of the cathode and anode coating on the 6 current collector, what's the porosity of that active 7 cathode -- active anode and cathode coating on those 8 current collectors, what's the conductivity of the 9 electrolyte, what's the thickness of the separator. I'm 10 sure there's a few others I missed. 11 Q. And the DC resistance of the cell is one 12 principal factor -- withdrawn. 13 The DC resistance of the cell is one principal 14 parameter that a person of ordinary skill in the art 15 would need to know to determine the difference between 16 an applied charge voltage and the open circuit voltage 17 at the end of charging. Correct? 18 A. Yes. 19 Q. Are you familiar with the term called 20 "theoretic capacity"? 21 A. "Theoretical capacity" is more commonly known. 22 Q. Okay. What is the theoretical capacity? 23 A. Theoretical capacity outside of the patent 24 means -- it's a calculated value, and it's based on the 25 molecular weight of the molecule. And it's based on the
Page 58 1 A. Yes. 2 Q. And the charge voltage is higher than the open 3 circuit voltage. Correct? 4 A. Yes. 5 Q. Is there a formula through which it would be 6 possible to obtain the open circuit voltage simply by 7 looking at the charge voltage? 8 A. No. 9 Q. Why not? Let me ask you a question, a 10 different question. Or, rather, if you can answer my 11 question, that's fine. 12 A. Okay. I mean, there's several components. 13 And one of the components would be the power that you're 14 using to charge the cell. 15 When you -- when you're putting current 16 through the cell, then when you release that current, 17 there's a drop in the voltage which can be calculated by 18 voltage, the voltage. But I should say the delta 19 voltage would be equal to the current times the DC 20 resistance of the cell. That's -- 21 Q. The DC resistance of the cell will be 22 different for every cell. Correct? 23 A. Correct. 24 Q. What does the DC resistance of the cell depend 25 upon?	Page 60 1 number of the moles of lithium-ion for lithium-ion 2 battery. So it's based on the molecular weight of the 3 cathode and the number of moles total in that molecule. 4 Q. Is the theoretical capacity a material 5 property? 6 A. Yes. 7 Q. And by material property, you mean that it 8 does not depend upon any particular lithium-ion battery 9 cell construction but, rather, it is dependent upon the 10 particular material that is used in the anode or the 11 cathode alone. Correct? 12 A. Yes. 13 Q. You mentioned earlier outside of the '641 14 patent when I asked you what theoretical capacity was, 15 right? 16 A. Yes. 17 Q. Why is it that you distinguished between the 18 patent and your response? 19 A. There's a claim construction that describes 20 what Claim 5 means in terms of the word "theoretic" 21 within Claim 5, and I didn't use that claim construction 22 when I gave you the general definition of theoretical 23 capacity that a POSITA would know without having access 24 to this patent. 25 Q. You said without having access to this patent.

Page 61 1 Did you mean without having access to the claim 2 construction that you applied in your analysis? 3 A. Yes, that's -- 4 ATTORNEY SOMMER: Object to form. 5 A. -- correct. That's correct. 6 BY ATTORNEY STAMATOPOULOS: 7 Q. And the claim construction that you applied in 8 your analysis was provided to you by counsel, as stated 9 in your declaration. Correct? 10 A. Yes. 11 Q. And this claim construction that was provided 12 to you by counsel was one with respect to which you have 13 not rendered any opinions in your declaration. Correct? 14 A. That's correct. 15 Q. Just to be clear, the claim construction that 16 you were provided by counsel is different than the 17 response you gave just now when I asked you about the 18 meaning of the term "theoretical capacity." Correct? 19 A. Sorry, could you repeat that question? 20 Q. Certainly. 21 The claim construction that you were provided 22 by counsel is different than the meaning of the term 23 "theoretical capacity" -- I'm sorry, my realtime seems 24 to be a little bit -- I'm going to withdraw that and 25 I'll ask you a different question, because I was trying	Page 63 1 A. The definition that I gave you speaks to how 2 the capacity is derived. 3 Q. And according to a POSITA's definition of a 4 theoretical capacity, the theoretical capacity is a 5 material property of the anode. Correct? 6 ATTORNEY SOMMER: Object to form. 7 A. Yes. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. Or of the cathode, right? 10 A. Yes. 11 Q. Depending on whether we're referring to the 12 theoretical capacity of the anode or of the cathode. 13 Correct? 14 A. Sorry, I didn't -- 15 Q. Let me make it easier. Let me make it easier. 16 A. Sure. 17 Q. The theoretical capacity of the cathode is a 18 property of the material that the cathode consists of. 19 Correct? 20 A. Yes. 21 Q. And the theoretical capacity of the anode 22 similarly is a material property of the anode material. 23 Correct? 24 ATTORNEY SOMMER: Object to form. 25 A. Yes.
Page 62 1 to read back. 2 The claim construction that you were provided 3 by counsel is different than the answer you gave me when 4 I asked you about the meaning of the term "theoretical 5 capacity." Correct? 6 A. When I gave you the meaning of the word 7 "theoretical capacity," you know, I was very explicit in 8 how it was calculated. 9 Q. Is there any difference between -- let me 10 withdraw that. 11 Fair to refer to the answer you gave me about 12 theoretical capacity as your definition of theoretical 13 capacity? 14 ATTORNEY SOMMER: Object to form. 15 A. It would be that of a POSITA. 16 BY ATTORNEY STAMATOPOULOS: 17 Q. So the theoretical -- a POSITA's definition of 18 "theoretical capacity" corresponds to the answer that 19 you just give me. Correct? 20 ATTORNEY SOMMER: Object to form. 21 A. Yes. 22 BY ATTORNEY STAMATOPOULOS: 23 Q. How does a POSITA's definition of "theoretical 24 capacity" differ from the construction that you were 25 provided by counsel?	Page 64 1 BY ATTORNEY STAMATOPOULOS: 2 Q. Does the theoretical capacity of a particular 3 material differ depending upon the conditions in which 4 it is measured for a given material? 5 ATTORNEY SOMMER: Object to -- 6 A. No. 7 ATTORNEY SOMMER: -- form. 8 A. No. 9 BY ATTORNEY STAMATOPOULOS: 10 Q. What do you mean by that when you say no? 11 A. The theoretical definition is a calculated 12 definition. It's calculated. And it's based on the 13 total number of lithium-ions and the molecular weight of 14 that material. 15 Q. Does it differ depending on the voltage to 16 which the anode and cathode may be subjected? 17 A. No. 18 Q. Is it possible to arrive at the theoretical 19 capacity of an electrode through experiment? 20 ATTORNEY SOMMER: Object to form. 21 A. No. A POSITA would recognize the word 22 "theoretical" as a calculated value. 23 BY ATTORNEY STAMATOPOULOS: 24 Q. But if a POSITA wanted to experimentally 25 arrive at a theoretical capacity, would it be possible

1 for a POSITA to conduct an experiment in which a POSITA 2 could measure the theoretical capacity? 3 A. You could do the experiment, and then you 4 could compare that result to the calculated value and 5 see if they match. But, you know, this is speaking 6 outside of the patent claims, so everything I -- I'm 7 saying is outside the patent claims unless I say 8 otherwise. 9 Q. Now, you formed your opinions taking into 10 account the claim constructions that were provided to 11 you by counsel. Correct? 12 A. Correct. 13 Q. And you did not form opinions in your 14 declaration taking into account any alternative 15 construction other than the one provided to you by 16 counsel. Correct? 17 A. Correct, with respect to the claims. 18 Q. With respect to the claims. 19 Do you have the patent in front of you? 20 A. Yes. 21 Q. Could you -- and this is Exhibit 1001 in these 22 proceedings. 23 (Exhibit No. 1001, previously marked, was 24 referenced and indexed.) 25 BY ATTORNEY STAMATOPOULOS:	Page 65 1 A. The claim construction was proposed by 2 RJ Technologies. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. My question's a little bit different. I 5 understand who proposed the construction. 6 My question to you is, in your opinion, would 7 a POSITA understand this term, "as calculated by a 8 theoretic capacity with a charge cutoff voltage set at 9 4.2 volts" consistent with the claim construction that 10 was provided to you by counsel? 11 ATTORNEY SOMMER: Same objection. 12 A. I was not asked to make any opinions. 13 BY ATTORNEY STAMATOPOULOS: 14 Q. As you sit here today, do you have an opinion 15 as to whether a POSITA would understand this term 16 consistent with the construction that was supplied to 17 you? 18 A. A POSITA would look at the claim construction 19 provided by RJ, adopted by the claims -- the California 20 courts, and use that definition. 21 Q. Well, this patent has been around for -- since 22 2010, right? 23 So a POSITA looking at this patent, say, in 24 2013, before any proceedings with respect to this patent 25 had ever been initiated, would such a POSITA understand Page 67
1 Q. Can I ask you to turn to Claim 5. 2 A. Yes. 3 Q. And you can take a moment to familiarize 4 yourself with Claim 5. My question is about the very 5 last clause in Claim 5, "as calculated by a theoretic 6 capacity with a charge cutoff voltage set at 4.2 volts." 7 Take a moment to familiarize yourself, and then I'll ask 8 you my question. Let me know when you're ready. 9 A. I'm ready. 10 Q. What is your understanding of the phrase "as 11 calculated by a theoretic capacity with a charge cutoff 12 voltage set at 4.2 volts"? 13 A. I was asked to construe the meaning of that as 14 per RJ Technology's proposed claim construction adopted 15 by the courts in California and provided to me by 16 Samsung's counsel. 17 Q. Is it fair to say that other than -- well, 18 withdrawn. 19 Is it fair to say that you have formed no 20 opinions as to the meaning of this term? 21 A. The term in Claim 5, I -- that's correct. 22 Q. In your opinion, would a POSITA understand 23 this term consistent with the claim construction that 24 was provided to you by counsel? 25 ATTORNEY SOMMER: Object to form. Page 66	1 the term "as calculated by a theoretic capacity with a 2 charge cutoff voltage set at 4.2 volts" consistent with 3 the construction that was provided to you by counsel, 4 notwithstanding that a court had not made any findings 5 with respect to that construction and there was no court 6 case in which that construction had been proposed? 7 ATTORNEY SOMMER: Object to form. 8 A. That's a hypothetical question that I can't 9 answer. 10 BY ATTORNEY STAMATOPOULOS: 11 Q. Do you agree with the construction that was 12 provided to you by counsel? 13 ATTORNEY SOMMER: Object to form. 14 A. The claim construction -- the claim -- I -- 15 I've not been asked to make any opinions on the claim 16 construction. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. As you sit here today and you look at this 19 claim construction with your wealth of experience, do 20 you agree or disagree with the construction? 21 ATTORNEY SOMMER: Object to form. 22 A. I've not -- I've not been asked to make any 23 opinions. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. Okay. So as you sit here today, you're not Page 68

1 prepared to offer one. Correct? 2 A. That's correct. 3 Q. How much time would you need in order to be in 4 a position to offer an opinion? 5 ATTORNEY SOMMER: Object to form. 6 A. I'm not sure why I would need an opinion once 7 the -- RJ has proposed what they mean by the claim and 8 the California claims has, or California court has 9 adopted that. 10 BY ATTORNEY STAMATOPOULOS: 11 Q. Well, I'm asking you a different question, 12 sir. I'm asking you to the extent that you were called 13 upon to offer an opinion on this term, what would you 14 need in order to offer an opinion as to the appropriate 15 construction? 16 ATTORNEY SOMMER: Object to form. 17 A. I guess I would need to have not been 18 instructed to apply this construction. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. Would it be sufficient for you to look at the 21 patent in order to render such an opinion? 22 ATTORNEY SOMMER: Object to form. 23 A. I had not read the patent before reading the 24 claim construction. Or I should say I read them both at 25 the same time.	Page 69 1 calculated voltage. 2 Q. Why is that? 3 A. In the formula to calculate the theoretical 4 capacity, you count the lithium-ion as 1. You have one 5 lithium-ion within that molecule. You count that as 1. 6 You -- when you do a charge, you may not discharge -- 7 or, sorry, you may not move all of that lithium out of 8 the cathode, so you may end up with a value that's not 9 zero but may be, you know, X. And that value of X then 10 would change the calculation. 11 Q. So it's possible to obtain different 12 theoretical capacities for the same material at 13 different charge voltages. Is that fair? 14 A. Those would no longer be theoretical values, 15 or theoretical capacities. They'd be experimental 16 capacities, practical capacities. 17 Q. My initial question was if there is a 18 difference between theoretical capacity outside of the 19 particular construction that was provided to you between 20 "theoretical capacity" as a standalone term and 21 theoretical capacity at a particular voltage. And I 22 believe you answered yes. 23 Is that fair? 24 A. I said that they can be different -- 25 Q. They can --
1 BY ATTORNEY STAMATOPOULOS: 2 Q. "Theoretical capacity" was a term that you 3 were familiar with prior to reading this patent. 4 Correct? 5 A. Prior to reading the patent, yes. 6 Q. And "theoretical capacity" is a term that you 7 were familiar with in 2001? 8 A. Yes. 9 Q. It's a term of art? 10 ATTORNEY SOMMER: Object to form. 11 A. It's a term of science within the art. 12 BY ATTORNEY STAMATOPOULOS: 13 Q. Is there a difference between theoretical 14 capacity -- outside of the '641 patent claims and the 15 particular construction that was provided to you, is 16 there a difference between theoretical capacity as a 17 standalone term and theoretical capacity at a particular 18 voltage? 19 A. Outside of the patent, yes. 20 Q. What is the difference? 21 A. When you consider a charge voltage, you 22 have -- you end up with a value for the lithium that's 23 transported to be up to and including 1. If it's less 24 than 1, then that value that you measure by taking -- by 25 charging the cell to a voltage would be different than a	Page 70 1 A. -- unless the -- 2 Q. -- or cannot? 3 A. They -- yes, they can be different. But if 4 you extract 100 percent of the lithium out of the 5 molecule, they'll be the same value. 6 Q. And why is it that they can be different 7 again? 8 A. When you charge a lithium-ion battery, let's 9 take example of lithium cobalt oxide. The theoretical 10 capacity, about 274 milliamp hours per gram. But if you 11 extracted 100 percent of that lithium from that active 12 material, that lithium cobalt oxide, leaving you with 13 CoO₂, cobalt oxide, that molecule does not exist. You 14 would end up converting that to other molecules, and you 15 would generate a lot of heat. It would break down, and 16 that battery would most likely go into thermal runaway. 17 So you are limited to how much lithium you can 18 extract from a cell. So that's -- practically speaking, 19 you can't discharge the -- you can't charge the battery 20 completely and remove all the lithium in a practical 21 lithium-ion cell. 22 So for lithium cobalt oxide, typically remove 23 about half. So therefore, the practical capacity would 24 be about half of the 274, so maybe 140, plus or minus. 25 Q. Okay. This practical number that you refer to
BlueBear Reporting LLC	Page 71 Page 72 RJ Technology Exhibit 2008 Apple Inc. v. RJ Technology LLC IPR2023-01183, Page 18 of 105

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1 is also a theoretical number in the sense that it's tied 2 to the theoretical capacity. Correct? 3 ATTORNEY SOMMER: Object to form. 4 A. Theoretical capacity considers the entire 5 lithium content within the molecule. When you have a 6 voltage that limits the amount of lithium you take out 7 of that, you end up with a different value than your 8 theoretical value. 9 If you know what the amount of lithium that 10 you take out is and you multiply -- and you insert that 11 value into the calculation, then you will end up with 12 the same result. 13 BY ATTORNEY STAMATOPOULOS: 14 Q. So if I have a particular cathode, for 15 example, lithium cobalt oxide, with a particular 16 theoretical capacity, the amount of lithium that I can 17 actually extract from that cathode is limited by the 18 voltage that I will apply to that cathode. 19 Is that fair? 20 A. That's one of the limitations. The other 21 might be the charge rate, the temperature. Those are 22 two other parameters that could change that value. 23 Q. If a person of ordinary skill in the art were 24 attempting to establish the practical capacity of 25 lithium cobalt oxide, meaning the maximum amount of	1 the cell. 2 BY ATTORNEY STAMATOPOULOS: 3 Q. The higher the current, the higher the charge 4 rate -- 5 A. Correct. 6 Q. -- all else being equal? 7 A. Correct. 8 Q. What about temperature? 9 Does temperature affect the charge rate? 10 A. No. 11 Q. Impedance is a form of resistance? 12 A. Yes. DC impedance is a little different from 13 AC impedance, but impedance is -- people use it similar 14 to resistance. 15 Q. While you were at Moli Energy, did you apply 16 charge voltages over 4.2 volts to secondary lithium-ion 17 battery cells? 18 A. Yes. 19 Q. And it was relatively safe to do so. Correct? 20 ATTORNEY SOMMER: Object to form. 21 A. That's not 100 percent accurate. 22 BY ATTORNEY STAMATOPOULOS: 23 Q. Tell me why. 24 A. When you extract an excess amount of lithium, 25 the molecule, the lithium cobalt oxide, will decompose.
Page 74	Page 76
1 lithium that it would be practicable to extract from 2 that cathode, that person of ordinary skill in the art 3 would have to apply a slow charging rate. Correct? 4 ATTORNEY SOMMER: Object to form. 5 A. You can use any charging rate. Probably more 6 accurate value at lower charge rates. Typically at 7 higher charge rates you don't get the full capacity out 8 of a cell at high charge rates. 9 BY ATTORNEY STAMATOPOULOS: 10 Q. And why is that? 11 A. It's impedance driven. It's diffusion, how 12 fast the lithium-ions can deintercalate from the cathode 13 and how fast they can intercalate into the anode. So 14 you have diffusion and impedance that slows down your 15 charge rate if you want to go to the full charge 16 capacity. 17 Q. So to obtain more accurate results, a person 18 of ordinary skill in the art would try to slow down the 19 charge rate. Correct? 20 A. Yes. 21 Q. And what determines the speed of the charge 22 rate? Or let me withdraw that question. 23 What determines the speed of charging? 24 ATTORNEY SOMMER: Object to form. 25 A. I mean, it's the current that you apply across	1 And first, you'll lose cycle life. And if you 2 overcharge further, that battery can explode. 3 Q. You said when you extract an excess amount of 4 lithium. What do you mean by excess amount of lithium? 5 A. More than the practical amount of lithium that 6 you would use to optimize the cycle life and safety of 7 the cell. 8 Q. And was 4.2 volts the threshold at which a 9 person of ordinary skill in the art would understand a 10 charge might lead to extracting excess lithium from a 11 cathode? 12 ATTORNEY SOMMER: Object to form. 13 A. We started with 4.1 volts and then we moved to 14 4.2 volts. But we did not go beyond 4.2 volts, as we 15 would lessen the cycle life of the cell. 16 BY ATTORNEY STAMATOPOULOS: 17 Q. Do you have an understanding as to whether 18 your competitors would go beyond 4.2 volts? 19 A. Not in the early days. People are more 20 conservative. Today, you know, I see cell voltages 21 going to 4.25, possibly 4.3. 22 I tested some cells in my lab at 4.6 volts. 23 They exploded in my lab just last year. So yeah, so 24 that, I mean, people do have voltages today that are 25 more aggressive. But back in the day, back in the '90s,

1 you know, there was not very many lithium-ion suppliers. 2 We were very cautious about the technology, especially 3 Moli Energy, where we had many fires and explosions in 4 the field when we were selling lithium metal 5 rechargeable batteries. 6 And we ended up having to recall all of those 7 lithium metal rechargeable batteries because of the 8 fires in the computers and cellphones of our customers. 9 Q. So did I understand correctly that one of the 10 reasons you didn't go beyond 4.2 volts was out of 11 concern that doing so would extract an excess amount of 12 lithium that might lead to thermal runaway phenomena? 13 A. That was one of the reasons, yes. 14 Q. And that was considered dangerous? 15 A. Yes. 16 Q. And do you know when the industry transitioned 17 to a phase where manufacturers would routinely charge 18 their batteries with voltages above 4.2 volts? 19 A. I don't know. I can't recall. 20 Q. Was it generally desirable to charge batteries 21 at higher voltages if possible? 22 ATTORNEY SOMMER: Object to form. 23 A. By charging to higher voltages, so if you -- 24 if you look at the voltage curve of a cathode material, 25 many cathode materials have capacity, you know, in	Page 77 1 anode potential. 2 Q. Let me try to unpack that a little bit. 3 Is it fair to say that the open circuit 4 voltage of the battery is the difference between the 5 cathode voltage and the anode voltage? 6 A. Versus the reference voltage of lithium for 7 each of those, correct. 8 Q. And what is the reference voltage for 9 graphite? 10 A. Graphite -- there's multiple plateaus as you 11 discharge it, so those plateaus -- you know, you can 12 charge graphite anode as high as, you know, 1.5 volts, 13 and then you can discharge it down to zero volts. 14 So the average plateaus are probably in the 15 0.1 to 0.2-volt range over the bulk of the discharge or, 16 sorry, charge, I should say. It's -- it's -- yeah. 17 When you're -- when you're putting lithium-ions into the 18 anode charge, you're charging the cell. So as you put 19 more and more lithium-ions in the graphite, it 20 continually -- used on the various voltage plateaus, it 21 drops and it continues to drop until there's no room 22 within that graphite to continue to absorb lithium-ions, 23 at which point you start plating lithium metal. 24 The lithium-ions plate on the surface of the 25 graphite. And when that happens, you're at the voltage
1 excess of 4.2 volts. So if you charge the cell in 2 excess of 4.2 volts, you can access that excess 3 capacity. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. Why is that desirable? In general. 6 A. You end up with a cell that has increased 7 capacity. You're -- if you're using that cell in a 8 cellphone, then your cellphone will run for a longer 9 period of time. 10 Q. Do you recall when Moli Energy transitioned 11 from a 4.1-volt charge voltage to a 4.2 volt charge 12 voltage? 13 A. It was probably in the year 1990 -- between 14 1990 and 1991 to '2. Let's say between 1990 and '92. 15 And one of the other reasons we did that was a 16 change in the anode material. So we went from a hard 17 carbon to a graphite. And a hard carbon has a higher 18 voltage versus the reference lithium, so the voltage of 19 the cell is dependent -- it's the difference between the 20 cathode voltage and the anode voltage. 21 So when we went to graphite, that anode 22 voltage dropped about by 0.1 volts, so then we were able 23 to charge from 4.1 to 4.2 without pushing the cathode 24 any further. So we basically extracted the same amount 25 of lithium material out of that cell by changing the	Page 78 1 of a lithium metal reference, so you're at zero volts. 2 Q. And so you said that for graphite, the 3 reference voltage is between 0.1 and 0.2. 4 What about for hard carbon? 5 A. It's more of a sloping plateau. So, you know, 6 it has a higher voltage. I don't recall the exact 7 voltage because it is -- it ranges from, you know, maybe 8 0.3 or 4 down to zero. 9 ATTORNEY STAMATOPOULOS: Is this a good time 10 to take another break? 11 ATTORNEY SOMMER: Good for me. 12 THE REPORTER: Yes. 13 THE VIDEOGRAPHER: The time is 9:23 AM. We 14 are off the record. 15 (Recess taken.) 16 THE VIDEOGRAPHER: We are back on the record. 17 The time is 9:38 AM. 18 BY ATTORNEY STAMATOPOULOS: 19 Q. Mr. Juzkow, welcome back. 20 Did you speak with counsel during the break? 21 A. No, I did not. 22 Q. Okay. Are you familiar with a term called 23 "equilibrium potential"? 24 A. Not specifically. 25 Q. What about "equilibrium voltage"? Page 79 Page 80

1 A. Not specifically. 2 Q. What does the term "equilibrium voltage" or 3 "potential" bring to mind in the context of lithium-ion 4 batteries, if anything? 5 A. I'm not sure. I'm not familiar with the use 6 of "equilibrium voltage" within lithium-ion batteries 7 that I've been involved with. 8 Q. Are you familiar with that term in any other 9 context? 10 A. No. 11 Q. Now, we talked about how Moli Energy's battery 12 would retain approximately 80 percent of capacity after 13 500 cycles. 14 Do you recall that? 15 A. Yes. 16 Q. And if a battery lost 80 percent of its 17 capacity after, say, five cycles, would that be 18 considered by a person of ordinary skill in the art a 19 commercially viable lithium-ion battery? 20 A. You said if it loses 80 percent, or if it 21 reaches 80? I think you said it loses 80 percent. 22 Q. If it retained 80 percent. 23 A. Yes, I thought that's what you meant. 24 Q. I think I actually said loss, so let me just 25 repeat the question so it's clear.	Page 81 1 25 cycles in their cellphone, then that would not be a 2 viable product. So it really depends on the 3 application. 4 Q. And you said that a battery would be marketed 5 based on it flattened-out capacity to a consumer if 6 that -- if the capacity of that battery flattened out 7 after, say, five cycles. Correct? 8 A. That would be the right thing to do. 9 Q. Would those five first cycles be considered a 10 formation period for the battery? 11 A. Yes. That's one way you could lose capacity. 12 You could have the lithium-ions, instead of 13 intercalating into the graphite anode or carbon anode, 14 that they would react on the surface of that active 15 material and would -- they create what we call a solid 16 electrolyte interface layer, known as SEI layer. 17 And that layer builds up on the surface of the 18 active material and it basically protects that anode 19 material, which is active and reacts with the 20 electrolyte. 21 So it protects that active anode material. 22 And sometimes what happens is when that anode material 23 expands and contracts, you can get cracks in that 24 material in the passivation layer. We call it -- the 25 SEI is a passivation layer. It protects. If it gets a
1 If a battery retained 80 percent of its 2 capacity after, say, five cycles, would that be 3 considered by a person of ordinary skill in the art a 4 commercially viable lithium-ion battery? 5 A. It could. 6 Q. In what context? 7 A. If you have a sudden drop in, or a quick drop 8 in capacity over five cycles, and then it flattens out, 9 and then you continue along at maybe 79 percent capacity 10 for the next, you know, hundreds of cycles, then 11 that's -- that would be a viable battery. 12 But you would base that battery -- you would 13 sell it based on that 79 or whatever percent. That 14 would be what you would market that battery as, and 15 that's what the customer would expect, not the first 16 five cycles. But it's common. I've seen that. 17 Q. What if a battery lost or -- withdrawn. 18 What if a battery retained 80 percent of its 19 capacity for 25 cycles? Would that be considered a 20 commercially viable lithium-ion battery? 21 A. That would depend on the application. So, you 22 know, military applications, for instance, they in a lot 23 of instances would be happy with a high-energy battery 24 that gave them 25 cycles. 25 If a consumer had a battery that only lasted	Page 82 1 crack, the next cycle, you lose more lithium-ions inside 2 those cracks. 3 And, you know, there's some electrodes that 4 will expand and contract more, like a -- you know, a 5 silicon anode will expand and contract a lot more, more 6 cracks, more irreversible capacity loss. So I believe 7 that was the answer to your question. 8 Q. You said "more irreversible capacity loss." 9 Did you mean to say reversible capacity loss? 10 A. No, you would -- for a cell that drops quickly 11 in the first five cycles, you would be losing reversible 12 capacity so you would have increased irreversible 13 capacity. 14 Q. So the reason I ask is because you just said, 15 I believe, in your answer that you would have more 16 irreversible capacity loss. 17 A. If it continued to crack and you had to add 18 more lithium to protect the surface of the passivation, 19 you end up with increased irreversible capacity. 20 Q. Increased irreversible capacity? 21 A. Correct, yeah, lost -- you lose those 22 lithium-ions and they're no longer reversible to 23 deintercalate from the anode and move to the cathode to 24 intercalate into the cathode. 25 Q. And to the extent that some of the anode

1 material reacts with the lithium-ions to create this SEI 2 layer, then it's no longer active. Correct? 3 A. That lithium-ion -- those lithium-ions are no 4 longer active. 5 Q. And the anode material that's reacted with 6 those lithium-ions that are no longer active likewise is 7 no longer active. Correct? 8 A. No. 9 Q. Why not? 10 A. Well, lithium-ions can still diffuse through 11 that passivation layer. 12 Q. Just to backtrack for a second, these first 13 few cycles in which you have a loss of capacity in my 14 previous question, would those first few cycles be 15 properly characterized as a formation period? 16 A. Yes. You call them an SEI formation period, 17 correct. 18 Q. And the reason you call it a formation period 19 is because those SEI layers are formed during that 20 period. Correct? 21 A. Correct. 22 Q. And the anode active material prior to the 23 beginning of this formation period, is it more or less 24 than the active material after the completion of that 25 formation period?	Page 85 1 methods to control lithium dendrite growth on the 2 surface of the lithium metal. 3 And in my experience, when you charge and 4 discharge a lithium metal battery, as you charge -- as 5 you move the lithium-ions towards the lithium metal, you 6 can form metallic dendrites that are sharp and spikey 7 that would start on the surface of the lithium metal and 8 can actually grow through the separator and short out to 9 the cathode so you have a current path. 10 You can also get lithium that becomes -- it 11 reacts with the electrolyte and it becomes what we call 12 dead lithium. And it's typically very mossy and a very 13 high surface area. 14 So when you check for the thermal stability 15 using an arc type equipment, a cell that's fresh can be 16 quite safe. But if you cycle lithium-ion -- or, sorry, 17 if you cycle a lithium metal battery 100 times, let's 18 say, the thermal stability is decreased, making it less 19 safe. 20 So in my work, I test lithium metal batteries. 21 Lithium metal batteries typically have higher energy 22 density than lithium-ion batteries for a given cathode 23 material, higher specific energy, which is what we need 24 for aircraft. 25 But on the downside, we have to make sure that Page 87
1 A. There's no change in the active -- there's no 2 change in the active material, but there is a loss of 3 lithium. So, I mean, you don't lose the amount. You 4 still have the same amount of anode, active by mass. 5 It's still there. It's just that you've lost the 6 lithium that comes back and forth into it. 7 Q. I guess my question is what's your 8 understanding of active material? 9 A. Active material is -- active material is 10 material that is involved in the intercalation and 11 deintercalation of lithium-ions. 12 Q. So if part of that anode material is no longer 13 involved in a deintercalation of lithium-ions, would it 14 be fair to say that it's no longer active? 15 A. Yes. 16 Q. And in contrast, anode material that is still 17 involved in intercalation as well as deintercalation of 18 lithium-ions would be considered active. Correct? 19 A. Yes. 20 Q. Is it safe to use lithium metal as the 21 negative electrode? 22 ATTORNEY SOMMER: Object to form. 23 A. In my experience at Moli Energy, it was 24 unsafe. There's a lot of companies out there now that 25 are using lithium metal, and they are trying different Page 86	1 the thermal stability doesn't decrease to the point 2 where it would be too dangerous to put on an aircraft. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. Is it fair to say that cathode capacity is 5 proportional to the amount of lithium-ions that can be 6 extracted from the cathode at a particular voltage? 7 ATTORNEY SOMMER: Object to form. 8 A. In a lithium-ion cell, your lithium-ions that 9 you have in your battery come from your cathode. So 10 that's your -- typically, that's your entire source of 11 lithium-ions within the battery. 12 BY ATTORNEY STAMATOPOULOS: 13 Q. The greater the voltage that's applied to the 14 battery, the greater the amount of lithium-ions 15 extracted. Correct? 16 A. Correct. 17 Q. And to the extent that a person of ordinary 18 skill in the art were attempting to decrease the total 19 amount of lithium-ions from the cathode, would it be 20 reasonable to decrease the voltage applied to the 21 battery? 22 A. No. You would increase the voltage of the 23 charge voltage. 24 Q. My question was to the extent that a person of 25 ordinary skill in the art were attempting to decrease Page 88

1 the amount of lithium-ions from the cathode, would it be 2 reasonable to decrease the voltage? 3 A. So I'm trying to answer your question the best 4 I can. When you have a fresh battery, lithium cobalt 5 oxide, the value of the number of lithium within that 6 cobalt oxide is 1. When you charge the battery, you 7 extract lithium from that lithium cobalt oxide. The 8 higher the voltage you go, the more you extract of the 9 lithium. 10 Q. Right. But if I wanted to limit the amount of 11 lithium extracted from the cathode during a charge 12 cycle, make it less -- 13 A. Uh-huh. 14 Q. -- wouldn't I decrease the charge voltage? 15 A. You would. 16 ATTORNEY SOMMER: Object to form. 17 A. You would. And I apologize for 18 misunderstanding your question. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. No need to apologize. Like I said, I'm happy 21 to ask better questions if I can. Why is it that -- 22 withdrawn. 23 You testified earlier that persons of ordinary 24 skill in the art were cautious about extracting an 25 excess amount of lithium from the cathode.	Page 89 1 Does hard carbon have typical irreversible 2 capacity values? 3 ATTORNEY SOMMER: Object to form. 4 A. Yeah. They're higher. They'd be higher than 5 graphite. You have more -- the carbons are -- in 6 graphite are pretty well structured. You have graphite 7 C6 rings, and they're flat, and they sit on top of each 8 other like a deck of playing cards. 9 But when you have hard carbon, those flat C6 10 carbon rings are less -- they're more disordered. And 11 when they're more disordered, there's more reaction 12 sites and you can get more irreversible capacity loss, 13 more passivation occurring because the surface area is 14 typically larger. 15 BY ATTORNEY STAMATOPOULOS: 16 Q. And what's a typical range of irreversible 17 capacity for hard carbon? 18 ATTORNEY SOMMER: Object to form. 19 A. It could vary. It could be 20 percent. Some 20 materials can be much higher, to 45, 50 percent if it's 21 a really poor material. 22 BY ATTORNEY STAMATOPOULOS: 23 Q. Have you ever encountered a hard carbon anode 24 material that had a 1 percent irreversible capacity? 25 A. Not to my knowledge. Page 91
1 Is that fair? 2 A. Yes. 3 Q. Why is it that there was a concern about 4 extracting excess lithium? 5 A. You would make the cathode material unstable. 6 Q. In what way? 7 A. The molecule will change its structure and it 8 will become more thermally unstable. So when you take 9 out too much lithium, you change the molecular structure 10 of the cathode material. When you do that, it becomes, 11 you know, more reactive, less thermally stable for, you 12 know, cobalt oxide, nickel oxide, all these type 13 compounds. 14 Q. Are you generally familiar with the typical 15 irreversible capacity for graphite anode material? 16 A. Yeah. 17 ATTORNEY SOMMER: Objection. 18 A. It could be -- could be in the 10 percent or 19 less range. It really depends on the, you know, the 20 quality of the lithium, the surface area -- or, sorry, 21 the quality of the graphite, the surface area of the 22 graphite. You know, there's a number of factors but, 23 you know. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. What about for hard carbon? Page 90	1 Q. What about a 5 percent irreversible capacity? 2 A. Not to my knowledge. I don't have a lot of 3 experience with hard carbons. Most of my experience is 4 with graphite. We moved away from hard carbons back in 5 the early '90s to increase the gravimetric energy of the 6 cells. 7 Q. And for graphite, have you encountered any 8 graphite anodes with a 5 percent irreversible capacity? 9 A. Probably. Probably, over the years. I mean, 10 there's definitely a range, and it definitely is 11 dependent on the surface area of the material. 12 Q. What about a 1 percent irreversible capacity 13 for graphite? 14 A. I'm not that familiar with values that low 15 for -- 16 Q. Would you be surprised if you were presented 17 with a graphite anode for which it was reported that the 18 irreversible capacity was 1 percent? 19 A. No, I would not be surprised. 20 Q. Why is that? 21 A. If the graphite's stable, you can have a lot 22 less -- and the surface area's low, you can have a lot 23 lower -- a lot lower irreversible capacity. 24 Q. What about 0.1 percent? 25 Would that be a surprising value? Page 92

Page 93 1 A. I've not personally seen materials that I've 2 worked with that are that low. 3 Q. Have you ever heard of any materials that had 4 irreversible capacity at that level? 5 ATTORNEY SOMMER: Object to form. 6 A. I know in the Uemura patent, the values for 7 irreversible capacity are pretty low. One of the 8 reference in my -- one of the references I use. 9 BY ATTORNEY STAMATOPOULOS: 10 Q. And you're referring to Exhibit 1009 of your 11 declaration. Correct? 12 A. Yes. 13 (Exhibit No. 1009, previously marked, was 14 referenced and indexed.) 15 BY ATTORNEY STAMATOPOULOS: 16 Q. And you have that in front of you? 17 A. Yes. 18 Q. And you're looking at Figure 3 of Uemura? 19 A. Yes. 20 Q. And when you said that Uemura reports low 21 irreversible capacities, you're referring to a column in 22 Figure 3 that is titled Total Irreversible Capacity. 23 Correct? 24 A. Yes. 25 Q. And other than examples 2, 3, and 4, Uemura	Page 95 1 A. That's the irreversible capacity divided by 2 the total capacity of the cathode. 3 Q. And for examples 1 and 5 through 17, that's 4 reported as 0.1 percent, right? 5 A. Yes. 6 Q. And to be clear, in your experience personally 7 as well as from papers that you had read or that you 8 have read in the last 30 or so years, you have not 9 encountered values as low as those reported in Uemura. 10 Correct? 11 A. I -- I can't recall. 12 Q. And once you encountered these values in 13 Uemura, did you conduct any research to determine 14 whether these values were accurate? 15 A. No. 16 Q. Why not? 17 A. I did not because I just went by the technical 18 data provided in the patent. 19 Q. Now, you have experience building secondary 20 lithium-ion battery cells. Correct? 21 A. Yes. 22 Q. And designing lithium-ion battery cells? 23 A. Yes. 24 Q. And you've had hands-on experience in the lab 25 testing these types of cells. Correct?
Page 94 1 reports 0.002 as the total irreversible capacity value 2 corresponding to the remaining examples. Correct? 3 A. Correct. 4 Q. Prior to the Uemura reference and your study 5 of the Uemura reference in connection with this case, 6 had you encountered any anode materials with total 7 irreversible capacity values as low as those reported in 8 Uemura? 9 A. Not personally. 10 Q. What about other than personally? 11 A. Not that I recall. I mean, it's a very 12 specific property. You know, you have to read specific 13 technical papers. And over the years, I've read a lot 14 of papers but I don't recall, you know, values, specific 15 values. 16 Q. And you studied Uemura in connection with 17 forming your opinions in this case, right? 18 A. Yes. 19 Q. And in addition to the Total Irreversible 20 Capacity column, there is another column two columns to 21 the right that is titled IC Over PC Times 100 percent. 22 Do you see that? 23 A. Yes. 24 Q. What is your understanding of the meaning of 25 IC over PC times 100 percent?	Page 96 1 A. Yes. 2 Q. And do you know if it would be possible for 3 you or someone under your supervision to reconstruct the 4 battery described in the Uemura reference? 5 A. I don't believe they specifically say where 6 they get their graphite material from. I'd have to read 7 through here again to see. But whether they -- where 8 they buy it from or if they make it themselves. But to 9 replicate this, you would need to use the very same 10 graphite material. 11 Q. When you say "the very same graphite 12 material," do you mean the same material procured from 13 the exact same source? 14 A. Yes. 15 Q. So if you were able to procure material that 16 was similar or had similar properties to the one 17 described in Uemura, would it not be possible to 18 recreate the Uemura battery? 19 ATTORNEY SOMMER: Object to form. 20 A. If you tested a graphite material and you 21 measured the irreversible capacity and you achieved 22 0.1 percent, then yes, that would be -- you would be 23 able to replicate. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. You mentioned graphite. Do the examples in

Page 97 1 Uemura all pertain to graphite? 2 A. No, they don't. 3 Q. They pertain to hard carbon. Correct? 4 A. They give examples of coke, artificial 5 graphite, natural graphite, hard carbon. 6 Q. And the materials used are listed in page 11 7 of the exhibit as well as page 12, where it describes 8 the various examples, right? 9 A. Yeah. Also page 9, paragraph 53 is one area. 10 Q. And then also in paragraph 74, there's a 11 section titled Fabrication of Battery. Correct? 12 A. Yes. That's regarding the positive electrode. 13 Q. Now, if you reconstructed the Uemura battery 14 with respect to each of these examples and ran the tests 15 reported in Uemura to discover that the total 16 irreversible capacity reported in Uemura is actually not 17 the same as that experimentally determined by you in the 18 process of reconstructing the Uemura battery, would that 19 in any way affect your opinions? 20 ATTORNEY SOMMER: Object to form. 21 A. In paragraph 77, paragraph 77, they explain 22 the way they made the carbon negative electrodes to have 23 the irreversible capacity of .002. They performed a 24 number of cycles, discharge/charge cycles performed at 25 0.5 milliamps for 40 hours with a lithium metal plate as	Page 99 1 process described in paragraph 77 was greater than the 2 0.002 reported in Uemura? 3 A. Yes. 4 Q. Why is that? 5 A. As I said before, I had not seen negative 6 electrodes that -- carbon negative electrodes that had 7 low irreversible capacity such as this level. And, I 8 mean, 0.1 percent is very low. 9 I'm not familiar with materials like that. 10 This one's made by -- it's a hard carbon made by 11 Mitsubishi Gas & Chemical. Chances are, yeah, it would 12 not have 0 point -- it would not have 0.1 percent 13 irreversible capacity as provided by Mitsubishi Gas & 14 Chemical, or standard hard carbon, which they don't 15 specify exactly which hard carbon. I mean, there's a 16 multitude of hard carbons out there. 17 Q. Is the charge/discharge that was performed at 18 0.5 milliamps for 40 hours described in paragraph 77 of 19 Uemura, in your view, a formation period for the anode? 20 A. Yes, that's the way I read it. 21 Q. And is a formation period necessary -- 22 withdrawn. 23 Is it necessary to complete the formation 24 period before testing a battery to see how it would 25 perform in normal operation?
Page 98 1 the opposite electrode, then decomposition was performed 2 in an argon gas atmosphere. Thus, the carbon negative 3 electrodes, each with -- each of which had a total 4 irreversible capacity of .002 milliamp hours, were made. 5 So it looks like, based on paragraph 77, that 6 they -- they created the irreversible -- they used up 7 the irreversible capacity. And once that was completed, 8 once those 40 hours of charge/discharge was performed, 9 if you took that carbon negative electrode and you ran 10 one more cycle on it, that the total irreversible 11 capacity of that negative electrode would be .002 12 milliamp hours. 13 BY ATTORNEY STAMATOPOULOS: 14 Q. So what you're saying I think -- I just want 15 to make sure I understand -- is that at the end of that 16 40-hour period, the, let's say, incremental irreversible 17 capacity was 0.002. Correct? 18 A. That's the way I read this paragraph. 19 Q. In other words, the irreversible capacity 20 before this process was much greater. 21 ATTORNEY SOMMER: Object to form. 22 A. They don't specifically say that here. 23 BY ATTORNEY STAMATOPOULOS: 24 Q. Would a person of ordinary skill in the art 25 understand that the irreversible capacity before the	Page 100 1 ATTORNEY SOMMER: Object to form. 2 A. In the experiments that Uemura was doing, he 3 needed a graphite material that had a low irreversible 4 capacity to prove out his thesis. And so therefore, the 5 way I read this is that he created those low 6 irreversible capacity electrodes to -- for the purpose 7 of his tests and what he was trying to prove. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. And what was Uemura trying to prove? 10 A. He was trying to make electrodes that had -- 11 it was like he's -- he's trying to get away from cobalt 12 and nickel and go to manganese-type materials. 13 Manganese, which is a very low-cost material. 14 And there's different manganese materials. 15 There's a manganese lithium, Mn204. But, you know, 16 there's problems with that one. Particularly, it's got 17 a lower capacity per gram and it's less stable at high 18 temperatures. The manganese will come out of the 19 material. The manganese will dissolve into the 20 electrolyte and poison the anode. 21 So he was looking at manganese dioxide. So 22 lithium LiMnO2, and he was looking at variations of that 23 material. And he was trying to create a cathode 24 material that had high capacity but also cycled with 25 high cycle life.

1 Q. And why was it important to Uemura to carry 2 out this formation period in connection with showing 3 that lithium manganese dioxide was a suitable anode? 4 Sorry, cathode. 5 ATTORNEY SOMMER: Object to form. 6 A. So he was adjusting the lithium content within 7 those molecules. And his -- one of his theses was that 8 if you had a lithium-deficient molecule that you could 9 get higher cycle life. And by lowering that lithium 10 content, he wanted to know how that molecule would cycle 11 with a minimal amount of loss of the lithium in there. 12 So let's say there's example 14. He has 0.75 13 lithium per molecule. He wants to cycle that and see 14 how well it cycles with 0.75 lithium in that molecule. 15 If he had a higher reversible -- sorry, if he had a 16 higher irreversible capacity in his anode, that would 17 change the value of that .75 material that's available 18 on the second discharge. It would change that value, 19 and he would -- his thesis would be a little harder to 20 prove. 21 BY ATTORNEY STAMATOPOULOS: 22 Q. You said that for lithium manganese -- forgive 23 me, my chemical terminology is not -- my organic 24 chemistry, or maybe it's inorganic in this case, is not 25 that great.	Page 101 1 dissolve more. 2 I actually leased a Nissan LEAF, and it had a 3 manganese spinel material in it. And within three 4 years, my battery went from 80 miles to 64 miles of 5 range. So it, you know, it lost a significant amount of 6 capacity. 7 And you -- you know, it depends on the 8 application, it depends on the temperature that you take 9 it to. But there are applications like drills. 10 Milwaukee drills use lithium manganese spinel and they 11 work very well. But it's just the temperature -- I 12 should -- sorry, it's a long answer, but to answer a 13 short answer, the higher the temperature, the more 14 manganese dissolution. 15 Q. And is temperature affected by the charge 16 voltage? 17 ATTORNEY SOMMER: Object to form. 18 A. Those are two separate parameters. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. Well, if I apply a higher charge voltage, all 21 else being equal, will the temperature increase or 22 decrease or remain the same? 23 ATTORNEY SOMMER: Object to form. 24 A. When you charge a battery, there's internal 25 impedance in that battery in that when you charge it, Page 103
1 But when we have four oxygens, lithium 2 manganese O4, is that called layered? 3 A. No, that's a spinel structure, so lithium 4 Mn2O4, and that's a very different -- it's a spinel 5 structure whereas these, lithium manganese dioxide, so 6 LiMnO2, that's a layered structure. 7 Q. So for the lithium manganese oxide, the spinel 8 structure, you said that at high temperatures, this 9 could poison the electrolyte? 10 A. Well, that's been -- it's a common, you know, 11 understanding for that material that when you cycle it, 12 particularly at high temperatures, the manganese -- some 13 manganese will dissolve and it will travel over to the 14 anode, poison the anode, and your cycle life would be 15 decreased. 16 Q. And what would constitute a high temperature? 17 A. The amount of manganese that would dissolve 18 would be -- would be a function of temperature. So, you 19 know, the higher the temperature, the more manganese 20 would dissolve out. 21 There are manganese -- you know, spinel, when 22 I say lithium manganese spinel, I'm talking about Mn2O4. 23 There are materials out there that are sold on the 24 market that perform, you know, reasonably well. But 25 typically, when you go to a higher temperature, it will Page 102	1 the higher the rate that you use, the higher the 2 current, generates more heat within the battery and 3 raises the temperature of the battery. So that's a 4 function of the square of the current multiplied by the 5 resistance of the battery is the amount of heat that's 6 generated. So higher charge rates, more -- higher 7 temperature within the battery. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. And one way to increase the charge rate would 10 be to increase the voltage. Correct? 11 A. No. 12 Q. Is the current not related to the voltage? 13 A. No. 14 Q. The current of a -- the charging current of a 15 battery is not related to the voltage that is applied to 16 the battery? 17 A. Well, when you -- if you charge a battery 18 under normal -- a one-hour charge, you can charge fully 19 to the top upper cutoff voltage. 20 When you try to fast charge a battery, let's 21 say you want to charge a battery in 30 minutes, then if 22 you charge to -- at that rate, you can -- you'll 23 generate more heat within the battery. The temperature 24 of the battery will go up, but you'll also have a 25 possibility of plating lithium on the surface of the Page 104

1 anode material. And when you do that, you end up with 2 irreversible capacity, loss of lithium, loss of lithium 3 in the cell, and your cycle life will drop. 4 So in that respect, voltage is important. But 5 voltage is just the -- it's just one part. It's the -- 6 actually, voltage and the amount of lithium that's in 7 that molecule are related. 8 So when you say voltage, it's also the amount 9 of lithium within the molecule, and they're related. So 10 to do a fast charge, you don't want to fast charge a 11 cell that has less lithium inside the cathode material. 12 Q. Is it fair to say that typically, a person of 13 ordinary skill in the art might apply a constant current 14 for a period of the charging and then for a different 15 period of the charging switch to a constant voltage? 16 ATTORNEY SOMMER: Object to form. 17 A. Yes. 18 BY ATTORNEY STAMATOPOULOS: 19 Q. In what circumstance? 20 A. That's a very, very common method of charging 21 a lithium-ion battery. 22 Q. Why is that? 23 A. When you charge at a constant current, you 24 don't -- you can't move all the lithium from the cathode 25 that you want to move into the anode. You have some	Page 105 1 irreversible capacity loss, and it only occurs for -- at 2 the very beginning. If you do it correctly, you can 3 have most of the irreversible capacity, all the 4 passivation generated within the first one or two 5 cycles. 6 And then after that, the amount of 7 irreversible capacity would be much lower and those 8 future cycles would be very similar. 9 But if you tested your first cycle, your very 10 first charge and you compared it to your fifth charge 11 and your 10th charge and all that, very different. 12 And finally, final comment is that, you know, 13 the customer never sees the formation process. They 14 always get the battery after it's been formed so they 15 never see that part of the process. 16 Q. You mentioned a term there, "irreversible 17 capacity loss." What do you mean by irreversible 18 capacity loss? 19 A. Well, you're losing lithium. You're losing 20 lithium on the -- and generated in the passivation 21 layer. So I said earlier that in a standard battery, 22 lithium-ion battery, your lithium, you have a finite 23 amount of lithium within the cell. And that lithium 24 comes from the cathode. 25 So in your first charge, you take that lithium
Page 106 1 diffusion limits so you have to diffuse lithium through 2 the SEI layer into the active anode material, and that 3 takes time. And you have to allow it that time. 4 So you want to hold the battery at a voltage 5 so that you have that electromotive force so you hold it 6 at that upper charge cutoff and then the current slowly 7 drops and -- as you start -- as you continue to 8 intercalate lithium into the graphite. 9 So it's a very common method. If you only did 10 a constant current charge, you might only get, let's 11 say, 80 percent charge if you don't do the full charge. 12 If you charge at a very high rate, like a 2C rate, you 13 might only get 60 percent capacity in the cell if you 14 only do the constant current portion. 15 Q. I see. 16 Going back to the formation period, if a 17 person of ordinary skill in the art wanted to test the 18 performance characteristics of a battery in normal 19 operating conditions, would they conduct their testing 20 after the formation period is over? 21 ATTORNEY SOMMER: Object to form. 22 A. Yes. That's very typical. 23 BY ATTORNEY STAMATOPOULOS: 24 Q. And why is that? 25 A. The formation cycle is unique in that you have	Page 108 1 out of the cathode. You try to intercalate it into the 2 graphite anode, but you also generate that passivation 3 layer. When you do that, that lithium that goes into 4 the passivation layer's lost so you can no longer access 5 that lithium. That becomes irreversible lithium. 6 Q. I see. 7 Earlier, we discussed very briefly a reference 8 electrode. Do you recall that? 9 A. Yes. 10 Q. What is a reference electrode? 11 A. When you have two electrodes that both have 12 voltages that change, a reference electrode could be a 13 third electrode that you would put into the cell. It 14 does not -- it's not part of the working cell. You're 15 moving lithium-ions between the counter and the working 16 electrode, which you move -- and then you have a third 17 electrode that just sits there and doesn't really 18 intercalate/deintercalate, it just kind of sits there 19 and it acts like a reference. 20 So lithium metal is a very good reference for 21 this. Lithium metal, if you take lithium metal versus 22 lithium metal and you move lithium from one side to the 23 other, you'll just have a very flat voltage. It's a 24 flat voltage throughout. And because you have 25 lithium-ions within lithium-ion batteries, lithium metal

1 is a very standard reference. 2 When we look at the -- when we talk about the 3 voltages of the individual cathode and anode, we talk 4 about those individual voltages as a function of the 5 lithium reference voltage. 6 Q. And is the reference electrode used in 7 lithium-ion batteries that are sold to consumers as a 8 final product? 9 A. No. 10 Q. Are reference electrode used in testing of 11 lithium-ion batteries? 12 A. Yes. 13 Q. And are reference electrodes used to establish 14 the capacities of the anode and cathode respectively? 15 A. Yes. 16 Q. And the cathode will have a potential versus 17 the lithium reference electrode. Correct? 18 A. Yes. 19 Q. For example, 4.3 volts might be the potential 20 of the cathode versus the reference electrode, right? 21 A. Yes. 22 Q. And is that known as the half-cell cathode 23 potential? 24 A. Yes. 25 Q. And similarly, the anode may have a potential	Page 109 1 the lithium -- the anode versus a -- the anode versus 2 lithium metal, and you called that a lithium anode 3 half-cell? Could you -- the court reporter, could you 4 repeat the previous question? 5 (The reporter read from the record.) 6 THE WITNESS: Thank you. So it's -- in that 7 case, when you have a anode and you put it against the 8 lithium metal, the lithium metal is the actual anode by 9 definition, by electrochemical definition. So the 10 lithium metal becomes the anode in that case. 11 So it's a little -- it's just a nuance. I 12 just wanted to make sure I was clear on that because 13 your higher voltage was your anode material, your lower 14 voltage was the lithium metal, yeah. 15 BY ATTORNEY STAMATOPOULOS: 16 Q. But it's still a half-cell potential. 17 Correct? 18 A. It's still -- yeah. I -- I just wanted to be 19 absolutely clear in my answer. 20 Q. That's fair. 21 And we spoke earlier a little bit about 22 constant current charging. Just to be clear, what is 23 constant current charging? 24 A. Constant current is when you have a constant 25 number of electrons moving through the external circuit.
1 versus the lithium reference electrode, right? 2 A. Yes. 3 Q. And that might be much lower than the cathode, 4 for example, 0.1, 0.2, or 0.3 volts. Correct? 5 A. Yes. 6 Q. And we discussed those earlier about different 7 anode materials like graphite or hard carbon, right? 8 A. Yes. 9 Q. And the anode potential versus the lithium 10 reference electrode would have to be determined on a 11 case-by-case basis for different anode materials. 12 Correct? 13 A. Yes. 14 Q. And that potential between the anode and the 15 lithium reference electrode is known as the half-cell 16 anode potential. Correct? 17 ATTORNEY SOMMER: Object to form. 18 A. Yes. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. And the full-cell potential between the anode 21 and the cathode will be equal to the difference between 22 the half-cell potentials of the anode and the cathode. 23 Correct? 24 A. Yes. 25 Going back to your previous question, you said	Page 110 1 Q. Current is measured in amps. Yes? 2 A. Yes. Amperes, to be -- but we call it -- we 3 say amps, but amperes, A-M-P-E-R-E, is the actual term. 4 But yeah, we say amps. 5 Q. And when you're charging with constant 6 current, a person of ordinary skill in the art would 7 understand that the number of amps doesn't change. 8 Correct? 9 A. Correct. 10 Q. And when a battery is charged with a constant 11 current, typically, charging will stop once a certain 12 voltage is reached. Correct? 13 A. If the charger is set up to not allow charge 14 beyond a specific voltage, then yes, it would stop. 15 Q. Let's go back to Uemura, which is Exhibit 1009 16 of your declaration, or to your declaration. And 17 specifically, paragraph 81. Let me know when you're 18 there. 19 A. I'm here. 20 Q. So Uemura describes here: The 21 charge/discharge was repeatedly performed at a constant 22 current of 0.5 milliamps per squared centimeter and a 23 voltage ranging from 4.3 volts to 2 volts at an 24 atmospheric temperature of 60 degrees Celsius. 25 Did I read that correctly?
BlueBear Reporting LLC	Page 111 Page 112 RJ Technology Exhibit 2008 Apple Inc. v. RJ Technology LLC IPR2023-01183, Page 28 of 105

Page 113 1 A. Yes. 2 Q. So Uemura's describing constant current 3 charging. Is that fair? 4 A. Yes. 5 Q. And according to Uemura's description, the 6 charging would stop once the externally applied voltage 7 would reach 4.3 volts. Correct? 8 A. The way it's written in paragraph 81, yes. 9 Q. Is there any other way to understand what's 10 written in paragraph 81? 11 ATTORNEY SOMMER: Object to form. 12 A. No, unless they left out the constant voltage 13 component, if they left that out. But when you charge 14 and discharge a cell, if you charge it at a slow enough 15 rate, you don't need that constant voltage component if 16 you charge at a slow enough rate. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. And what would be a slow enough rate? 19 A. Depending on the cell. 20 Q. And how would the -- how would different cells 21 inform your view as to whether the constant current 22 applied to them produced a slow enough charge rate? 23 ATTORNEY SOMMER: Object to form. 24 A. The way you would test it is you would run at 25 a specific current to your upper voltage. You put it in	Page 115 1 which would be a 10-hour discharge. It could be C over 2 5, which would be a 5-hour discharge. It could be 2C, 3 which is a 30-minute discharge. So that's how you 4 determine what the C rate is. 5 And then you have to look at the electrodes to 6 see how porous they are, what the power capability is, 7 and to determine what C rate is low. 8 Q. Can you determine the C rate here in Uemura 9 based on the information reported in the reference? 10 A. I'll have to look to see what the area of 11 those electrodes are. I don't recall. I can read 12 through the patent if you want. 13 Q. You can, yes. But before -- yes, please go 14 ahead and read it. 15 A. Okay. So the electrode diameter is 15 16 millimeters, so the area of that would be pi r squared 17 so -- can I open up my calculator? 18 Q. Sure. 19 A. Okay. Actually, if it's okay if I do it on my 20 phone? 21 Q. That's fine, yes. 22 A. Okay. 23 Q. I trust that you won't communicate with anyone 24 as you perform the calculation. It's totally fine. 25 A. It's a calculator. Okay, so 2015,
Page 114 1 constant voltage mode, and then you see how much 2 capacity is available during that constant voltage mode 3 to a lower cutoff current. 4 So, you know, if your lower cutoff current is 5 the same as your constant current that you use, then 6 there is no need for your -- that constant voltage 7 component. So it's -- you know, it -- also, like, if a 8 cell -- the way the cells are designed, cells that are 9 designed for very high power capability, very thin 10 electrodes, very porous, you can charge them fully at 11 low power -- at low current. 12 BY ATTORNEY STAMATOPOULOS: 13 Q. Is the current described here in Uemura low? 14 ATTORNEY SOMMER: Object to form. 15 A. Yes. 16 BY ATTORNEY STAMATOPOULOS: 17 Q. In what sense is it low? 18 A. Typically what you do is you look at the 19 milliamps versus the milliamps per square centimeter. 20 So they measure at milliamps per square centimeter. And 21 then you look at the materials, the actual electrodes, 22 and you determine what's the milliamp hours per square 23 centimeter. And you divide, and you end up with a, you 24 know, a rate, which would be what we call a C rate. 25 And that C rate could be, you know, C over 10,	Page 116 1 1.5 centimeters, .75 times point -- see, that's about 2 1.8 square centimeters. And .5 divided by 1.8 works out 3 to about C over 3, C over 4 discharge rate. So that 4 would be a 4-hour discharge from start to finish. 5 Q. What capacity did you use? 6 A. Sorry, you're right. Sorry, let me do that 7 one more time. Okay, so that works out to about 1.3 8 milliamp hours per square centimeter, divided by .5, so 9 that's about a -- 2.6 -- so that's about a C -- it's 10 about a 4-hour discharge. 11 Q. Can you for the record describe the 12 calculation that you performed? 13 A. Sure. I took the diameter of the electrode. 14 I divided by 2 to get the radius. I squared that value, 15 then I multiplied by pi, and that gave me the area of 16 the electrode. And then I took the capacity of the 17 negative electrode, I divided by -- so that's milliamps. 18 And I divided by the area in square centimeters, and I 19 came up with a value for milliamp hours per square 20 centimeter. 21 Q. Why did you use the capacity of the negative 22 electrode? 23 A. That was the first one I found. But you're 24 very right. I found the diameter of the cathode, so 25 you're absolutely correct. When you have the diameter

Page 117 1 of the anode larger than the diameter of the cathode, 2 the diameter of the cathode should be the one I'm using, 3 yes. 4 Q. So how would your calculation be affected if 5 you used the diameter of the cathode? 6 A. Okay, so that one is about 2, 2 milliamp hours 7 per square centimeter. And at 0.5 milliamps per square 8 centimeter, that's about a 4-hour rate, so it's -- it 9 was a negligible difference. So it's a -- a 4-hour 10 discharge rate. 11 Q. And what is the practical significance of a 12 4-hour discharge rate? 13 ATTORNEY SOMMER: Object to form. 14 THE WITNESS: Can you clarify that question? 15 BY ATTORNEY STAMATOPOULOS: 16 Q. Is that a fast discharge rate or a slow 17 discharge rate? 18 ATTORNEY SOMMER: Object to form. 19 A. That would be kind of in the middle of your 20 typical 10 hours and one hour rates. But the actual -- 21 you have to look at the electrodes themselves and look 22 at the porosity of the electrodes, the surface area of 23 the electrodes, the connectivity of the electrodes to 24 determine for that particular material, is that a low or 25 high rate for that particular material.	Page 119 1 A. That's correct. 2 Q. And you mentioned that persons of ordinary 3 skill in the art conducting experiments or testing such 4 as the one THAT'S disclosed here in Uemura will 5 typically omit a CV component. Correct? 6 ATTORNEY SOMMER: Object to form. 7 A. It's -- it's common. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. And when you say -- and when you say a CV 10 component, you mean the constant voltage part of the 11 charging, right? 12 A. Correct. Yeah. 13 Q. And Uemura here doesn't show a constant 14 voltage period -- or let me withdraw that. 15 Uemura here doesn't disclose that constant 16 voltage charging was performed in the experiment 17 described in paragraph 81. Correct? 18 A. Correct. 19 Q. Why is it that persons of ordinary skill in 20 the art conducting these types of tests would omit the 21 constant voltage phase of the charging? 22 ATTORNEY SOMMER: Object to form. 23 A. Yeah, I don't have a specific answer for that. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. It's just based on your experience that
Page 118 1 And typically, when -- in research and 2 development, you know, researchers don't push the 3 envelope of the capacity per square centimeter. They go 4 very light, very low capacity per square centimeter just 5 for research purposes. 6 So in a typical lithium-ion battery, a 10-hour 7 rate would be slow, but that would be a very high, very 8 dense electrode. And so, you know, for this one, it's 9 hard -- they don't specifically say -- yeah, it's -- 10 it's difficult for the amount of information they give 11 you whether or not that's a low or a high rate. 12 And typically in research, too, people don't 13 do CV component when you're trying to study electrodes. 14 A lot of times, not -- it's typically, a POSITA would 15 maybe use just constant current. 16 BY ATTORNEY STAMATOPOULOS: 17 Q. So just to sum things up a little bit, there's 18 a number of things that you would need to look at in 19 order to determine whether the charge -- the discharge 20 rate you just calculated for Uemura's example is slow or 21 fast. Correct? 22 A. Yes. 23 Q. And that information that would be necessary 24 for you to consider in order to make that determination 25 is not available in Uemura. Correct?	Page 120 1 you're -- 2 A. Based on my -- 3 Q. -- basing it on? 4 A. -- experience in research and development type 5 papers, technical work, people use low currents. And 6 they're able to get really the full results using low 7 currents without having to do a CV component. 8 It's just in -- like with standard commercial 9 lithium batteries, lithium-ion batteries, you want to 10 charge them quickly. And to do that, you use the 11 constant voltage component and you use a much higher 12 charge current. 13 The way I read this, a POSITA would read it -- 14 sorry. The way a POSITA would read this is saying that 15 if there's not using the constant voltage mode that they 16 are fully charging and fully discharging the cell at 17 that rate. 18 ATTORNEY STAMATOPOULOS: Okay. I think we've 19 reached another logical sort of breaking point. Should 20 we go off the record briefly? 21 THE VIDEOGRAPHER: Time is 10:57 AM. We are 22 off the record. 23 (Recess taken.) 24 THE VIDEOGRAPHER: We are back on the record. 25 The time is 11:47 AM.

Page 121 1 BY ATTORNEY STAMATOPOULOS: 2 Q. Welcome back, Mr. Juzkow. 3 Did you communicate with counsel at all during 4 the break? 5 A. No, I didn't. 6 Q. Now, we discussed earlier two different 7 lithium manganese oxide types of cathode, the layered 8 and the spinel. 9 Do you recall that? 10 A. Yes. 11 Q. Is the layered version of lithium manganese 12 oxide in use commercially currently? 13 ATTORNEY SOMMER: Object to form. 14 A. Not that I know of. 15 BY ATTORNEY STAMATOPOULOS: 16 Q. Why is that? 17 A. Well, lithium manganese dioxide has a low 18 voltage versus lithium metal, so its voltage is around 19 3 volts. So energy is a function of the product of 20 voltage times capacity. So if your voltage is 21 25 percent lower, then your energy is going to be 22 25 percent lower. 23 Q. What do you mean that lithium manganese 24 dioxide has a low voltage versus lithium metal? 25 A. When you put it in a half-cell and you cycle	Page 123 1 company, and they now use that same technology. 2 Q. And besides Nissan LEAF and Milwaukee drills, 3 are you familiar with any other types of applications 4 that employ lithium-ion batteries with spinel lithium 5 manganese oxide as the cathode? 6 ATTORNEY SOMMER: Object to form. 7 A. Not that I can think of today. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. Are you aware of any reasons for which the use 10 of lithium manganese oxide in the spinel form is limited 11 to those two applications? 12 ATTORNEY SOMMER: Object to form. 13 A. The practical capacity of that material is 14 lower than other materials, other cathode materials that 15 are commonly used in the industry. It also has the 16 issues that I talked about earlier where you -- you 17 know, if you take it to high voltages at high 18 temperatures you have manganese dissolution, poisoning 19 of the anode, and reduction in cycle life. 20 BY ATTORNEY STAMATOPOULOS: 21 Q. And what do you mean by taking it to high 22 voltages? 23 A. Above 4 point -- well, even 4.2 is a high 24 enough voltage for that to occur. It's a really good 25 compound in the way that it's -- the manganese spinel is
Page 122 1 it in a half-cell, the voltage is around 3 volts. And 2 the difference -- the battery voltage, as we talked 3 about earlier, are the cathode minus the anode voltages. 4 Now, lithium manganese dioxide is used in 5 primary batteries and so it is used in lithium metal 6 primary batteries. Lithium metal primary batteries. 7 It's a lot of time coin cells, military batteries. 8 Q. What would happen to a battery using lithium 9 manganese dioxide as its cathode if a 4.3-volt voltage 10 were applied to it, for example? 11 ATTORNEY SOMMER: Object to form. 12 A. The average plateau voltage will still be 13 around 3 volts. And it's really the average voltage 14 that gives you the capacity. So you can charge it to 15 4.3, but the average is going to be lower. 16 BY ATTORNEY STAMATOPOULOS: 17 Q. What about spinel lithium manganese dioxide? 18 Is that currently in use commercially? 19 A. Yes. 20 Q. In what types of applications? 21 A. That's used in Milwaukee drills and power 22 tools, and it's used in the Nissan LEAF. Actually, the 23 Nissan LEAF uses -- we developed lithium manganese 24 spinel at Moli Energy. NEC was one of our owners, and 25 they took the technology to Japan and started a battery	Page 124 1 a zero strain material, so at zero strain, it doesn't 2 collapse on itself. It just stays -- you can cycle it 3 at -- when you're cycling at normal temperatures and, 4 you know, lower voltages, it will cycle very, very well. 5 We used it at -- when I was at Leyden Energy, 6 we used it as a cathode versus lithium titanate to make 7 start/stop batteries for cars that I don't believe 8 they're being used anymore. 9 Q. But if you charged it to 4.2 volts, various 10 issues would arise. Correct? 11 A. You know, the cycle life is good at 4.2. It's 12 just when you get to higher temperatures that it 13 starts -- you know, and there's been a lot of work -- 14 General Motors has done a lot of work in this area in 15 terms of stopping the manganese dissolution. A lot of 16 work, because it's such a good material. It's safe. 17 Manganese is very, very safe. You can overcharge it, 18 overdischarge it. It's very safe that way. 19 So there's been a lot of work on it, but you 20 still have that high temperature dissolution issue. 21 Q. So what's the recommended voltage for lithium 22 manganese oxide in the spinel form? 23 ATTORNEY SOMMER: Object to form. 24 A. At the time I was working on it, it was 25 4.2 volts. But I don't know specifically what voltage

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1 it's used in today in the portable drills and the 2 electric vehicles. I'm not sure. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. You cited Exhibit 1008 in your declaration. 5 Correct? 6 A. Yes. 7 (Exhibit No. 1008, previously marked, was 8 referenced and indexed.) 9 BY ATTORNEY STAMATOPOULOS: 10 Q. Exhibit 1008 is a reference by Guyomard. 11 A. Yes. 12 Q. Now, if you turn to page 4 of Exhibit 1008, 13 and when I say page 4, I mean the number that appears in 14 the bottom right corner of that exhibit. Page 4 of 19. 15 A. Okay. 16 Q. At lines 6 through 10, it says: Such use of 17 carbon, however, presents some detractions, such as loss 18 of average output voltage and energy density as compared 19 to lithium metal, since the voltage of lithium X carbon 20 6 negative electrode is always greater than that of pure 21 lithium negative electrode. 22 Do you see that? 23 A. Yes. 24 Q. What's your understanding of that sentence? 25 A. We talked about half-cells where you take the	1 well, let me withdraw that. 2 In your experience, what is a common value 3 associated with room temperature? 4 ATTORNEY SOMMER: Object to form. 5 ATTORNEY STAMATOPOULOS: Let me ask it 6 slightly differently. 7 BY ATTORNEY STAMATOPOULOS: 8 Q. Is 25 degrees Celsius room temperature? 9 A. That's a very standard ambient temperature 10 that we use in the industry when we're cycling 11 batteries. When we say ambient temperature, it's 12 typically 25 Celsius. 13 Q. And what is a common temperature for the 14 battery when the battery's in normal operation? 15 ATTORNEY SOMMER: Object to form. 16 A. That's a very difficult question to answer. I 17 mean, it has to do with the resistance of the inside -- 18 internal resistance, the current that you're flowing. 19 That generates heat in the unit's watts. And then you 20 have to consider your thermal mass of your battery and 21 how much heat it can absorb, how quickly, what's the 22 flow rate for that heat. And also, what's the -- how is 23 that heat being released in terms of what's a surface 24 area on the outside of the battery. Is it a cylindrical 25 cell, is it a prismatic cell, is it a pouch cell. It --
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1 lithium X carbon 6 negative electrode and you put it 2 against a lithium metal electrode and you cycle it. The 3 voltage will always be greater than lithium metal 4 voltage. 5 Q. What is the relationship between the voltage 6 of the cathode relative to a reference electrode made of 7 lithium and the external voltage applied to a battery? 8 ATTORNEY SOMMER: Object to form. 9 A. If you make a half-cell with lithium manganese 10 spinel versus lithium metal, the voltage between the two 11 electrodes is larger than if you take the same lithium 12 manganese spinel versus carbon. The voltage difference 13 between those electrodes will be lower. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. Is it fair to say that in normal operating 16 conditions, the temperature of a battery will be higher 17 than room temperature? 18 ATTORNEY SOMMER: Object to form. 19 A. Yes. 20 BY ATTORNEY STAMATOPOULOS: 21 Q. And why is that? 22 A. It's the heat generation, which is calculated 23 by the square of the current times the resistance of the 24 cell. 25 Q. And in your experience, how much higher --	1 you can't -- I can't answer that. 2 BY ATTORNEY STAMATOPOULOS: 3 Q. Okay, that's fine. 4 If you go to page 7 of 19 of Guyomard, you'll 5 see there's a reference to Figure 4. And it reads: 6 Figure 4 depicts comparative plots of cell current 7 against charging voltage at 55 degrees Celsius for 8 secondary cells comprising an Li interpolation electrode 9 and respective electrolytes, and it goes on. At that 10 point -- 11 A. I'm sorry, what? I apologize. What page 12 number and what paragraph? 13 Q. Page 7 of 19. 14 A. And the line number? 15 Q. Line 25. There's an indented paragraph that 16 talks about Figure 4. Do you see that? 17 A. Yes. 18 Q. And do you see where it says: Comparative 19 plots of cell current against charging voltage at 20 55 degrees Celsius? 21 A. Yes. 22 Q. Do you have a view as to why 55 degrees 23 Celsius were included in this reference? 24 ATTORNEY SOMMER: Object to form. 25 A. I think what he was trying to show is that the

Page 129 1 impedance changes at the higher temperature and the 2 voltage plateaus might change a little bit as a function 3 of temperature. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. Is this 55 degrees Celsius temperature a 6 temperature that a person of ordinary skill would 7 understand a battery might rise to in normal operations? 8 ATTORNEY SOMMER: Object to form. 9 A. They can, sure. They can reach those 10 temperatures at higher charge rates. 11 BY ATTORNEY STAMATOPOULOS: 12 Q. And when you say "higher charge rates," what 13 would a range for such higher charge rates be? 14 A. Probably in excess of a 30-minute charge. 15 Basically less than a 30-minute charge, so -- and it 16 really also depends on the impedance of the cell and the 17 surface area of the cell. And there's many, many 18 factors. 19 But when you discharge or charge a cell, 20 you're passing current. And that current squared times 21 the resistance of the cell gives you the heat generation 22 in watts. And, you know, I've seen -- in the work I'm 23 doing these days currently, you know, 55, I've seen 24 that, yeah, routinely. 25 Q. If you were to apply a high charge voltage,	Page 131 1 And if you're charging at a high current, you're also 2 generating a lot of heat, and that combination can lead 3 to thermal runaway. 4 Q. But the longer I charge the battery for at a 5 particular voltage, all else being equal, the higher the 6 likelihood of thermal runaway. Correct? 7 A. Yes. But once again, that's dependent on the 8 cathode. 9 Q. How is it dependent on the cathode? 10 A. Some cathodes are less thermally stable than 11 others. Lithium nickel oxide was the very first 12 electrode cathode that we used because of its higher 13 capacity than cobalt oxide. But those cells were less 14 thermally stable. 15 And when I was -- I would make coin cells, and 16 when I welded a tab to the coin cell, they'd explode in 17 my fingers. And that heat from the -- the resistance 18 welder put enough heat in that cell to cause that 19 cathode to go into thermal runaway, basically. Luckily, 20 it was a coin cell and it just happened very quickly. 21 And so, you know, you have to have that extra 22 heat. Well, you don't have to, but extra heat will 23 speed up the thermal runaway. If you take up too much 24 lithium for an electrode -- for a cathode like a lithium 25 cobalt oxide, if you take up too much lithium, it will
Page 130 1 say, in excess of 5 volts, to a secondary lithium-ion 2 battery cell for a very brief period of time, say, under 3 a minute, would that lead to thermal runaway phenomena? 4 ATTORNEY SOMMER: Object to form. 5 A. The thermal runaway phenomena is a function of 6 the amount of lithium in the cathode. And if you go to 7 5 volts just for a very short period of time, you 8 probably -- if it's a very short period of time, and it 9 is all dependent on the current, how much lithium you 10 take out. So you can do that. You can take cells to 11 5 volts for a very short period of time and they won't 12 go into thermal runaway. 13 Q. If you apply constant voltage over a prolonged 14 period of time at a level as high as 5 volts, then you 15 might produce such phenomena. Correct? 16 A. It depends on what the active material is. So 17 with cobalt oxide, nickel oxide, definitely at those -- 18 at that voltage for those materials. 19 Q. So is it fair to say that the risk of thermal 20 runaway is proportional to the time for which a battery 21 is charged at a particular high voltage? 22 A. It's a -- the amount of lithium that you have 23 inside the cell is one factor. Sorry. The amount of 24 lithium inside the cathode is one factor. That 25 material -- that cathode becomes less thermally stable.	Page 132 1 generate its own heat. 2 Q. And that's because there's a chemical reaction 3 occurring in the cathode because of the elimination of 4 lithium from its chemical structure. Yes? 5 A. It's -- it's the structure change in the 6 material that changes. Not so much a chemical reaction, 7 but a structural change in the material. 8 Q. On page 9 of 19 of Guyomard, in the first full 9 paragraph, lines 20 to 25, or 19 to 25, it reads: The 10 initiation of electrolyte oxidation at about 4.3 volts 11 versus -- 12 A. I'm sorry. I apologize. You're on page 9 of 13 19? 14 Q. 9 of 19, yes, starting at line 19. 15 A. That's not the start of a paragraph in the 16 version I'm on. 17 Q. No, no, no. It's not the start. It's the 18 middle of the paragraph, roughly. 19 A. Okay. 20 Q. And you're free to look at the full paragraph 21 if you want. 22 A. That's okay. I am there now. Please go 23 ahead. 24 Q. I just want to focus your attention on the 25 part where it says: The initiation of electrolyte

1 oxidation at about 4.3 volts versus lithium and at even 2 lower voltage during later recharge cycles indicates 3 that the charging cutoff voltage must be limited to 4 about 4.1 volts versus lithium for practical operation 5 at the higher temperature. As a result of this 6 limitation, the available cell capacity is at best only 7 about 75 percent of that at room temperature. 8 Do you see that? 9 A. Yes. 10 Q. Is Guyomard saying that the charge cutoff 11 voltage for a spinel-type lithium manganese oxide 12 cathode must be limited to about 4.1 volts? 13 A. When it's operating at higher temperature. 14 And that's due to electrolyte reactions on the surface 15 of the electrodes, and you're getting -- you're breaking 16 down the electrolyte, you're oxidizing it, you're 17 generating gases. And he's saying that if you go beyond 18 4.1 volts at high temperature with that material, that 19 specific material, then your electrolyte breakdown is 20 going to cause you -- result in shorter cycle life. 21 Q. And Guyomard here is focused on the behavior 22 of the electrolyte during charge and discharge cycles. 23 Correct? 24 A. Yes. He's trying to optimize the electrolyte 25 to ensure he can have the available cell capacity,	Page 133 1 too unsafe. Can you elaborate on that? 2 A. Yeah. That was a Molicel product at Moli 3 Energy, and we had a -- our first product, the lithium 4 metal rechargeable battery, we took it off the shelf 5 because it was too unsafe. But while it was on the 6 shelf, while we were selling it we had developed another 7 lithium metal battery with a 3-volt electrode, which was 8 the manganese dioxide electrode. 9 We had developed that. We called that the 10 Molicel II. But that was about 1990 when -- or '89 to 11 '90 that we were going to release it. And when we had 12 to call back the other lithium metal rechargeable 13 battery, we realized that this had the same thermal 14 stability problems. And that's when we switched to 15 developing lithium-ion. So that reason we didn't bring 16 it to market was because of the lithium metal aspect. 17 Q. And if you change the anode, would that cure 18 the problem with respect to the safety of lithium 19 manganese dioxide used as the cathode? 20 A. Yes. 21 Q. How so? 22 A. Well, the lithium metal is well known for when 23 you charge lithium metal, you can create lithium 24 dendrites. These are spikey formations of lithium metal 25 that grow on the surface of the lithium metal anode.
Page 134 1 100 percent of the available cell capacity available. 2 Q. And Guyomard is not focused on the phenomenon 3 that you spoke about earlier concerning the cathode 4 poisoning the electrolyte with manganese. Correct? 5 ATTORNEY SOMMER: Object to form. 6 A. He's not speaking about that, correct. 7 BY ATTORNEY STAMATOPOULOS: 8 Q. Does that phenomenon occur only with spinel 9 lithium manganese oxide used as the cathode? 10 A. I'm not sure about lithium manganese dioxide. 11 It's been a long time since I did anything with that. 12 That was lithium metal rechargeable battery with 13 manganese dioxide. Never made it to market. Too 14 unsafe. 15 Manganese spinel, I don't know if people knew 16 about the manganese dissolution back at the time he 17 wrote this. There's a chance that he didn't know about 18 that effect. His consideration -- 19 Q. Oh, sorry. Go ahead. I didn't mean to cut 20 you off. 21 A. His consideration here was the reaction of the 22 electrolyte with the electrodes and that -- trying to 23 stop, inhibit that oxidation of the electrolyte. 24 Q. You said it never made it to market in 25 reference to lithium manganese dioxide because it was	Page 136 1 The lithium metal anode is like -- you can 2 consider it like aluminum foil. Kind of looks like 3 that. But when you plate lithium metal onto that 4 material, it starts forming these dendrites, which can 5 go right through the separator and short the cell. 6 And as I said before, you also got dead 7 lithium, which is very highly -- high surface area, 8 mossy lithium, and thermal stability of those cells is 9 very poor. 10 Q. And if you change the anode material, that 11 also changes the voltage of the anode relative to a 12 reference electrode. Correct? 13 A. Yes. If you -- if you move from lithium 14 metal, which has the voltage of zero versus lithium 15 metal, and you moved to a graphite, which has a voltage 16 of maybe 0.1 volts, now your cell is 0.1 volts lower in 17 voltage for the entire cell and you've -- you're 18 decreasing the energy of that cell. 19 Q. How important was it to a person of ordinary 20 skill in the art to maintain the safety of a battery 21 when it operated in a high-temperature environment? 22 ATTORNEY SOMMER: Object to form. 23 A. Well, very important in regards to safety. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. And why is that?

1 A. Well, I mean, it's very important whether it's 2 at high temperature or low temperature. It's very 3 important to maintain the safety of the cell. 4 Q. If you go to page 11 of 19 of Guyomard, 5 starting at line 5 there's a sentence that starts with 6 the words "The ability," and it reads: The ability of 7 the electrolyte to extend the cycle life of the 8 batteries was amply demonstrated by the remarkable fact 9 that the cell capacities after 500 cycles was only about 10 10 percent less than after five cycles. 11 Do you see that? 12 A. Yes. 13 Q. Does Guyomard disclose the capacity of a 14 battery after the first cycle? 15 A. No. 16 Q. Does Guyomard disclose whether the batteries 17 tested had already been subjected to a formation period? 18 A. The first four cycles would -- during the 19 first four cycles, a formation of a passivation layer on 20 the anode would occur. 21 Q. Does Guyomard say that? 22 A. No. 23 Q. So what's your basis for saying that a 24 formation period would occur after the first four 25 cycles?	Page 137 1 time, and they did not -- they had a spinoff company, 2 but I don't believe he went into that spinoff company. 3 But they -- now, this particular battery, Guyomard did 4 not commercialize this battery. 5 Q. And there's no way to tell just from reading 6 the Guyomard reference how much capacity the battery 7 lost in its first five charge/discharge cycles. 8 Correct? 9 A. That's correct. 10 Q. I'd like to turn to your declaration at page 11 54, footnote 56. 12 A. Yes. 13 Q. And you discuss here in this footnote, among 14 other things, Exhibit 1012. Do you see that on the 15 third line of the footnote? 16 A. Yes. 17 (Exhibit No. 1012, previously marked, was 18 referenced and indexed.) 19 BY ATTORNEY STAMATOPOULOS: 20 Q. And that is a reference. We'll call it the Au 21 reference, A-U. 22 A. Yes. 23 Q. Right after the parenthetical or the two 24 parentheticals that you provide here, you state: I note 25 that the cells described in Au were designed for a
Page 138 1 A. The formation -- the formation cycle itself 2 when you're building a cell is the first cycle, but you 3 don't completely passivate the anode active material. 4 So over the next few cycles you can have a little bit of 5 increased passivation growth. 6 So, you know, it's interesting because, you 7 know, some people say, well, percentage of capacity 8 after initial cycles. He says after five cycles. This 9 is exactly what we did at Moli Energy when I was -- I -- 10 I was a sales and marketing manager when we took the 11 product to market and this is what I did. I counted the 12 capacity as a function of the initial capacity of the 13 fifth cycle. 14 The cells that we had had, you know, drops in 15 capacity over the first four cycles. Well, you know, 16 once a customer gets the battery and he or she uses the 17 phone for, you know, four times, their phone, after 18 that, you're going to get a very flat plateau. 19 So we always -- and we always cited and 20 specified the capacity of the cell on the fifth cycle 21 because it was more fair to what the customer would see. 22 Q. Guyomard doesn't state anywhere in this 23 reference that the battery that was tested was actually 24 made available commercially. Correct? 25 A. That's correct. He was at Bell Labs at this	Page 140 1 cutoff voltage of 4.1 volts. 2 Do you see that? 3 A. I don't see that specific language that you 4 just said. Was it a Sony charging method? Is that the 5 sentence that you're talking about? 6 Q. It's right before Sony charging method. 7 A. Okay. Yeah, yeah, in the early days of 8 lithium-ion, in the very early days, 4.1 was the cutoff 9 voltage that was used in the first few years of 10 lithium-ion. 11 Q. And when you say that was the voltage cutoff 12 that was used, you mean using a constant current method 13 of charging? 14 A. Constant current, constant voltage. 15 Q. And constant current, constant voltage is the 16 method in which a constant current is followed by a 17 constant voltage. Correct? 18 A. Yes. 19 Q. And what does it mean for a battery to be 20 designed for a particular cutoff voltage? 21 A. There's a lot of considerations. And in the 22 early days, safety was the number one consideration, and 23 cycle life performance was also a big consideration. So 24 those are two considerations that would -- and then the 25 anode material also was a consideration. Before

Page 141 1 graphite was introduced, the cells were at 4.1 volts 2 when we were using the hard carbons. 3 Q. Is the Au battery a lithium anode battery? 4 ATTORNEY SOMMER: Object to form. 5 A. No. This is a lithium-ion battery. 6 BY ATTORNEY STAMATOPOULOS: 7 Q. With that in mind, were there anode material 8 considerations in designing a battery such as the Au 9 battery for a cutoff voltage of 4.1 volts? 10 ATTORNEY SOMMER: Object to form. 11 A. Au just purchased Sony lithium-ion cells and 12 tested them. He did not develop these. He purchased a 13 number of the cells and tested them at the Army Research 14 Lab. 15 BY ATTORNEY STAMATOPOULOS: 16 Q. And those batteries were designed to 17 4.1 volts. Correct? 18 A. Yes. At the time he purchased them, these 19 particular batteries that he purchased were 4.1 volts. 20 Q. And when designing a battery to 4.1 volts that 21 had a carbonate anode, was the anode material a limiting 22 factor in terms of the charge cutoff voltage to which 23 the battery was designed? 24 ATTORNEY SOMMER: Object to form. 25 A. Yes. The anode -- the voltage of the anodes	Page 143 1 BY ATTORNEY STAMATOPOULOS: 2 Q. And you'll see at the very top of page 10 3 there's a heading 4.2, Analytical Results. 4 Do you see that? 5 A. Yes. 6 Q. You're familiar with these analytical results? 7 A. I'm familiar with the -- what they were 8 measuring, yes, the active material, the loading, the 9 capacity, yes. 10 This is a -- what you would do if you are 11 going to take apart a lithium-ion cell and try to 12 reconstruct or understand what the components are and 13 how it's assembled. 14 Q. And if you look at the active material 15 capacities for the cathode and for the anode, would you 16 agree that the cathode has more capacity than the anode? 17 A. You can't determine that without knowing the 18 binder content and the conductive additive content. 19 Q. You said the binder content and the? 20 A. Conductive additive content. So when you make 21 these electrodes, you can see how they have -- under the 22 category Binder under -- they say -- for the anode, it 23 says polyvinylidene fluoride. Let's just put down PVDF. 24 There's PVDF binder added to that anode. And when they 25 put it all together, they mix that with the active
Page 142 1 versus a lithium reference are different for hard 2 carbons versus graphite. 3 And when you had the graphite, that gave you 4 an extra 0.1 volts, approximately, versus your hard 5 carbons. And that allowed you to increase the voltage 6 of the cell by 0.1 volts without increasing the voltage 7 of the cathode versus lithium metal reference. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. And that's because hard carbon's voltage 10 versus the reference voltage was lower than that of 11 graphite? 12 A. The graphite voltage versus the lithium metal 13 reference was lower than hard carbon. 14 Q. Okay. I'd like to invite your attention to 15 page 10 of 37 in Exhibit 10012, the Au reference. 16 A. Uh-huh. So what page number? 17 Q. Page 10 of 37. 18 ATTORNEY SOMMER: Counsel, I think you said 19 Exhibit 10012. It's 1012. Correct? 20 ATTORNEY STAMATOPOULOS: You are correct. I 21 misspoke, I'm sorry. It's 1012. 22 ATTORNEY SOMMER: Thank you. 23 THE WITNESS: Okay, page 10? 24 ATTORNEY STAMATOPOULOS: That's right. 25 THE WITNESS: Okay.	Page 144 1 material and they don't -- you don't know what that 2 percentage of binder is so you really don't know how 3 many grams. That 6.56 grams may not be completely 4 accurate. Okay, let me -- yeah, so that might not be 5 completely accurate. 6 When I'm reading this, though, let's see. I'd 7 have to read through in more detail how he came up with 8 the active material capacity for the cathode and the 9 anode. I'm not sure how he measured those. I'd have 10 to -- 11 Q. Let me try something else. Let me start first 12 of all by asking you the active material in the Au 13 reference and the analytical results we're looking at is 14 lithium cobalt dioxide. Correct? 15 A. Yes. 16 Q. Is it fair to say that the theoretical 17 capacity for lithium cobalt dioxide is 137 milliamps, 18 milliamp hours per gram? 19 A. And you're basing that on what number? 20 Q. I'm not basing it on anything, I'm just asking 21 you if you agree. You may disagree, by the way, that -- 22 A. Okay. 23 Q. -- the theoretical capacity for lithium cobalt 24 dioxide, the material that's listed as the active 25 material here, is 137 milliamp hours per gram.

1 ATTORNEY SOMMER: Objection to form. Page 145 2 A. So he has it written as lithium 0.5, cobalt 3 oxide. So on a theoretical basis, you're correct. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. Okay. So let's put that number to the side, 6 137, as the theoretical capacity. 7 The cathode here has a weight of 8 10.46 milligrams. Correct? 9 A. 10.46 grams. 10 Q. Grams, yes. I apologize. Grams. 11 And the active material capacity is listed as 12 1.43. Correct? 13 A. Yes. 14 Q. If you divide 1.43 by 10.46, that is, the 15 capacity over the active material loading, isn't it true 16 that you would get 137 milliamp hours per gram? 17 A. Yes. 18 Q. And -- 19 A. So I have to read through this report, but it 20 seems that he has the actual active material loading 21 where he's taking out the binder content. And the 22 10.46 grams is lithium cobalt oxide only, that mass. 23 That works out to 137 milliamp hours per gram. 24 Q. Which we agreed is the theoretical capacity 25 for that material. Correct?	1 Q. Why is that? Page 147 2 A. Lithium -- lithium graphite -- okay, lithiated 3 graphite, you can put in 1.0 C6. So it's theoretical. 4 You can pretty much reach its theoretical value. 5 What he's showing here, it's unclear to me 6 what he's showing here in terms of active material 7 capacity. 8 At 0.5 C6, he's not looking at the entire 9 graphite capacity, he's only looking at what is being 10 shuttled back and forth on a discharge and charge basis 11 after the first cycle. 12 Q. But he's using the same 0.5 value for both the 13 anode and the cathode. Correct? 14 A. Yes. 15 Q. So if you were to use the full lithium for 16 both the anode and the cathode, the same relationship 17 would apply. Correct? 18 ATTORNEY SOMMER: Object to form. 19 A. On a practical basis, you can reach lithium 1 20 C6. On a practical basis, you cannot reach lithium 1 21 cobalt oxide. 22 Q. Why not? 23 A. The structure CoO2 does not exist. It's not a 24 thermal -- thermally stable material. So, you know, 25 we've talked about lithium being taken out of that
1 ATTORNEY SOMMER: Object to form. Page 146 2 A. The theoretical capacity for lithium 0.5 3 cobalt oxide. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. Right. And now if you look at the anode, if 6 you were to run the same numbers, specifically the 7 active material capacity over the active material 8 loading, you would arrive at 186 milliamp hours per 9 gram. Correct? 10 A. Yes. 11 Q. And 186 is the theoretical capacity for the 12 active material listed here. Correct? 13 ATTORNEY SOMMER: Object to form. 14 A. It's the theoretical capacity for lithium 0.5, 15 C6. 16 BY ATTORNEY STAMATOPOULOS: 17 Q. So in this example, the active material 18 capacity is higher than -- sorry, withdrawn. 19 In this example right here, the active 20 material cathode capacity is higher than the active 21 material anode capacity, right? 22 A. For these 0.5 lithium values, yes. When you 23 do the calculation, though, for design capacity, you 24 start with lithium 1 C6, which is 372 milliamp hours per 25 gram.	1 molecule, and we know that we cannot take all of it out; Page 148 2 otherwise, the molecule becomes unstable. So he's 3 showing here that it's lithium 0.5 cobalt oxide. That's 4 what's shuttling back and forth, the 137 milliamp hours 5 per gram. 6 Q. In any event, he's using the same 0.5 lithium, 7 or lithium 0.5 for both the anode and the cathode. 8 Correct? 9 A. Yes. 10 Q. And what's the anode active material here? Is 11 it graphite? 12 A. It's not specifically saying it's graphite. 13 To make graphite, you start with different types of 14 carbon and then you graphitize them at high temperature. 15 And he's calling it a carbon. It may or may not be a 16 graphitized carbon. 17 Q. Here, it doesn't say it's a graphitized 18 carbon. Correct? 19 A. That's correct. A lot of these old papers -- 20 you know, it was so new. And this is the first time 21 Mr. Au tested lithium-ion batteries. And, you know, 22 people didn't know much about them at that time, so 23 there's -- you can't take everything here at -- you 24 know, it's not always accurate. It was accurate on the 25 day it was written, but it might not be accurate today.

1 Q. Was it accurate as of the priority date of the 2 '641 patent? 3 A. I'd have to go through more calculations to 4 see how he came about these calculations, how he came 5 about this, so I can't give you a definitive answer. 6 All I'm saying is that, you know, when 7 Guyomard didn't mention manganese dissolution as being 8 an issue, it's because, you know, we didn't know about 9 it back then. So, you know, we learn more and more all 10 the time. 11 Q. Is it fair to say that a charge voltage -- let 12 me withdraw that question, actually. 13 ATTORNEY STAMATOPOULOS: We have been going 14 for about an hour. Let's go off the record briefly. 15 THE VIDEOGRAPHER: Time is 12:49 PM. We are 16 off the record. 17 (Recess taken.) 18 THE VIDEOGRAPHER: We are back on the record. 19 The time is 12:58 PM. 20 BY ATTORNEY STAMATOPOULOS: 21 Q. Welcome back, Mr. Juzkow. 22 Did you communicate with counsel during the 23 break? 24 A. No. 25 Q. Okay. So I want to invite your attention back	Page 149 1 it, so that if you want to use that versus graphite, you 2 have your source of lithium within the lithium manganese 3 dioxide. That's your source of lithium. Whereas pure 4 manganese dioxide versus graphite, you have no source of 5 lithium. 6 Q. Are you aware of any benefits associated with 7 using the ion exchange method for preparing lithium 8 manganese dioxide? 9 A. No, I'm not -- I'm not familiar with any, no. 10 Q. Are you aware of any attempts to synthesize 11 lithium manganese dioxide prior to Uemura? 12 A. Well, I mean, Dr. Bruce did it in 1996. That 13 was his paper. 14 Q. Are you looking at his paper right now? 15 A. No, I'm reading the -- I'm reading the -- in 16 that paragraph that you showed me. 17 Q. Okay. 18 A. So that material was introduced by Dr. Robert 19 and Dr. Bruce in a paper in 1996. 20 ATTORNEY STAMATOPOULOS: Let me actually 21 introduce an exhibit that is not part of the record. So 22 let's call that Juzkow 1. 23 (Juzkow Exhibit No. 1 was marked for 24 identification.) 25 ATTORNEY STAMATOPOULOS: And I'll share it
1 to the Uemura reference, Exhibit 1009. 2 A. Yes. 3 Q. At paragraph 10, Uemura talks about a 4 reference, an article by A. Robert and P.G. Bruce, 5 Nature, Volume 381, 1996. 6 Do you see that? 7 A. Yes. 8 Q. Did you review that reference? 9 A. No, I did not. 10 Q. Are you familiar with the so-called ion 11 exchange method for preparing lithium manganese dioxide? 12 A. You take manganese dioxide and you react it 13 with lithium to generate lithium, and you do that in 14 stoichiometric equivalents and you end up with lithium 1 15 Mn2O4. 16 Q. And is this a commonly used method for 17 preparing lithium manganese dioxide? 18 ATTORNEY SOMMER: Objection to form. 19 A. I don't -- I'm not sure what method's used in 20 large quantity. It's -- lithiated manganese dioxide, 21 it's not a common material used in lithium-ion batteries 22 or in lithium metal batteries. 23 So what Dr. Bruce was doing here was he was 24 taking manganese dioxide, which was well known in the 25 industry, and he was lithiating it, putting lithium into	Page 152 1 right now on my screen. And I'm not sure if the -- 2 what's the best -- I also want to share it with you, so 3 I'm not sure. Can you see my screen? Can you see here 4 where it says Armstrong 1996, or am I sharing the wrong 5 part of my screen? 6 THE WITNESS: I can see it. 7 ATTORNEY STAMATOPOULOS: Okay. 8 ATTORNEY SOMMER: It's cut off. I can only 9 see half of it. 10 ATTORNEY STAMATOPOULOS: Okay. And what's the 11 best way for me to share this with Mr. Juzkow and with 12 counsel? Just drop it in the -- drop it in the chat? 13 THE VIDEOGRAPHER: Yes. If you want them to 14 be able to download it, just drop it in the chat and 15 they should be able to click on it and check where they 16 want to save it and click on it. 17 ATTORNEY STAMATOPOULOS: Great. Let me do 18 that real quick. Actually, with apologies, could I have 19 a couple minutes? Because I need to clear this of 20 annotations. I'm sorry. 21 THE VIDEOGRAPHER: Do you want to go off the 22 record? 23 ATTORNEY STAMATOPOULOS: Yeah. 24 THE VIDEOGRAPHER: The time is 1:05 PM. We're 25 off the record.

1 (Discussion held off the record.) Page 153 2 THE VIDEOGRAPHER: We're back on the record. 3 The time is 1:09 PM. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. So, Mr. Juzkow, thank you for your patience. 6 We're looking at the article by Armstrong and Bruce 7 that's cited in the Uemura reference. I'll represent to 8 you that this is the same article. 9 Do you see it on your screen? 10 A. Yes. 11 Q. Starting in the second full paragraph, it says 12 that many attempts have been made to prepare layered 13 lithium manganese dioxide, mainly involving the use of 14 aqueous solutions. 15 Do you see that? 16 A. Yes. 17 Q. And in the immediately succeeded sentence, it 18 says that the resulting products, though interesting, 19 have stoichiometries which differ from lithium manganese 20 dioxide, contain water or protons for poor 21 crystallinity, or do not maintain their structure during 22 cycling. 23 Do you see that? 24 A. Yes. 25 Q. Fair to say that what Armstrong's referring to	1 A. I would have to reread the -- Uemura's Page 155 2 reference. 3 ATTORNEY STAMATOPOULOS: All right, I'm going 4 to temporarily stop sharing Armstrong. But you're, of 5 course, free to refer to it. 6 BY ATTORNEY STAMATOPOULOS: 7 Q. Do you know if the ion exchange method was a 8 commonly accepted method for preparing lithium manganese 9 dioxide? 10 ATTORNEY SOMMER: Object to form. 11 A. That method by Armstrong and Bruce, that 12 was -- from what they say, that was the first time it 13 was used. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. And it says it was used successfully. Yes? 16 A. Yes. 17 Q. Do you know of any other successful methods 18 for preparing lithium manganese dioxide, from your 19 experience? 20 A. No, I don't. 21 Q. Have you ever prepared lithium manganese 22 dioxide? 23 A. No. 24 Q. Are you familiar with a so-called 25 co-precipitation method?
1 here is previous failed attempts to synthesize an Page 154 2 acceptable form of lithium manganese dioxide? 3 A. Yes. 4 Q. And later on or, rather, in the immediately 5 following sentence, Armstrong reports: In contrast, we 6 have succeeded in preparing layered anhydrous and 7 stoichiometric lithium manganese dioxide, which is 8 analogous to lithium cobalt dioxide and may be cycled in 9 a rechargeable battery. 10 Do you see that? 11 A. Yes. 12 Q. So he's contrasting his successful preparation 13 of lithium manganese dioxide on the basis that it can be 14 used in a rechargeable battery. Correct? 15 A. Yes. 16 Q. And in the same sentence, followed by the 17 semicolon, Armstrong reports that this lithium manganese 18 dioxide is obtained by ion exchange from sodium 19 manganese dioxide. 20 Do you see that? 21 A. Yes. 22 Q. Now, do you know if Uemura used the ion 23 exchange method to prepare the lithium manganese dioxide 24 used in connection with the testing reported in Uemura? 25 ATTORNEY SOMMER: Object to form.	1 A. Yes. Page 156 2 Q. And are you aware of a so-called solid phase 3 mixing method? 4 A. Yes. 5 Q. Have you used the co-precipitation method in 6 any context? 7 A. I don't specifically recall. But I did use 8 that solid method that I talked about with the tube 9 furnace. That was a very high temperature, mixing it 10 and having to take it out of the tube -- out of the 11 furnace at -- glowing red with hydrogen inside it. So 12 that was the method that -- that was a, you know, 13 mixture when we mixed solids together to make a new 14 compound. 15 Q. That's the solid phase mixing method? 16 A. Correct. We would crush -- crush up the 17 individual components, crush them up, put them in a 18 crucible, put them in the oven and heat them up and they 19 would mix. 20 Q. And you would -- did you mix the materials by 21 hand? 22 A. Yes. Mortar and pestle. 23 Q. So it's a manual preparation method. 24 A. In the R&D facility, yes. But it's very 25 scalable.

Page 157 1 Q. And is that the example that you were 2 referring to earlier where the cell almost exploded in 3 your hands? 4 A. Yes. But I don't recall what the material I 5 was making was. 6 Q. Would you characterize that as a reliable 7 method? 8 A. Yes. 9 Q. Did you repeat that method after the cell 10 almost exploded in your hand? 11 A. Well, it -- it didn't. The tube furnace 12 method was -- we used that quite a bit, where you put 13 different gases through, reducing gases or oxidizing 14 gases you would put through the furnace as you're 15 heating up that mixture and it's melting and forming a 16 new compound. That was done in a small vial or crucible 17 but very easy to scale up. 18 Q. What are the advantages of the solid phase 19 mixing method versus other lithium manganese oxide 20 preparation methods? 21 ATTORNEY SOMMER: Object to form. 22 A. Yeah, it's difficult to answer. I'm not -- I 23 don't know the answer to that. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. Is it a cost-effective method?	Page 159 1 Q. What types of equipment do you need for the 2 ion exchange method? 3 A. Mostly glassware and vacuum filtration system. 4 Q. A vacuum filtration system? 5 A. Yeah, where you pull a vacuum because 6 you're -- you've got the new material, it's solidified 7 within -- it's a solid within your aqueous -- or 8 actually, they were using a Hexanol, Hexanol solution. 9 And then once they -- once the solid was formed, they 10 were able to cool it down, and then you filter. So 11 you're using a vacuum to filter the liquid out of there 12 so that you're left with the solid material. 13 Q. Does the ion exchange method have more steps 14 than the solid phase mixing method? 15 A. Yes. 16 Q. Does the ion exchange method have more steps 17 than the co-precipitation method? 18 A. That, I'm not sure. 19 Q. Which one is a more reliable method of the 20 three? 21 ATTORNEY SOMMER: Object to form. 22 A. Based on this paper, the ion exchange method 23 was the best method. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. And the reason you say that the ion exchange
Page 158 1 ATTORNEY SOMMER: Object to form. 2 A. The cost of heating the furnaces is your main 3 cost to that method. But I think the co-precipitation 4 method would be less expensive. 5 BY ATTORNEY STAMATOPOULOS: 6 Q. The co-precipitation method would be less 7 expensive than the solid phase mixing method. Yes? 8 A. I believe so, because you're just mixing two 9 materials in water, mixing them and then -- yeah, I 10 believe that would be. 11 Q. What about the ion exchange method? 12 Where would that rank in terms of cost versus 13 the solid phase mixing method and the co-precipitation 14 method? 15 ATTORNEY SOMMER: Object to form. 16 A. I -- I'm not sure. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. Are you familiar at all with the ion exchange 19 method and what it takes to carry it out? 20 ATTORNEY SOMMER: Object to form. 21 A. Somewhat. I've done different ion exchange in 22 the past, but it's been a long time. But yeah, I've -- 23 I don't know which one would be more expensive or less 24 expensive. 25 BY ATTORNEY STAMATOPOULOS:	Page 160 1 method was the best method is because the solid phase 2 mixing method was known to persons of ordinary skill in 3 the art as of the time that this paper was published. 4 Correct? 5 ATTORNEY SOMMER: Object to form. 6 A. Yes. 7 BY ATTORNEY STAMATOPOULOS: 8 Q. And so was the co-precipitation method, right? 9 A. It's not listed in this paper. 10 Q. Well, in your experience, was the 11 co-precipitation method known as of 1996? 12 A. Yes. 13 Q. Now turning to paragraph 69 of the Uemura 14 reference, are you there? 15 A. Yes. 16 Q. It reads: The positive electrode materials of 17 the rechargeable lithium-ion batteries in examples 1 to 18 9 were prepared by the use of a co-precipitation method 19 described below. Full stop. The positive electrode 20 materials in examples 10 to 17 were prepared by the use 21 of a solid phase mixing method. Full stop. 22 Do you see that? 23 A. Yes. 24 Q. Fair to say that the ion exchange method was 25 not used in Uemura?

1 ATTORNEY SOMMER: Object to form. Page 161 2 A. That's correct. It's not listed under this -- 3 in this paragraph. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. And the solid phase mixing method that was 6 used in Uemura is the same as solid phase mixing method 7 that you used resulting in a near-accident? 8 ATTORNEY SOMMER: Object to form. 9 A. In solid phase mixing, you're taking the 10 materials, several materials, you're crushing them into 11 powder and trying to mix them as best you can and then 12 heat them up, so it's a very standard technique. So I 13 think yes, I would say there's a good chance that that's 14 the same way I would do -- make them. He doesn't get 15 into too many details. 16 BY ATTORNEY STAMATOPOULOS: 17 Q. Do you have a sense as to why Uemura selected 18 the solid phase mixing method as well as the 19 co-precipitation method to prepare the layered lithium 20 manganese oxide cathode structure as opposed to using 21 the ion exchange method described in Armstrong? 22 ATTORNEY SOMMER: Object to form. 23 A. I can't answer that. I don't know. 24 BY ATTORNEY STAMATOPOULOS: 25 Q. Now going to Figure 3 of Uemura --	1 value. And that would be milliamp hours per gram. Page 163 And 2 then you would have to multiply it by a mass to give you 3 milliamp hours, and that would be the full theoretical 4 value based on that lithium content. 5 BY ATTORNEY STAMATOPOULOS: 6 Q. And then at different voltage levels would 7 those theoretical capacities change? 8 A. Yes. 9 ATTORNEY SOMMER: Objection. Form. 10 A. I wouldn't call them theoretical capacities at 11 that point. They're more practical capacities. 12 BY ATTORNEY STAMATOPOULOS: 13 Q. Well, they're specific values at different 14 voltages. Correct? 15 ATTORNEY SOMMER: Object to form. 16 A. Yes. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. Do you know how Uemura defines the total 19 capacity of the cathode? 20 A. From what I can tell is he's starting with the 21 theoretical capacity for the total amount of lithium, 22 multiplying it by the mass of the active material, 23 coming up with a experiment -- or coming up with a 24 theoretical -- strike that -- coming up with a total 25 capacity based on a theoretical value, and then using a
1 A. Yes. Page 162 2 Q. -- you'll see that for the cathode, the Uemura 3 reports the total capacity PC. 4 Do you see that? 5 A. Yes. 6 Q. What would a POSITA understand the total 7 capacity of the cathode to mean from Uemura's 8 disclosure? 9 ATTORNEY SOMMER: Object to form. 10 A. That's the capacity within the positive 11 electrode. 12 BY ATTORNEY STAMATOPOULOS: 13 Q. That's not the theoretical capacity of the 14 positive electrode. Correct? 15 ATTORNEY SOMMER: Object to form. 16 A. Theoretical capacities are based on per unit 17 mass. This is just -- just milliamp hours. 18 BY ATTORNEY STAMATOPOULOS: 19 Q. Is it possible to determine the theoretical 20 capacity in a particular voltage from the numbers given 21 here with respect to total capacity by Uemura? 22 ATTORNEY SOMMER: Object to form. 23 A. You can determine the theoretical capacities 24 of these compounds using their molecular weights and 25 using the lithium content, and you can come up with a	1 voltage to -- upper voltage, which would then limit and Page 164 and 2 lower the actual value from the theoretical limit -- 3 theoretical value to the practical value shown here on 4 your total capacity. 5 Q. Is that somewhere disclosed in Uemura? 6 ATTORNEY SOMMER: Object to form. 7 A. I'm not sure. I just -- looking at the 8 numbers, I was able to determine that that's how they 9 did it. 10 BY ATTORNEY STAMATOPOULOS: 11 Q. On what basis were you able to determine that 12 that's how they did it? 13 A. I calculated what the theoretical -- 14 theoretical capacities of each of those materials should 15 be and then I multiplied by the mass that they were -- 16 that was used and divided by the total capacity. And 17 the values that I reached were -- they always had the 18 same ratio, and that led me to believe that that ratio 19 was due to the cutoff voltage. 20 And the reason all those different materials 21 all had the same total capacity is that when you run the 22 numbers, the molecular weights are very similar in all 23 these materials. 24 Manganese, just all the -- all the different 25 materials, they have very similar molecular weights for

Page 165 1 those individual elements. And when you -- yeah, so 2 when you run the calculations, you end up with a ratio. 3 That ratio was pretty consistent among all these 4 materials. 5 And as I said, that would be the theoretical 6 capacity based on some voltage, which that voltage would 7 provide a ratio so that you take the calculated -- what 8 the total capacity should be if it was completely 9 delithiated, but it's not, and that's where the total 10 capacity here comes in. 11 Q. So when you say all of these materials had 12 very similar molecular weights, you mean the different 13 materials listed in all of these different examples? 14 A. Yes. 15 ATTORNEY SOMMER: Object to form. 16 A. Yes. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. But the molecular weights of the different 19 cathode materials, did you calculate those? 20 A. Yes. Yes, I did. 21 Q. And were they all identical? 22 A. No. All the ones that have a total capacity 23 of 2.24, their molecular weights were very similar. And 24 they also had the same amount of lithium-ions within the 25 molecule. But when you had a lower number of	Page 167 1 all your preparation so I don't actually know what your 2 answer's going to be. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. You might want to have a break with counsel to 5 discuss the circumstances, because I understand you're 6 not a lawyer. Right, Mr. Juzkow? 7 A. That's correct. 8 Q. And you don't know what would and what would 9 not fall under privilege and work product. 10 Is that fair? 11 A. That's correct. 12 ATTORNEY STAMATOPOULOS: So what I will tell 13 you, Andrew, for the record, is that we're going to ask 14 for that calculation to be provided to us because we 15 understand that it's part of the analysis that 16 Mr. Juzkow did. So I will be asking about it. You can 17 instruct him not to answer. But in the meantime, if you 18 want to go on break so you can discuss the parameters of 19 privilege, that's fine. 20 ATTORNEY SOMMER: Yeah, well, we can take up 21 the request for the document. I think you're assuming 22 some facts that you haven't established yet. But 23 nonetheless, Marc, do you understand my instruction, 24 that if you were asked to do the analysis, the 25 explanation of why it's privileged? Or would you like
Page 166 1 lithium-ions in the molecule, you end up with a lower 2 total capacity. And when you have a higher amount of 3 lithium-ions within the molecule, you end up with a 4 higher capacity. 5 Q. And now the calculation of the molecular 6 weight for all of the different materials in the 17 7 different examples given in Uemura, did you provide it 8 somewhere in your report? 9 ATTORNEY SOMMER: Object to form. 10 A. No. 11 BY ATTORNEY STAMATOPOULOS: 12 Q. Why not? 13 A. I didn't feel it was necessary at the time. 14 Q. Do you have it somewhere? 15 A. I made an Excel spreadsheet with the numbers. 16 I don't have it in front of me. 17 Q. Do you have it saved somewhere? 18 A. Yes. 19 Q. And the reason you performed the calculation 20 at the time was -- let me withdraw that question. 21 Why did you perform this calculation on a 22 separate Excel sheet? 23 ATTORNEY SOMMER: Marc, I'm going to instruct 24 you not to answer the question if you were asked by 25 counsel to do that analysis. I wasn't present during	Page 168 1 to discuss that? 2 THE WITNESS: I'd like to discuss that. 3 ATTORNEY SOMMER: Okay. Why don't we go off 4 the record? Marc, can you give me a call on my 5 cellphone? 6 THE WITNESS: Sure. 7 THE VIDEOGRAPHER: The time is 1:36 PM. We 8 are off the record. 9 (Recess taken.) 10 THE VIDEOGRAPHER: We are back on the record. 11 The time is 1:41 PM. 12 BY ATTORNEY STAMATOPOULOS: 13 Q. Welcome back, Mr. Juzkow. So just a couple 14 questions about your communication with counsel during 15 the break. 16 You discussed the question of what would and 17 what would not fall under privilege. 18 Is that fair? 19 ATTORNEY SOMMER: You can answer that question 20 yes or no, Marc. 21 A. Yes. 22 BY ATTORNEY STAMATOPOULOS: 23 Q. Did your conversation with counsel extend 24 beyond what would fall under privilege? 25 ATTORNEY SOMMER: Marc, you can answer that

Page 169 1 question yes or no. 2 A. No. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. No? 5 A. No. 6 Q. Okay. So before we went on break, you 7 testified that you prepared an Excel sheet in which you 8 calculated the molecular weights of the different 9 cathode materials listed here in examples 1 through 17 10 of the Uemura reference. Correct? 11 A. Yes. 12 ATTORNEY SOMMER: Object to form. 13 A. I didn't calculate all of them, but maybe a 14 third of them, a half of them. 15 BY ATTORNEY STAMATOPOULOS: 16 Q. Who made the decision to calculate the 17 molecular weights of the materials for which you did 18 perform the calculation? 19 A. That was my decision, my curiosity. 20 Q. So it wasn't something that counsel asked you 21 to do. Correct? 22 A. That's correct. It was not. 23 Q. So why did you decide to perform that 24 calculation? 25 A. You know, when I was drilling down into the	Page 171 1 molecules. So my total capacities were higher than the 2 total capacities shown here. 3 When I did a ratio, the ratios were all very, 4 very similar, which led me to believe that these values 5 were a result of a theoretical calculation with a 6 voltage cutoff. 7 Q. Let me try to unpack that. 8 So your total capacities, meaning your 9 theoretical capacities? Is that what you meant when you 10 said your total capacity? 11 A. Yes. Well, there's two total capacities. 12 There's a theoretical total capacity, and then these 13 actual total capacity of the electrode. 14 Q. The theoretical total capacity is the one that 15 you would arrive at applying formulas based on the 16 molecular weight of the material. Correct? 17 A. Yes. 18 Q. And what you are referring to as a theoretical 19 total capacity is what's referred to here in Uemura? 20 A. No. The theoretical total capacity was the 21 capacity in milliamp hours per gram that I calculated 22 multiplied by the mass of the positive electrode 23 material. That is the total theoretical capacity, and 24 that is different from the total capacity in -- that's 25 listed here in this table, Figure 3.
Page 170 1 numbers, you see all the total capacities, and there's 2 many of them that are similar. And there's a few that 3 are higher and lower. And I was wondering, how did they 4 come up with those values? And were they using a -- you 5 know, just how did they come up with those numbers? Was 6 it experimental? Theoretical calculations? 7 And so then I ran the theoretical calculation 8 and determined that the theoretical calculation with a 9 fixed cutoff voltage, without knowing that fixed cutoff 10 voltage, but just understanding that what is the ratio 11 between the theoretical capacity and the total capacity 12 in that pellet, in that electrode. 13 So the ratio of the theoretical capacity 14 divided by the ratio -- divided by the total capacity 15 gave similar ratios, which led me to believe that that 16 ratio was based on the upper cutoff voltage. 17 Q. And when you say "similar ratios," what ratios 18 are you referring to? 19 A. I was referring to when I ran the calculation 20 of the molecular weights, I was able to calculate what 21 the theoretical capacity of that molecule should be in 22 milliamp hours per gram. Then I multiplied by the 23 weight in grams, and I ended up with a total capacity 24 value based on a theoretical calculation if 100 percent 25 of the lithium was removed from each one of those	Page 172 1 Q. So the theoretical total capacity is arrived 2 at through a multiplication of some value with the 3 weight that's listed here in Uemura? 4 A. And that works out to a result in a milliamp 5 hour value. 6 Q. How is that number a theoretical number if it 7 is dependent upon a weight that is an input to an 8 experiment? 9 A. Yeah, I see what you're saying. It's -- it's 10 a theoretical number in milliamp hours per gram that, 11 when I multiplied by the mass of the electrode, I came 12 up with the total capacity, which it's the theoretical 13 capacity multiplied by the mass of the electrode. So 14 may be splitting hairs here. 15 Q. So it ceases to be a theoretical value. 16 Correct? 17 ATTORNEY SOMMER: Object to form. 18 A. Okay, yes. 19 BY ATTORNEY STAMATOPOULOS: 20 Q. And you said whether I did a ratio, the ratios 21 were all very, very similar. 22 A. Yes. 23 Q. What were the numerator and the denominator of 24 those ratios? 25 A. I took the total capacities listed in Figure 3

Page 173 1 and I divided by the total capacity that I calculated as 2 a theoretical capacity multiple -- and then I multiplied 3 that by the weight. That was the denominator. So it 4 was the theoretical capacity times the mass gave me a 5 value in milliamp hours. 6 Q. What conclusion -- let me withdraw that. 7 You said they were very, very similar. They 8 were very, very similar to what? 9 A. Each other. 10 Q. So as between examples 1 through 17, for the 11 ones that you performed that calculation, the different 12 ratios were similar to one another? 13 A. Yes. 14 Q. And what conclusion did you arrive at based on 15 that similarity, if any? 16 A. Conclusion was that the total capacity values 17 that are shown in the table here are the values that 18 were measured experimentally, but there -- as with -- 19 okay, the -- the theoretical capacity that I measured -- 20 that I calculated multiplied by a ratio gave me these 21 total capacities here. 22 So the total capacity available in this 23 Figure 3 were lower than the theoretical value. And 24 that is because we're not taking all of the lithium out 25 of these molecules. There's always a little bit of	Page 175 1 A. Yes, that's, yes, correct. 2 BY ATTORNEY STAMATOPOULOS: 3 Q. In fact, 4.3 volts are only applied to each 4 battery instantaneously, after which time the charging 5 stops. Correct? 6 A. You reach 4.3 volts, and at that point, after 7 you hit 4.3 volts, you stop charging. So yes, you 8 charge all the way to 3 volts -- 4.3. You charge all 9 the way to 4.3 volts. 10 Q. Do you have the Excel sheet on which you 11 performed the calculation in front of you? 12 A. No, I don't. 13 Q. Do you have it accessible to you? 14 A. I can open it, but I can't share it. 15 ATTORNEY STAMATOPOULOS: Andrew, I'm going to 16 ask that the Excel sheet be produced. 17 ATTORNEY SOMMER: And I'm going to object to 18 the additional discovery under Rule 42.51(b)(2). We can 19 have a meet and confer over this, but my understanding 20 is this Excel sheet includes a ton of privileged 21 information that you're not entitled to. 22 ATTORNEY STAMATOPOULOS: And it can be 23 produced in a redacted format, correct? 24 ATTORNEY SOMMER: I -- are you asking me that? 25 ATTORNEY STAMATOPOULOS: Well, let me ask --
Page 174 1 lithium left in these molecules. And the reason for 2 that is because you have an upper charge cutoff voltage. 3 Q. And you arrived at the conclusion from your 4 analysis that the capacities reported in Uemura, the 5 total capacities reported in Uemura, were measured at 6 some voltage. Correct? 7 A. Yes. 8 Q. And you also opined, I believe, in your 9 declaration that that voltage must have been the charge 10 cutoff voltage reported in Uemura. Correct? 11 A. Yes. 12 Q. Uemura does not contain such a disclosure, 13 though. Correct? 14 ATTORNEY SOMMER: Object to form. 15 A. Uemura talks about cycling the batteries 16 between certain voltage limits. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. And because it is constant current -- 19 withdrawn. 20 Because the charging conditions in Uemura are 21 constant current, the upper limit of that range, which 22 is 4.3 volts, is actually only applied very briefly 23 during the charge and discharge cycle of these 24 batteries. Correct? 25 ATTORNEY SOMMER: Object to form.	Page 176 1 THE WITNESS: Yes. 2 ATTORNEY STAMATOPOULOS: -- Mr. Juzkow that. 3 THE WITNESS: The answer's yes. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. You could -- could you -- is it possible to 6 redact information from the Excel sheet that you've 7 prepared? 8 A. Yes. 9 ATTORNEY SOMMER: I've not seen the sheet and 10 I'm not going to stand on Mr. Juzkow's representation of 11 what is and what is not privileged and what may or may 12 not be redacted. So on that, yeah, I'm not waiving any 13 objection or, you know, to this. 14 ATTORNEY STAMATOPOULOS: That's fine. I'm not 15 asking you to waive objections on the fly. 16 ATTORNEY SOMMER: No, but you're asking 17 Mr. Juzkow whether this can be redacted for privilege 18 after just admitting he's not a lawyer and can't make a 19 call on privilege, so -- 20 ATTORNEY STAMATOPOULOS: Andrew, I'm going to 21 cut you off, not to be rude. 22 BY ATTORNEY STAMATOPOULOS: 23 Q. But, Mr. Juzkow, just to be clear, when I ask 24 if it can be redacted, I mean if you can actually 25 eliminate certain things as a technical matter from this

Page 177 1 Excel spreadsheet, like basically hide them from plain 2 view. 3 A. Yes. 4 Q. You can do that, right? 5 A. Yes. 6 Q. Okay. Not asking you if anything's privileged 7 or if it's not privileged. I know you're not a lawyer. 8 Just as a technical matter, whether you can eliminate 9 certain things from plain view. 10 Now, Mr. Juzkow, is it fair to say that the 11 reason why you did the analysis of the molecular weights 12 in the first place was because you had some concern with 13 respect to the total capacity numbers reported in 14 Uemura, and in particular, the fact that many of these 15 numbers are exactly the same as between all the 16 different examples reported in Uemura? 17 ATTORNEY SOMMER: Object to form. 18 A. What I wanted to understand was how they 19 arrived at these numbers. And so I went about it by 20 looking at the numbers, running some calculations, and I 21 was wanting to understand how did they arrive at those 22 numbers. 23 BY ATTORNEY STAMATOPOULOS: 24 Q. And you said that you only did the 25 calculations with respect to some examples and not	Page 179 1 A. Not the exact same, but close. 2 Q. Uemura reports the exact same, right? 3 A. To several -- to several significant figures. 4 It's -- it's -- yeah, it -- okay, go ahead. 5 Q. No, I didn't mean to cut you off. I'm sorry. 6 A. No, go ahead. 7 Q. In addition to the total capacity numbers 8 being reported as the same, and I take your point about 9 the significant figures, the total irreversible capacity 10 for 14 out of the 17 examples of anode is also reported 11 as identical over all of these different experiments. 12 Do you see that? 13 A. Yes. 14 Q. Would you agree with me that experimental 15 conditions vary even when using the same materials from 16 one experiment to the other? 17 A. They can vary, yes. 18 Q. And very often do. Correct? 19 A. It's unclear how they determine -- how they 20 generated these numbers. It's possible that they had 21 one large electrode, one large anode and they did the 22 same experiment on that one large anode and then they 23 took pieces of that -- individual pieces from that one 24 anode, which has one number. You know, I'm speculating, 25 but it's possible.
Page 178 1 others. Correct? 2 A. Yes. I did six -- five examples. 3 Q. You were more curious about those five or six 4 examples than you were about others. Fair? 5 A. I didn't -- I was lazy. I didn't want to go 6 through and look up these molecular weights for 7 germanium and niobium and stuff. I used the common ones 8 that I already knew. I used iron, nickel, manganese, 9 cobalt, and lithium and oxygen and -- so I used the 10 standard ones. And I was able to look at the -- 11 determine what the theoretical specific capacity was in 12 milliamp hours per gram, multiply that by the mass of 13 that electrode, and come up with a milliamp hours what 14 that electrode should be. 15 Q. Did it strike you as at all curious that these 16 different materials, in particular, 1, 2, 3, 4, 5, 6, 7, 17 8, 9, 10, 11, 12 materials in 12 separate examples all 18 list a total capacity of 2.24 on the dot? 19 A. The reason is for those particular molecules, 20 the -- the molecular weights are very similar, and the 21 lithium-ions for those ones that are available in that 22 molecule were all the same. So with those two numbers 23 being the same, or very close, you end up with the same 24 theoretical capacity and -- yes, that's it. 25 Q. You end up with the exact same numbers.	Page 180 1 Q. Isn't it true that you yourself detected 2 errors when reviewing Uemura? 3 A. Yes. 4 Q. Did the fact that you detected errors in 5 Uemura cause you to want to look into Uemura's numbers 6 further and see how they were determined? 7 ATTORNEY SOMMER: Object to form. 8 A. No, not at the time I wrote the declaration. 9 I did these calculations subsequent to writing the 10 declaration. 11 BY ATTORNEY STAMATOPOULOS: 12 Q. You did these calculations after you wrote the 13 declaration. Did I catch that correctly? 14 A. Yes. 15 Q. What made you want to do the calculations 16 after you wrote the declaration? 17 ATTORNEY SOMMER: I'm going to caution the 18 witness not to reveal the substance of any discussions 19 that you may have had with counsel. 20 A. So when I was preparing for this deposition, I 21 was digging deeper into the patents, and it just came 22 upon me to try to understand these numbers a little bit 23 better. 24 And the, you know, the core numbers that were 25 really critical to this are the capacity balance

Page 181 1 numbers, but that's the core number. But then I wanted 2 to know how these other numbers were generated and so I 3 was wondering, can I calculate this to see how they 4 generated these numbers? And yes, I was able to 5 calculate how they determined these numbers. 6 BY ATTORNEY STAMATOPOULOS: 7 Q. So is it fair to say that you -- and when you 8 say -- let me withdraw my question. 9 So the calculations that you just referred to, 10 those are the ones in the Excel sheet that we were 11 talking about earlier? 12 A. Yes. 13 Q. So you performed these calculations in 14 connection with preparing for your deposition. Correct? 15 A. Yes. 16 Q. And you prepared these calculations in 17 connection with preparing for your deposition before you 18 spoke with counsel about the deposition? 19 ATTORNEY SOMMER: Object to form. 20 A. I performed the calculations last night. 21 BY ATTORNEY STAMATOPOULOS: 22 Q. You did it on your own? 23 A. Yes. 24 Q. Without speaking to counsel? 25 A. Correct.	Page 183 1 ATTORNEY SOMMER: Object to form. 2 A. I'd have to review it, but I don't believe he 3 said that. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. Does your Excel sheet contain any information 6 that you were asked to prepare by counsel? 7 A. No. 8 Q. Does your spreadsheet contain any information 9 that was sent to you by counsel? 10 A. No. 11 Q. Does your spreadsheet contain any reference to 12 any communications with counsel? 13 A. No. 14 Can I ask a question, not being a lawyer? 15 Q. Yes. 16 A. The Excel spreadsheet, when we talk about the 17 Excel spreadsheet, are we talking about -- I'm answering 18 the questions based on one sheet within a large Excel 19 file with multiple sheets. So the answer to your 20 questions is regarding that one sheet that I'm using to 21 do calculations on. 22 Q. Are there several tabs in your Excel sheet? 23 A. Yes, there are. 24 Q. And right now -- or, withdrawn. 25 We have been talking about one of the tabs in
Page 182 1 Q. And any conclusions that might be derived from 2 your calculations would not be reflected in your 3 declaration. Correct? 4 A. That's correct. As I said, my curiosity 5 stemmed from how did they come up with these total 6 capacity values? And that was my curiosity. 7 And I like to get into the numbers with my 8 spreadsheets, and so I put in all the numbers and lo and 9 behold, you know, I got my results. And yeah, it was an 10 interesting exercise. 11 Q. And do your calculations support the opinions 12 that are in your declaration? 13 A. They don't change my declaration whatsoever. 14 Q. The calculations that you performed, do they 15 bear upon the reliability of the data reported in 16 Uemura? 17 A. The calculations I did were consistent with 18 the values in Uemura. 19 Q. Did the calculations you performed inform your 20 views as to the reliability of the data in Uemura one 21 way or the other? 22 A. For that specific total capacity of the 23 cathode for those values in that one column, yes. 24 Q. And Uemura reports that those values were 25 experimentally determined?	Page 184 1 that file. Correct? 2 A. Yes. 3 Q. And that file contains calculations that you 4 created on your own initiative without being prompted by 5 or otherwise discussing with counsel. Correct? 6 A. Exactly correct. 7 Q. There are other tabs in your spreadsheet. 8 Correct? 9 A. Yes. 10 Q. How many tabs? 11 Fair to say there are many tabs in your 12 spreadsheet? 13 A. Yeah, maybe 15. 14 Q. Okay. And do any of those tabs contain 15 information that's relevant to this case? 16 ATTORNEY SOMMER: Object to form. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. Yes or no. 19 A. In the tabs are notes that I've prepared. 20 Q. And the notes that you have prepared, were 21 they in connection with forming your opinions in this 22 matter? 23 ATTORNEY SOMMER: Object to form? 24 A. They were summaries of various references. 25 BY ATTORNEY STAMATOPOULOS:

Page 185 1 Q. And did you consult with your notes in 2 connection with forming your opinions as set forth in 3 your declaration? 4 ATTORNEY SOMMER: Object to form. 5 A. I use these primarily to review a number of 6 different references. So I took the different 7 references, I reviewed them, I made notes about each 8 reference. And this is one of the ways I was able to 9 look at it and say okay, this reference is not 10 applicable, this reference is. And that's what I did 11 with those. It's just notes that I took on the -- each 12 different reference. 13 BY ATTORNEY STAMATOPOULOS: 14 Q. And your notes relate also to references that 15 you decided not to include in your declaration because 16 they did not contain useful information? 17 A. Yeah. Like I said, there was -- one of them 18 was lithium metal batteries, which had nothing to do 19 with this. 20 Q. Did you create your notes at counsel's 21 request? 22 A. I was asked to review the papers, and when I 23 reviewed the papers, I made notes. 24 ATTORNEY STAMATOPOULOS: I want to -- I want 25 to move this along, Andrew, because I don't want to	Page 187 1 Q. Now still focusing on the Uemura, Mr. Juzkow, 2 do you know if the total capacity of the cathode 3 reported in Figure 3 of Uemura is in reference to the 4 total capacity after the first discharge of the battery? 5 A. A POSITA would use those values the very first 6 cycle to do these capacity balances. 7 Q. So just to be clear, your opinion is that a 8 POSITA reading Uemura would understand that the total 9 capacity reported here for the cathode is the total 10 capacity after the first discharge cycle? 11 A. The total capacity would be the first -- it's 12 the first discharge of the cathode, yes. 13 Q. And on what basis is that your opinion? 14 A. Oh, that's a POSITA. When we do design 15 capacities and we're trying to calculate what the ratios 16 are for positive/negative ratio, we take the very first 17 charge/discharge. So when we do the very first one, 18 we're charging -- well, the very first cycle, the very 19 first time you charge it, you -- you're putting 20 capacity -- you're taking lithium-ions out of the 21 cathode and putting them into the anode. So the values 22 here are based on those values. 23 Q. Earlier, you testified that the total 24 irreversible capacity was actually arrived at after the 25 procedure that's described in paragraph 77 of Uemura.
Page 186 1 consume the deposition with this right now. But I think 2 that we're going to put in a request on the record right 3 now for the full Excel sheet. We can meet and confer 4 about what is and what is not privileged. It sounds 5 like right now, based on Mr. Juzkow's testimony, that at 6 least one tab in that spreadsheet is not privileged. 7 But I understand that you may have a different view. We 8 can meet and confer about this at a different time. 9 ATTORNEY SOMMER: George, let's set something 10 up for Monday to talk about it once I've seen the sheet 11 and seen the rest of this document. You know, these 12 kind of requests at depositions are not typical at PTAB 13 and not really in compliance with the rules. But let's 14 talk about this on Monday. Let's find some time. 15 ATTORNEY STAMATOPOULOS: Okay, yeah, that's 16 fine. And I don't mean to -- you know, I just want to 17 make sure that it's clear that this is at this time our 18 position, and we can -- 19 ATTORNEY SOMMER: I understand. We can talk 20 about it further to keep this thing moving. 21 ATTORNEY STAMATOPOULOS: Yeah, absolutely. 22 Obviously, it's -- you know, I was not expecting to go 23 into this line of questioning either, to be very candid 24 with you. 25 BY ATTORNEY STAMATOPOULOS:	Page 188 1 Correct? 2 A. That one was -- that one was very specific to 3 one of the anodes where they wanted to generate an anode 4 that had a very, very low irreversible capacity. And 5 they wanted to specifically make that to -- to -- so 6 they could do their calculations, their experimentation, 7 to see if their hypothesis was correct. 8 Q. Going back to Figure 3 of Uemura, isn't it 9 true that 14 out of the 17 examples listed here have a 10 very low total irreversible capacity of the anode? 11 A. Yes. 12 Q. And in particular, it's 0.002 for, again, 14 13 out of the 17 examples. Correct? 14 A. Yes. 15 Q. And so the procedure described in paragraph 77 16 was actually followed with respect to at least 14 out of 17 the 17 examples given in Uemura. Correct? 18 A. The electrodes that they generated in 19 paragraph 77, those electrodes were used in examples 5 20 through 17, yes. 21 Q. So with respect to the anode, the values 22 reported here in Uemura were not after the first 23 charge/discharge cycle but after 40 hours of 24 charge/discharge that was performed on these batteries 25 as described in paragraph 77. Correct?

1 ATTORNEY SOMMER: Object to form. 2 A. Yes. 3 BY ATTORNEY STAMATOPOULOS: 4 Q. And how is it that if for the anode the values 5 reported are after 40 hours of repeated charging and 6 discharging it is your opinion that for the cathode, the 7 values reported are those that apply after the first 8 cycle? 9 A. A POSITA would know to use the first cycle of 10 the cathodes and first cycle of the anode. But in this 11 case, they were very clever in reducing the total 12 irreversible capacity by that technique in paragraph 77, 13 very clever technique so that when they tested these 14 electrodes they could see what the lithium content value 15 has with respect to the number of cycles in respect to 16 the performance. 17 So they knew that what they started with with 18 lithium in your cathode is what they -- what this cell 19 cycled at. So there was no irreversible loss of that 20 lithium that they couldn't measure, so they had -- they 21 knew exactly what lithium they started with, what value. 22 So, you know, for example 14, they had .75 23 lithium and they knew that by cycling it, there would be 24 no irreversible capacity loss so that when it cycled, 25 they knew that was the value of lithium that they had in	Page 189 1 would do, is make an individual coin cell with a sample 2 of the anode versus lithium, run the test. Then 3 afterwards, they would take a different anode, but 4 the -- or a different piece of the anode separate and 5 they would make another cell a full-cell knowing that 6 they know what the irreversible capacity would be in 7 that electrode. 8 Q. Now, on page 78 of your report in the 9 footnote, you state that you observed that a couple of 10 examples have obvious errors in them. And I'll wait for 11 you to get there. 12 A. Yes. 13 Q. You say: I observed that a couple of examples 14 have obvious errors in them. 15 Do you see that? 16 A. Yes. 17 Q. And you identify some of those examples. For 18 instance, some of the values in the Capacity Balance 19 column of Uemura figure 3 appear to incorrect list 1 20 over 1.3 when they should be listed as 1 over 1.1, see 21 e.g., examples 6 through 13 and 15 through 17. 22 Do you see that? 23 A. Yes. 24 Q. Now, later on in the same footnote, you say: 25 However, there are examples included in Figure 3 that
1 there. So it was clever. 2 Q. To arrive at the irreversible capacity of 3 0.002 reported, for example, in example 14 of Uemura, 4 Uemura describes charging and recharging and discharging 5 the whole battery. Correct? 6 A. That capacity is versus a lithium reference. 7 Q. So it's not the whole battery, it's just the 8 anode versus a lithium reference electrode? 9 A. Right. When you want to calculate individual 10 electrodes and you want to calculate what their 11 reversible and irreversible capacities are, you run 12 those versus a lithium metal reference. 13 Q. Is the -- 14 A. You run -- 15 Q. I'm sorry. 16 A. You run the anode. You put the anode versus 17 the lithium metal reference, and you intercalate lithium 18 and then you deintercalate lithium. So you look at the 19 difference between the initial intercalation and the 20 deintercalation that follows, and that difference 21 percentage is your irreversible loss. 22 Q. And that process that you just described, is 23 it performed on an experimental setup that includes the 24 cathode? 25 A. It can, but typically what we do, a POSITA	Page 190 1 correctly list 1 over 1, 1 over 1.3, and 1 over 1.5. 2 See examples 1 through 5 and 14. 3 Do you see that? 4 A. Yes. 5 Q. So in your view, examples 1 through 5 and 14 6 report accurate numbers based at least on what's 7 reported here in Uemura? 8 A. Yes. 9 Q. In example 5, it says the capacity balance is 10 1 over 1.3 in Uemura. 11 Do you see that? 12 A. Yes. 13 Q. That number is arrived at by dividing 2 over 14 2.36, right? 15 A. Yes. 16 Q. If you divide 2.3 -- and actually, I misspoke. 17 It's 2.36 over 2. Correct? 18 A. Correct. 19 Q. If you divide 2.36 over 2, that's 1.18, right? 20 A. Yes. 21 Q. So Uemura's example 5 lists an incorrect 22 ratio, right? 23 A. That is correct. 24 Q. On what basis did you opine that example 5 had 25 correctly reported the ratio?

1 A. There was an error on my part. 2 Q. Let's go to Uemura, paragraph 23. Uemura 3 states at the very first sentence of this paragraph that 4 the irreversible capacity of the negative electrode 5 material determines a quantity of lithium-ions coming in 6 and out of the positive electrode material. 7 Do you see that? 8 A. Yes. 9 Q. This means that the anode takes the lithium 10 out of circulation after the first charge cycle such 11 that the capacity's reduced, right? 12 A. Yes. 13 Q. Then in paragraph 25 of Uemura, Uemura says 14 that the layered lithium manganese complex oxide with a 15 very large capacity or with an unstable crystalline 16 structure and the negative electrode material with a 17 larger irreversible capacity than the conventional one 18 are employed in combination. 19 Do you see that? 20 A. Yes. 21 Q. Fair to say that Uemura reports that the 22 layered lithium manganese oxide is not stable? 23 ATTORNEY SOMMER: Object to form. 24 A. He's saying that the manganese complex oxide 25 has an unstable crystalline structure.	Page 193 Page 195 1 approaches. One of the approaches is to start with 2 lithium 1 and then extract the lithium using an 3 irreversible, highly irreversible anode. 4 And then the other way he's approaching it is 5 he's starting with lower lithium content in the first 6 initial molecule. And then he has a very low 7 irreversible capacity, so he gets to that same point 8 where he has a low -- he has a lithium-deficient 9 molecule for cycling. So he approaches it in two 10 different directions. 11 BY ATTORNEY STAMATOPOULOS: 12 Q. Is it fair to say that Uemura's trying to 13 reduce the capacity of the cathode? 14 A. No. 15 Q. Well, Uemura states that a lithium-deficient 16 cathode is more stable. Correct? 17 A. Yes. 18 Q. And in fact, Uemura considers it an 19 improvement to have a lithium-deficient cathode. 20 Correct? 21 A. Uemura is looking at a cathode material that 22 potentially has a very high specific capacity. So he's 23 taken that material that has a very high specific 24 capacity and he's saying I can stabilize this if I take 25 out a little bit of lithium. I will still end up with a
1 BY ATTORNEY STAMATOPOULOS: 2 Q. And Uemura goes on to say -- and I'm not 3 quoting -- that it uses an anode material that is 4 different from conventional anodes in the sense that it 5 has a larger irreversible capacity in order to stabilize 6 the crystal structure of the cathode. 7 Would you agree with that? 8 A. Yes. 9 Q. So is it fair to say that Uemura wants to take 10 out a larger portion of the lithium in circulation and 11 render it unusable in subsequent charge/discharge 12 cycles? 13 ATTORNEY SOMMER: Object to form. 14 A. He's approaching the -- using this material, 15 these various molecular formulas. He's looking at it 16 from two different angles. So the first one is he 17 starts with a high lithium content. So examples 3 and 18 4, you're almost at lithium 1 so you almost have the 19 full lithium in there. 20 And he's saying that by using a high 21 irreversible capacity -- irreversible anode, you're 22 extracting the lithium out of that lithium 0.967. So 23 then, you -- that results in a lower lithium value. 24 And he's trying to see if lithium-deficient 25 cathodes are more stable, so his approach -- he has two	Page 194 Page 196 1 molecule that has higher capacity than the conventional 2 lithium manganese spinel, so he'll still end up with a 3 higher capacity than that. And that's -- he's still -- 4 that's his goal is to come up with a stable material 5 that has high specific capacity. 6 Q. And just to be clear, that material is lithium 7 manganese dioxide. Yes? 8 ATTORNEY SOMMER: Object to form. 9 A. That's -- that's the base material. But then 10 he's doping it with different materials. He's making it 11 oxygen- and lithium deficient. So it's the starting 12 material but not the actual material that he's generated 13 for his study. 14 BY ATTORNEY STAMATOPOULOS: 15 Q. But is it fair to say that all the cathode 16 materials that Uemura experiments with are manganese 17 based? 18 A. Yes. 19 Q. So Uemura's approach with respect to these 20 manganese-based cathodes is to decrease their capacity 21 in subsequent charge/discharge cycles. Correct? 22 A. So lithium manganese spinel has a low specific 23 capacity. Lithium manganese dioxide has a much larger 24 specific capacity, which would be what you would want to 25 use in a lithium-ion cell. You want the highest

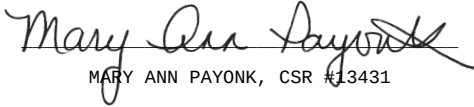
1 specific capacity. 2 So but then the lithium manganese dioxide 3 isn't as stable as he would like. So by reducing the 4 amount of lithium in there by a small amount, he's able 5 to come up with a final compound that is much higher 6 specific capacity than the spinel compound, the 7 manganese spinel. It will be lower than lithium 8 manganese dioxide pure, but that's not -- they're not 9 finding that they're able to get the performance out of 10 that material. So the end result is a material that's 11 still higher than lithium spinel, and that's his -- 12 that's the goal. 13 Q. Okay. You said that the lithium-deficient 14 lithium manganese dioxide used in Uemura has a slightly 15 smaller capacity than the nondeficient lithium manganese 16 dioxide. Is that fair? 17 A. Yes. 18 Q. How much slighter? Or let me rephrase that 19 question. 20 How much smaller does Uemura report the 21 lithium manganese -- let me withdraw that question. 22 Sorry, it's getting late. 23 How much smaller is the difference in capacity 24 between the lithium-deficient lithium manganese dioxide 25 used in Uemura versus the nondeficient lithium manganese	Page 197 1 dioxide is unstable. Correct? 2 A. It's -- I have to read through here where he 3 talks about the stability of the materials. 4 Q. Let me try to ask you a different question. 5 A person of ordinary skill in the art, reading 6 Uemura's disclosure that, for example, lithium manganese 7 dioxide has an unstable crystalline structure as shown 8 in paragraph 25, would such a POSITA understand that 9 problems start to arise with respect to that cathode 10 material structure in higher temperatures? 11 ATTORNEY SOMMER: Object to form. 12 A. Yes. By substituting various elements for 13 manganese within that compound, they're achieving higher 14 cycle life, better performance at high temperature. 15 So you can see that the cycle life for lithium 16 manganese dioxide is very poor, 10 cycles. But by 17 substituting some of the manganese with other metals -- 18 chromium, aluminum, gallium, vanadium, nickel -- sorry, 19 I'm going too fast. By substituting the manganese with 20 various other metals, you end up with a much more stable 21 structure, which provides a much higher cycle life when 22 cycling to 4.3 volts at high temperature. 23 BY ATTORNEY STAMATOPOULOS: 24 Q. And when you say cycling to 4.3 volts, again 25 you mean under constant current conditions. Correct?
1 dioxide according to Uemura? 2 A. So he has many examples. And to determine the 3 difference, you would look at the Total Capacity column 4 in Figure 3, look at the comparative example at the 5 bottom, which for that electrode is 2.7-milliamp hours, 6 and you would compare that to all the other examples, 7 and that would be your -- the difference in specific 8 capacity. 9 When I say "specific capacity," it's because 10 they all have the same mass to start with so it's really 11 based on having the same mass. 12 Q. In the comparative example, what's the 13 capacity balance ratio? 14 A. 1.3 is listed. 15 Q. Okay. And how does Uemura arrive at that 16 figure? 17 A. He doesn't show what the negative electrode 18 total capacity is so I am not 100 percent sure. 19 Q. Are you a different percent sure than 100? 20 ATTORNEY SOMMER: Object to form. 21 BY ATTORNEY STAMATOPOULOS: 22 Q. You don't know how he arrives at this value. 23 Correct? 24 A. That's correct. 25 Q. Now, you mentioned that lithium manganese	Page 198 1 A. Yes. 2 Q. And not constant current, constant voltage 3 conditions. Correct? 4 A. He doesn't mention constant voltage. He only 5 mentions constant current. 6 ATTORNEY SOMMER: We've been going about an 7 hour and a half. I don't know if this is a good 8 breaking point. 9 ATTORNEY STAMATOPOULOS: Let's take 10 10 minutes, and then I don't think I'll have much more. So 11 let's reconvene in 10. 12 THE VIDEOGRAPHER: The time is 2:40 PM. We 13 are off the record. 14 (Recess taken.) 15 THE VIDEOGRAPHER: We are back on the record. 16 The time is 2:48 PM. 17 BY ATTORNEY STAMATOPOULOS: 18 Q. Welcome back, Mr. Juzkow. 19 Now, you didn't communicate with counsel over 20 the break? 21 A. No. 22 Q. Now, in your declaration, for example, on page 23 12, you have offered the opinion that those in the field 24 knew to ensure that the negative electrode had 25 sufficient capacity to avoid plating or precipitating
BlueBear Reporting LLC	Page 200 RJ Technology Exhibit 2008 Apple Inc. v. RJ Technology LLC IPR2023-01183, Page 50 of 105

Page 201 1 lithium. 2 Do you see that? 3 A. Yes. 4 Q. Is it your opinion that, as a general matter, 5 designing a battery in which the anode capacity exceeded 6 the cathode capacity would result in better performance 7 characteristics? 8 A. Yes. 9 ATTORNEY SOMMER: Object to form. 10 BY ATTORNEY STAMATOPOULOS: 11 Q. I'm sorry, I didn't catch that. 12 A. Yes. 13 Q. For example, would it produce better 14 rechargeability? 15 A. Yes. 16 Q. Meaning that the -- withdrawn. 17 Meaning that a person of ordinary skill in the 18 art would expect that a battery in which the anode 19 capacity exceeded the cathode capacity would retain its 20 overall capacity over a higher number of cycles, all 21 else being equal. Correct? 22 A. When you start, the capacity of the cell is 23 based on the amount of lithium you have in there. And 24 the amount of lithium you have in there comes from the 25 cathode. So if you have your -- if your anode is larger	Page 203 1 else being equal, would expect that a battery with 2 greater anode than cathode capacity would have better 3 rechargeability. Fair? 4 A. Yes. 5 Q. Turning to Figure 3 of Uemura again, examples 6 3 and 4, those two examples use the same cathode 7 material, right? 8 A. Yes. 9 Q. They also use the same anode material. 10 Correct? 11 A. 3 and 4? 12 Q. Yes. 13 A. It's a different material. 14 Q. Well, let's take a look at -- 15 A. Oh, maybe -- I have to do the calculation. 16 Let's put that it way. 17 Q. I -- I don't think you need -- you're more 18 than free to do it, but I think it's probably easier if 19 I invite you to look at the relevant disclosure in 20 Uemura. So if you go to page 11 of 14, you see where it 21 says example 3 and example 4? 22 A. I'm sorry, which page was that again? 23 Q. 11 of 14, paragraph 85. 24 A. Okay. 25 Q. If you look at paragraph 85, in the right-hand
Page 202 1 than your cathode, then you -- all the -- you have a 2 space for all the lithium to enter into the anode and 3 then be available back to the cathode. So your ratios 4 should always have more negative than positive. 5 Q. I want to ask the question a little bit 6 differently. Let me ask a different question. 7 I asked you, for example, would it have better 8 rechargeability in reference to a battery in which the 9 anode capacity was greater than the cathode, and I 10 believe you answered yes. 11 Do you recall that? 12 A. I'd like to understand -- before I answer 13 that, I'll take that answer back and just understand, 14 what do you mean by rechargeability? 15 Q. That was going to be my next question to you, 16 so let me ask you a different question. 17 The ability of a battery to retain its 18 capacity over a number of cycles, what would -- how 19 would you call that property? 20 A. Rechargeability would be a good word for that. 21 Q. So now that we've come to an understanding as 22 to the meaning of rechargeability, do you want to change 23 your answer to my previous question? 24 A. No. 25 Q. So a person of ordinary skill in the art, all	Page 204 1 column to which that paragraph extends, do you see where 2 it says: With employing this material as a positive 3 electrode and Binchotan hard carbon with a carbon 4 content of 83.5 percent as a negative electrode? 5 Do you see that? 6 A. Yes. 7 Q. That's the negative electrode used in example 8 3? 9 A. Okay. So one of them is smaller. 10 Q. Bear with me for one second. 11 In example 4, do you see where it says: With 12 employing the same material as that in example 3 as a 13 positive electrode and Binchotan hard carbon with a 14 carbon content of 83.5 as a negative electrode? 15 Do you see that? 16 A. Yes. 17 Q. With those two disclosures in mind, do you 18 believe that the anode materials in examples 3 and 4 are 19 the same, or are they different in any way? 20 A. The material's the same. 21 Q. So the anode material's the same. Correct? 22 A. The anode material is the same. 23 Q. And the same is true of the cathode material. 24 Correct? 25 A. Yes.

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1 Q. But if you look at Figure 3 of Uemura, you'll 2 see that the capacity balances for these two examples 3 are different, right? 4 A. Yes. 5 Q. And one -- in example 3, the capacity ratio is 6 1 over 1.3. Correct? 7 A. Yes. 8 Q. And that means that the anode is 30 percent 9 greater than the cathode, right? 10 A. Yes. 11 Q. In example 4, there's a 1-to-1 ratio, right? 12 A. Yes. 13 Q. And based on that, a person of ordinary skill 14 in the art would expect that example 3's battery would 15 have better rechargeability than example 4. Correct? 16 ATTORNEY SOMMER: Object to form. 17 A. It's not that clearcut, given that the 18 irreversible capacity losses are different. So you -- 19 it's not exactly clear based on the irreversible 20 capacity values. 21 BY ATTORNEY STAMATOPOULOS: 22 Q. What would the irreversible capacity values 23 lead you to conclude? 24 A. That tells you what you -- you end up with in 25 terms of anode capability. So this isn't a real -- you	1 A. Yes. 2 Q. So at least with respect to examples 3 and 4, 3 which have identical anode and cathode materials, 4 rechargeability is not positively correlated with the 5 negative to positive capacity ratio. Correct? 6 A. Correct. 7 Q. Now -- 8 A. It comes down to irreversible capacity. And 9 then if you look at the irreversible capacity of 3 is 10 1.18 milliamp hours. So you're losing 2.6 -- starting 11 with 2.6 and you're losing 1.18. In the other -- in 12 number 4, you start with 2.6 and you lose only .94, so 13 there's a difference there. 14 Q. Why is it that the total irreversible 15 capacities are different in these two examples even 16 though the total capacity of the cathode is the same, 17 the cathode material is the same, and the anode material 18 is the same? 19 A. There's a difference in the mass of the 20 negative electrode. So you start with a smaller amount 21 of negative electrode in example 4, and the irreversible 22 capacity is lower because you have in the units milliamp 23 hours. It's lower because you have less mass to start 24 with. 25 Q. How is the total capacity of the anode defined
Page 206	Page 208
1 know, just a very general standard anode material. In 2 general, I agree that having a -- a value of greater 3 than 1 for your negative over your positive is 4 preferable, but I'm not sure why there's a small 5 difference in the number of cycles between these two. 6 Q. Well, when you say there's a small number of 7 difference in the number of cycles, to be clear -- let 8 me ask a question. Might make it better. 9 So example 3 reports a ratio or a capacity 10 balance that indicates the anode has greater capacity 11 than the cathode. Correct? 12 A. Yes. 13 Q. And it also reports 310 cycles as the number 14 of cycles over which a particular level of capacity is 15 retained for that battery. Correct? 16 A. Yes. 17 Q. Example 4 reports 350 cycles. Correct? 18 A. Yes. 19 Q. So the rechargeability of example 4, at least 20 according to the numbers reported here in Uemura, is 21 better than that of example 3. Correct? 22 A. Yes. 23 Q. However, example 4 reports a capacity ratio 24 between the anode and the cathode that is exactly 1 to 25 1. Correct?	1 in Uemura? 2 ATTORNEY SOMMER: Object to form. 3 A. I don't recall. 4 BY ATTORNEY STAMATOPOULOS: 5 Q. Take a look at paragraph 31. 6 A. Okay. So he has a formula based on an 7 experimental set of data that they collected, which was 8 Figure 2. So they took experimental data and they 9 worked and they calculated a formula for irreversible 10 capacity based on carbon content. 11 Q. The irreversible capacity as reported in 12 Uemura, paragraph 31, is not dependent upon the weight 13 of the anode. Correct? 14 A. The irreversible capacity can either be a 15 percentage or it could be a total in milliamp hours. 16 Q. Okay. 17 A. So by having -- you could -- they have the 18 same percentage of irreversible capacity, but the total 19 irreversible capacity in milliamp hours is lower if you 20 have less mass. 21 So when you cycle number 4, even though the 22 capacity balance from the first cycle is 1.1, subsequent 23 cycles, your capacity balance is going to be above 1 to 24 1. So there's no concern about having -- not having 25 enough negative capacity. There's no concern whatsoever

1 there because you have -- you're losing lithium from the 2 cathode. And when you do that, your ratio is no longer 3 1 to 1, it's going to be 1 to some 1.X value. 4 Q. So do you know if the difference in 5 rechargeability is attributable to the difference in 6 total irreversible capacity with respect to examples 3 7 and 4? 8 ATTORNEY SOMMER: Object to form. 9 A. Even though the capacity balance for number 4 10 is 1.1 -- 1 to 1 to start, which, you know, a POSITA 11 would not design a battery at 1 to 1 in a commercial 12 battery. But once you have that high irreversible 13 capacity loss on the first cycle, now you don't have all 14 that capacity in the cathode and so your anode -- your 15 ratio is going to be -- you'll have more negative than 16 positive. And as long as you have more negative than 17 positive, you're going to have good cyclability. 18 You're not going to have the issues -- I 19 should say you're not going to have the issues you would 20 have if you had less negative than positive. When you 21 have less negative than positive, as you know, you can 22 have lithium plating, lithium metal plating which 23 affects the rechargeability. 24 ATTORNEY STAMATOPOULOS: I want to -- I want 25 to invite your attention now to the Abe reference, which	Page 209 1 state that a person of ordinary skill would calculate 2 the ratio at the voltage that a battery is intended to 3 operate. 4 Do you recall that? 5 A. Yes. 6 ATTORNEY SOMMER: Object to form. Counsel, do 7 you mean 117? 8 ATTORNEY STAMATOPOULOS: 117. 9 ATTORNEY SOMMER: Okay. 10 ATTORNEY STAMATOPOULOS: One one seven. Did I 11 say something else? I'm sorry. 12 ATTORNEY SOMMER: No, you didn't. Sorry. 13 ATTORNEY STAMATOPOULOS: No worries. 14 THE WITNESS: Yes. 15 BY ATTORNEY STAMATOPOULOS: 16 Q. Now, what is your basis for concluding that 17 Abe discloses a ratio that was calculated at either 4.2 18 or 4.3 volts? 19 A. So the ratios that he calculated were shown in 20 Table 1. 21 Q. I'm sorry? Table 1 of Abe? 22 A. Abe, yeah. On page 28 of 31. 23 Q. Okay. 24 A. So can you repeat your question, please? 25 Q. So my question was what is your basis for Page 211
1 is Exhibit 1005 to your declaration. 2 THE WITNESS: Yes. 3 (Exhibit No. 1005, previously marked, was 4 referenced and indexed.) 5 BY ATTORNEY STAMATOPOULOS: 6 Q. Now, you've offered an opinion that Abe 7 discloses the capacity ratio that is claimed in the 8 independent claims of the '641 patent. Correct? 9 A. I have to refer to my deposition. 10 Q. Yeah, let me point you to the part of your 11 declaration that I'm referring to. So if you go to 12 paragraph 162 -- 13 A. Yes. 14 Q. -- is that where your opinions start with 15 respect to Abe's -- to whether Abe discloses the claimed 16 ratio? 17 A. Yes. 18 Q. And in paragraph 163 of your declaration, the 19 very last sentence, you say: A specific example is 20 provided by Abe for a lithium manganese oxide, the 21 spinel form, in which the design capacity ratio is 1 22 over 1.1. 23 Do you see that? 24 A. Yes. 25 Q. And in paragraph 117 of your declaration, you Page 210	1 concluding that Abe discloses a ratio that was 2 calculated at either 4.2 or 4.3 volts? 3 A. Within my declaration, sorry, can you point me 4 again to where I said that 4.2 or 4.3? 5 Q. Well, let's try a different -- let's try 6 something different. 7 At paragraph 163, you state that a specific 8 example's provided by Abe for the spinel lithium 9 manganese oxide cell in which the design capacity ratio 10 is 1 over 1.1. 11 Do you see that? 12 A. In paragraph 163, yes. 13 Q. Okay. And you cite in the footnote to 14 paragraph 18 of Abe. Correct? 15 A. I cite 18, 78, and 103, paragraphs -- 16 Q. You are correct. I apologize. You cite -- 17 for that particular proposition, you cite 103. 18 A. So 103 is the -- okay. 19 Q. Yes. Now, in 103, it reads, of Abe: A 20 cylindrical nonaqueous electrolyte-based secondary 21 battery was made in the same manner as in embodiment 1 22 using a negative electrode, cathode, and electrolyte 23 solution similar to that in embodiment 1. 24 Do you see that? 25 A. Yes. Page 212

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1 Q. And fair to say that it is with respect to 2 this embodiment 1 that you opine that Abe has reported a 3 design capacity ratio of 1 over 1.1? 4 A. In embodiment 1, the ratio is 1 to 1.2 as -- 5 Q. Well -- 6 A. -- as per Table 1. 7 Q. Well, that's a different embodiment. 8 That's -- and that's a different -- that's a different 9 disclosure. 10 I'm asking you about what's here in paragraph 11 103, where it states: The negative electrode design 12 capacity to positive electrode design capacity value of 13 this nonaqueous electrolyte secondary battery was 14 adjusted to 1.1 and the value shown in Table 1. 15 Do you see that? 16 A. Yes. 17 Q. So here, at least, what you've cited says that 18 the value is 1.1, right? 19 A. In the table, it shows embodiment 1 as being 20 1.2. 21 Q. I -- I see that. In your report, it says it's 22 1 over 1.1. Do you see that? 23 A. Yes. 24 Q. So in any event, I'm not -- the purpose of my 25 question is just to establish what embodiment we're	1 A. Yes. 2 Q. Fair to say that the capacity ratios of 3 embodiment 1 correspond to a charge voltage no greater 4 than 4.1 volts based on what's stated here in Abe? 5 ATTORNEY SOMMER: Object to form. 6 A. Yes. 7 BY ATTORNEY STAMATOPOULOS: 8 Q. Now, we talked earlier about the difference 9 between constant current charging and constant current, 10 constant voltage charging. 11 Do you recall that? 12 A. Yes. 13 Q. You rendered certain opinions as to whether 14 Uemura and Abe disclose the claimed charge cutoff 15 voltage that is recited in the claims of the '641 16 patents. Correct? 17 A. Yes. 18 Q. And in rendering those opinions, did you 19 consider any construction or proposed construction for 20 the term "charge cutoff voltage" that appears in those 21 claims? 22 A. The different claims have the same -- charge 23 limited voltage limited to 4.2 or charge cutoff voltage 24 set at 4.2 have the same meaning. 25 Q. Well, let me invite your attention to page 48
Page 214	Page 216
1 talking about. I don't want to squabble with you over 2 whether it's 1.1 or 1.2 right now. The Abe reference 3 says what it says. Your declaration says what it says. 4 But fair to say that what we're referring to 5 is what Abe refers to as embodiment 1? 6 ATTORNEY SOMMER: Object to form. 7 A. Yes. 8 BY ATTORNEY STAMATOPOULOS: 9 Q. Okay. I want to ask you about the 10 charge/discharge conditions of embodiment 1. 11 Fair to say that those are shown on page 29 in 12 the table that appears in the middle of that page? 13 A. Yes. 14 Q. And what Abe reports here in paragraph 97 in 15 reference to that table is the charge and discharge 16 tests were carried out at current values of 17 800 milliamps, 1600 milliamps, 2400 milliamps -- sorry, 18 microamps and 32 -- 19 A. Milliamps. 20 Q. Milliamps. Sorry, I get my milli's and 21 micro's mixed up. I'm sorry. 22 So in any event, to rephrase the question, 23 what Abe reports here is current values in the range of 24 charge and discharge voltages of 2.5 to 4.1 volts. 25 Do you see that?	1 of your declaration where it says Claim Construction. 2 Let me know when you're there. 3 A. I'm there. 4 Q. And paragraph 76, you state that you have not 5 been asked to render any opinions on claim construction. 6 Is that fair? 7 A. Yes. 8 Q. Fair to say that you just applied the 9 constructions that you were provided by counsel in 10 rendering your opinions? 11 A. So in here, I have three claim constructions 12 listed -- 13 Q. Okay. 14 A. -- in my document. 15 Q. Okay. And none of these claims -- oh, sorry. 16 Go ahead. 17 A. Okay. Yeah, there's -- there's one other 18 claim construction, charge cutoff voltage, which is 19 listed in the -- which I didn't -- I didn't have in my 20 declaration. 21 Q. I'm sorry, what are you referring to? What is 22 it listed in? 23 A. The Apple Markman order. 24 Q. You mean Exhibit 1016 to your declaration? 25 A. Yeah.

1 Q. And what is your understanding of 2 Exhibit 1016? 3 A. That -- my understanding is that it is that 4 there's no construction needed per RJ's proposed 5 construction. 6 Q. It also says that if this term needs 7 construction, it should be afforded its plain and 8 ordinary meaning, which is the maximum voltage to which 9 the battery is configured to be charged, right? 10 A. Right. That's the plain and ordinary meaning 11 that I agree with. 12 Q. Okay. And generally speaking, a person of 13 ordinary skill in the art, when charging a battery, 14 would use constant current, constant voltage charging. 15 Correct? 16 A. Not always. 17 ATTORNEY SOMMER: Object to form. 18 A. Not always. You can use -- you could use 19 constant current or constant voltage. You can use a 20 combination of. So there's multiple ways to charge a 21 battery. But there's also a maximum voltage that you 22 adhere to. And sometimes we call that the upper voltage 23 limit, upper cutoff voltage, charge cutoff voltage. 24 There's many terms for it, but it's a single number that 25 you -- the battery is designed to be charged to.	Page 217 1 REPORTER'S CERTIFICATE Page 219 2 I, MARY ANN PAYONK, shorthand reporter and 3 Notary Public, CA CSR No. 13431, do hereby certify that 4 the witness whose deposition is hereinbefore set forth 5 was sworn by agreement of all parties, that the 6 proceedings were reported stenographically by me, and 7 that this transcript is a true, correct, and full record 8 of the testimony given. 9 I further certify that I am not related to 10 any of the parties to this action by blood or by 11 marriage, and that I am in no way interested in the 12 outcome of this matter. 13 IN WITNESS WHEREOF, I have hereunto set my 14 hand this 4th day of May, 2024. 15 16  17 MARY ANN PAYONK, CSR #13431 18 19 20 21 22 23 24 25
1 BY ATTORNEY STAMATOPOULOS: Page 218 2 Q. You would get different open circuit voltage 3 values if you applied constant current charging with the 4 same voltage cutoff but different current values. 5 Correct? 6 A. Yes. 7 ATTORNEY STAMATOPOULOS: No further questions. 8 ATTORNEY SOMMER: I don't have any questions 9 for the witness. We'd like to reserve the right to 10 review and sign. George, send me your availability to 11 talk on Monday. I'm traveling on Tuesday so I'd like to 12 resolve this if we can. 13 ATTORNEY STAMATOPOULOS: Yeah. 14 THE VIDEOGRAPHER: The time is 3:25 PM. We 15 are off the record. 16 17 (Deposition adjourned at 3:25 p.m.) 18 19 20 21 22 23 24 25	Page 220 1 INDEX TO WITNESSES 2 WITNESS PAGE 3 MARC JUZKOW 4 Examination by Attorney Stamatopoulos 6 5 6 INDEX TO CERTIFIED QUESTIONS 7 PAGE/LINE TEXT OF THE QUESTION 8 17 5 And you were asked to provide opinions 9 that would show or tend to show that the 10 claims in the '641 patent are either 11 obvious or anticipated in light of the 12 prior art? 13 14 INDEX TO REFERENCED EXHIBITS 15 Exhibit No. 1001 65 16 Exhibit No. 1002 25 17 Exhibit No. 1005 210 18 Exhibit No. 1008 125 19 Exhibit No. 1009 93 20 Exhibit No. 1012 139 21 22 INDEX TO MARKED EXHIBITS 23 Juzkow Exhibit No. 1 Armstrong/Bruce article 151 24 25

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1 ERRATA SHEET FOR TRANSCRIPT OF: MARC JUZKOW

2 CASE CAPTION: Samsung vs. RJ Technology LLC

3 DEPOSITION DATE: May 1, 2024

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24 Signature of Deponent _____

Date _____

25 _____

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1 I,

2 MARC JUZKOW,

3 state that I have read the foregoing deposition and

4 declare under penalty of perjury:

5 That the foregoing is my deposition under

6 oath;

7 That I have read same and have made the

8 necessary corrections, additions or changes to my

9 answers that I deem necessary;

10 That my answers as indicated are true and

11 correct.

12

13 Executed at _____

14 this _____ day of _____, 2024.

15

16 _____

17 MARC JUZKOW

18

19

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21

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23

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25

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