In the Matter Of:

LG ENERGY SOLUTION vs MOLECULAR REBAR DESIGN

IPR2024-01011

YU ZHU

August 12, 2025

MRD EX. 2045
LGES v MRD
IPR2024-01006

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

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LG ENERGY SOLUTION LTD          )(
SAMSUNG ELECTRONICS CO LTD      )(
SAMSUNG ELECTRONICS AMERICA INC)(
          Petitioner,           )(
                                )(
VS.                             )(CASE IPR2024-01011
                                )(U.S. PATENT 8,896,924
MOLECULAR REBAR DESIGN LLC      )(
          Patent Owner.         )(
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ORAL DEPOSITION OF

YU ZHU

August 12, 2025

(Reported Remotely)

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ORAL DEPOSITION OF YU ZHU, produced as a witness at the instance of the Patent Owner, and duly sworn, was taken in the above-styled and numbered cause on the 12th day of August, 2025, from 9:40 a.m. to 9:52 a.m., before BROOKE SAWYER, CSR, in and for the State of Texas, reported by oral stenograph, at Akron, Ohio, pursuant to the Federal Rules of Civil Procedure and the provisions stated on the record or attached herein.

A P P E A R A N C E S

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DANIEL JANG, Paralegal

I N D E X

PAGE

Appearances 2

YU ZHU
Examination by Mr. Zinda 4

Reporter's Certificate 12

E X H I B I T S

(None marked.)

P R O C E E D I N G S

THE COURT REPORTER: We're on the record. Today's date is August 12th, 2025. The time is 9:40 a.m. Would counsel please state their appearance and affiliations, and I will swear in the witness.

MR. ZINDA: Stephen Zinda on behalf of the patent owner, Molecular Rebar.

MR. IN: Hyun Jin In on behalf of the petitioner, LG Energy Solution, here joined by Daniel Jang and Gretchen DeVries.

Yu Zhu,

having been duly sworn, testified as follows:

THE COURT REPORTER: Thank you. Counsel, you may proceed.

EXAMINATION

BY MR. ZINDA

Q Dr. Zhu, you were just deposed in the IPR proceeding involving the 909 patent, correct?

A Yes.

Q Is there any reason that your answers would be different in this proceeding if I were to ask you the same questions again?

A They shouldn't.

Q Okay. Thank you. I'm trying to just save

us time, short circuit this a little bit. I wanted to ask you about a few of the exhibits that were referenced in your declaration in the 924 proceeding, which is the proceeding that you're being deposed on right now. Can I get you to pull out LGES 1032?

A LGES 1032. Yes. Just confirm this is ChemComm paper from Zhou.

Q And can you provide in your own words a summary of what this article is about?

MR. IN: Objection to form.

A Yeah. This article is -- is -- this article is an abstract -- it's -- it's a novel composite electrode structure with highly conductive three-dimensional carbon nanotube network superimposed into interlaced porous lithium iron phosphate medium, and it was designed and realized using in situ synthesis procedure. And they'll produce a high-performance composite cathode for high-energy and high-power lithium-ion batteries.

Q And is part of the process described in LGES 1032 calcination?

A Can you repeat the question again.

Q Sure. Is one of the steps that's performed in this -- in LGES 1032 -- a calcination step?

A Yes. One of the steps is calcination.

Q Does LGES 1032 report the oxidation level after the calcination step is performed?
A In this specific paper, they did not report the oxidation level.
Q Okay.
A However, it does use oxidized carbon nanotube.
Q Okay. And then if I could get you to go to -- pull out Exhibit LGES 1040.
A Yes. I have this document.
Q And what is L -- what is LGES 1040?
A This is supplementary information for the same document we just discussed, LGES 1032.
Q Okay. And does LGES 1040 report the oxygen level -- I'm sorry. Does LGES 1040 report the oxidation level after the calcination step of LGES 1032?
A It does not report the oxidation level after the calcination, but it does use oxidized carbon nanotube, as I mentioned.
Q Just give me one minute.
A In this paper. In this document.
Q One second. If I could get you to pull out LGES 1041.
A Yes. Yeah. I opened it. 1041. Just make

sure this is a paper published on the Journal of Nanomaterials.

Q Yes. That's correct. And it is entitled Electrode Composite Lithium Iron Phosphate at Carbon Structure. Do you see that?

A Yes.

Q Okay. So we're on the -- we've got the right document. Can I get you to flip down to page 5 and, particularly, Figure 4. And my question is: Is the purpose of Figure 4 to show that carbon remains after the heating step?

A Figure 4 shows three figures. It's basically, XPS data for the materials. There are three different type of materials: LFP600, 700, and 800. And the data of the XPS spectrum's copy.

THE COURT REPORTER: I'm sorry. Mr. In, did you have an objection prior to Dr. Zhu's answer? You're muted, and I didn't hear you. But I saw your mouth move.

MR. IN: Yeah. I had an objection to form. Sorry about that.

Q Let me ask it a different way, Dr. Zhu. What is the purpose of Figure 4, in your opinion?

A The purpose of the Figure 4 is the -- is -- is -- it's XPS data, so the XPS usually gives an

element to the information about the materials and their binding status, so that is the purpose of the figure.

Q So it is intended to show binding status, not necessarily the amount of carbon or oxygen that remains after heating?

A It shows both. It shows both the carbon-oxygen content as well as their binding status. So that being said, it not only shows the percentage of the carbon and oxygen, but also it shows the different bonding status between the carbon and oxygen. So there may be different bond -- bond formed between the carbon and the carbon-oxygen. It can also provide this information.

Q Can I get you to pull out LGES 1042.

A 1042.

Q Let me pull it up myself. Let me know when you have it handy.

A Yeah.

Q All right. And --

A 1042. I just want to make sure the document is reference from Journal of Materials Chemistry A with the title Synthesis of Porous Carbon Nanotubes for Composite.

Q Correct.

A Right.
Q And if you can go down to page 3, the first sentence.
A You mean page 3 is --
Q Page 3 of the PDF. The big --
A Page 3 of the PDF.
Q Yeah. Big numbers at the (cross-talk, indiscernible).
A Okay. Yes. Page 3 of the PDF.
Q It refers to -- if you look at the second sentence under 2.1 -- and it references AL2O3. Do you see that?
A You mean the second sentence of --
Q Correct.
A -- paragraph 2.1?
Q Correct. It says (as read): The carbon nanotubes were synthesized by chemical vapor deposition.
You see that?
A Yes.
Q And then it --
A I saw that.
Q And it says -- and it references aluminum -- AL2O3, which is also known as alumina, correct?
A Alumina. Yeah. Alumina oxide.

Q Alumina oxide. Okay. And is that considered -- is alumina oxide considered a high-temperature material?

MR. IN: Objection to form.

A Alumina oxide in this experiment is used as a substrate to supporting the growth of carbon nanotube. The irony is a CAD, so the growth was carried out in so-called chemical vapor deposition technique.

Q Yeah. But my question specifically is about -- is about the alumina oxide. Is that considered to be a high-temperature material?

A I -- I do not quite understand your question. What do you mean --

Q I guess --

A -- alumina oxide is a high-temperature material? You mean the temperature of alumina oxide is higher or some other -- what do you mean exactly?

Q Just strike the question. Just give me one second. All right. I have no further questions.

A Okay.

MR. IN: No further questions from Petitioner either.

MR. ZINDA: Okay. Were there any other questions that you had about the terminology,

Ms. Sawyer?

THE COURT REPORTER: One second. Mr. In, are you going to want to do read and signs for both of the transcript?

MR. IN: No. I don't think so.

THE COURT REPORTER: And would you like copies of either of them?

MR. IN: No. We're good here.

THE COURT REPORTER: We are off the record at 9:52 a.m.

(End of testimony at 9:52 a.m.)

1 UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
2
LG ENERGY SOLUTION LTD)(
3 SAMSUNG ELECTRONICS CO LTD)(
SAMSUNG ELECTRONICS AMERICA INC)(
4 Petitioner,)(
)(
5 VS.)(CASE IPR2024-01011
)(U.S. PATENT 8,896,924
6 MOLECULAR REBAR DESIGN LLC)(
Patent Owner.)(
7

8 REPORTER'S CERTIFICATION
ORAL DEPOSITION OF
9 YU ZHU
August 12, 2025
10 (Reported Remotely)

11 I, BROOKE SAWYER, Certified Shorthand
12 Reporter in and for the State of Texas, hereby certify
13 to the following:
14 That the witness, YU ZHU, was duly sworn by
15 the officer and that the transcript of the oral
16 deposition is a true record of the testimony given by
17 the witness;
18 I further certify that pursuant to FRCP Rule
19 30(f)(1) that the signature of the deponent:
20 ____ was requested by the deponent or a
21 party before the completion of the deposition and that
22 the signature is to be before any notary public and
23 returned within 30 days from the date of receipt of
24 the transcript. If returned, the attached Changes and
25 Signature Page contains any changes and the reasons

therefor;

__X__ was not requested by the deponent or a party before the completion of the deposition.

I further certify that I am neither counsel for, related to, nor employed by any of the parties or attorneys in the action in which the proceeding was taken, and further that I am not financially or otherwise interested in the outcome of the action.

Certified to by me this 12th of August, 2025.

_____

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Expiration Date: 01-31-2027
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Houston, Texas 77008
713-524-4500

1

1032 5:5,6,21, 24 6:1, 13,17
1040 6:9,11, 14,15
1041 6:24,25
1042 8:15,16, 21
12th 4:3

2

2.1 9:11,15
2025 4:3

3

3 9:2,4,5, 6,9

4

4 7:9,10, 12,23,24

5

5 7:8

7

700 7:14

8

800 7:15

9

909 4:19
924 5:3
9:40 4:4
9:52 11:10,11

A

a.m. 4:4 11:10,11
abstract 5:12
affiliations 4:5
AL2O3 9:11,24
alumina 9:24,25 10:1,2,5, 11,16,17
aluminum 9:23
amount 8:5
answers 4:21
appearance 4:5
article 5:9,11
August 4:3

B

basically 7:13
batteries 5:19
behalf 4:7,9
big 9:5,7
binding 8:2,4,8
bit 5:1
bond 8:12
bonding 8:11

C

CAD 10:7
calcination 5:21,24, 25 6:2, 16,19
carbon 5:14 6:6, 19 7:4,10 8:5,10, 11,13,23 9:16 10:6
carbon-oxygen 8:8,13
carried 10:8
cathode 5:18
Chemcomm 5:7
chemical 9:17 10:8
Chemistry 8:22
circuit 5:1
composite 5:12,18 7:4 8:24
conductive 5:13
confirm 5:6
considered 10:2,12
content 8:8
copies 11:7
copy 7:15
correct 4:19 7:3 8:25 9:14,16, 24
counsel 4:4,15
COURT 4:2,14 7:16 11:2,6,9
cross-talk 9:7

D

Daniel 4:10
data 7:13,15, 25
date 4:3
declaration 5:3
deposed 4:18 5:4
deposition 9:18 10:8
designed 5:16
Devries 4:11
discussed 6:13
document 6:10,13, 22 7:8 8:21
duly 4:13

E

electrode 5:13 7:4
element 8:1
end 11:11
Energy 4:10
entitled 7:3
EXAMINATION 4:16
Exhibit 6:9
exhibits 5:2
experiment 10:5

F

figure 7:9,10, 12,23,24 8:3
figures 7:12
flip 7:8
form 5:10 7:21 10:4
formed 8:12

G

give 6:21 10:19
good 11:8
Gretchen 4:11
growth 10:6,7
guess 10:15

H

handy 8:18
hear 7:18
heating 7:11 8:6
high-energy 5:18
high-performance 5:18
high-power 5:19
high-temperature 10:3,12, 16
higher 10:18
highly 5:13
Hyun 4:9

I

indiscernible 9:8
information 6:12 8:1, 14
intended 8:4
interlaced 5:15
involving 4:19
IPR 4:18
iron 5:15 7:4
irony 10:7

J

Jang 4:11
Jin 4:9
joined 4:10
Journal 7:1 8:22

L

level 6:1,4,15, 16,18
LFP600 7:14
LG 4:10
LGES 5:5,6,20, 24 6:1,9, 11,13,14, 15,16,24 8:15
lithium 5:15 7:4
lithium-ion 5:19

M

make 6:25 8:21
material 10:3,12, 17
materials 7:13,14 8:1,22
medium 5:15
mentioned 6:20
minute 6:21
Molecular 4:8
mouth 7:19
move 7:19
muted 7:18

N

Nanomaterials 7:2
nanotube 5:14 6:7, 20 10:7
nanotubes 8:23 9:17
necessarily 8:5
network 5:14
numbers 9:7

O

objection 5:10 7:17,20 10:4
opened 6:25
opinion 7:23
owner 4:8
oxidation 6:1,4,16, 18
oxide 9:25 10:1,2,5, 11,16,17
oxidized 6:6,19
oxygen

6:14 8:5, 10,12

P

paper 5:7 6:3, 22 7:1
paragraph 9:15
part 5:20
patent 4:8,19
PDF 9:5,6,9
percentage 8:9
performed 5:23 6:2
petitioner 4:10 10:23
phosphate 5:15 7:4
porous 5:15 8:23
prior 7:17
procedure 5:17
proceed 4:15
proceeding 4:19,22 5:3,4
process 5:20
produce 5:17
provide 5:8 8:14
published 7:1
pull 5:5 6:9, 23 8:15, 17
purpose 7:10,23, 24 8:2

Q

question 5:22 7:9 10:10,14, 19
questions 4:23 10:20,22, 25

R

read 9:16 11:3
realized 5:16
reason 4:21
Rebar 4:8
record 4:3 11:10
reference 8:22
referenced 5:3
references 9:11,23
refers 9:10
remains 7:10 8:6
repeat 5:22
report 6:1,3,14, 15,18
REPORTER 4:2,14 7:16 11:2,6,9

S

save 4:25
Sawyer 11:1
sentence 9:3,11,13
short 5:1
show 7:10 8:4
shows 7:12 8:7, 9,10
signs 11:3
situ 5:16
so-called 10:8
Solution 4:10
specific 6:3
specifically 10:10
spectrum's 7:15
state 4:4
status 8:2,4,8, 11
step 5:24 6:2, 16 7:11
Stephen 4:7
steps 5:23,25
strike 10:19
structure 5:13 7:5
substrate 10:6
summary 5:9
superimposed 5:14
supplementary 6:12
supporting 10:6
swear 4:5
sworn 4:13
synthesis 5:17 8:23
synthesized 9:17

T

technique 10:9
temperature 10:17
terminology 10:25
testified 4:13
testimony 11:11
three-dimensional 5:14
time 4:3 5:1
title 8:23
Today's 4:3
transcript 11:4
type 7:14

U

understand 10:13

V

vapor

9:17 10:8

W

wanted
5:1

words
5:8

X

XPS
7:13,15,
25

Y

Yu
4:12

Z

Zhou
5:7

Zhu
4:12,18
7:22

Zhu's
7:17

Zinda
4:7,17
10:24