

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MACRONIX INTERNATIONAL CO., LTD, MACRONIX ASIA
LIMITED, MACRONIX (HONG KONG) CO., LTD. and MACRONIX
AMERICA, INC.,

Petitioners

v.

SPANSION LLC,
Patent Owner

Case IPR2014-00108

U.S. PATENT NO. 7,151,027

Before the Honorable DEBRA K. STEPHENS, JUSTIN T.

ARBES, and RICHARD E. RICE,
Administrative Patent Judges

Washington, D.C.

Monday, September 15, 2014

Videotaped Deposition of SHUKRI J. SOURI, PH.D.

EXHIBIT

MACRONIX
IPR2014-00108
MX027-1011

Henderson Legal Services, Inc.

2	<p>1 Videotaped Deposition of SHUKRI J. SOURI, 2 PH.D., a witness herein, called for examination by 3 counsel for the Petitioners in the above-entitled 4 matter, pursuant to notice, the witness being duly 5 sworn by KAREN YOUNG, a Notary Public in and for the 6 District of Columbia, taken at the offices of Ropes & 7 Gray, 700 Twelfth Street, Northwest, Washington, D.C., 8 at 9:05 a.m. on Monday, September 15, 2014, and the 9 proceedings being taken down by stenotype by KAREN 10 YOUNG, and transcribed under her direction. 11 12 13 14 15 16 17 18 19 20 21 22</p>	4	<p>1 2 C O N T E N T S 3 THE WITNESS: 4 SHUKRI J. SOURI, PH.D. 5 By Mr. Sommer..... 6 6 By Mr. Davis..... 98 7 By Mr. Sommer..... 104 8 9 E X H I B I T S 10 11 SOURI EXHIBIT NO. PAGE NO. 12 13 Exhibit 1 Figure 1 with color..... 18 14 Exhibit 2 Figure 3D with color..... 56 15 Exhibit 3 Joint Submission Regarding Proposed 16 Construction of Disputed Claim Terms.64 17 Exhibit 4 Claim 1 with highlighting..... 109 18 Exhibit 5 Claim 1 with highlighting and 19 added language 113 20 21 - - - 22</p>
3	<p>1 APPEARANCES: 2 On Behalf of the Petitioners: 3 ANDREW R. SOMMER, ESQ. 4 Winston & Strawn LLP 5 1700 K Street, Northwest 6 Washington, D.C. 20006 7 asommer@winston.com 8 (202) 282-5896 9 10 On Behalf of Spansion LLC: 11 JAMES L. DAVIS, ESQ. 12 Ropes & Gray LLP 13 1900 University Avenue, 6th Floor 14 East Palo Alto, California 94303-2284 15 james.l.davis@ropesgray.com 16 (650) 617-4794 17 18 JANICE V. JABIDO, ESQ. 19 Ropes & Gray LLP 20 191 North Wacker Drive 21 32nd Floor 22 Chicago, Illinois 60606-4302 janice.jabido@ropesgray.com (312) 845-1259 ALSO PRESENT: Rick Sanborn, Videographer</p>	5	<p>1 THE VIDEOGRAPHER: Here begins Tape 1 in the 2 videotaped deposition of Shukri Souri in the matter of 3 Macronix International Company, Limited et al. versus 4 Spansion LLC, in the U.S. Patent and Trademark Office 5 before the Patent Trial and Appeal Board, Case Number 6 IPR2014-00108. Today's date is September 15th, 2014. 7 The time on the video monitor is 9:05 a.m. This 8 deposition is being held at Ropes & Gray, 700 12th 9 Street, Northwest, Washington, D.C. The court 10 reporter is Karen Young. The videocamera operator is 11 Rick Sanborn. Both are on behalf of Henderson Legal 12 Services. Will counsel please introduce themselves 13 and state whom they represent. 14 MR. SOMMER: Andrew Sommer of Winston & 15 Strawn LLP on behalf of the Macronix entities. 16 MR. DAVIS: Jim Davis and Janice Jabido of 17 Ropes & Gray for the patent owner. 18 THE VIDEOGRAPHER: Thank you. Will the 19 court reporter please swear in the witness. 20 Whereupon, 21 SHUKRI J. SOURI, PH.D., 22 called for examination by counsel for</p>

6	<p>1 the Petitioners and having been duly</p> <p>2 sworn by the Notary Public, was examined and</p> <p>3 testified as follows:</p> <p>4 - - -</p> <p>5 EXAMINATION BY COUNSEL FOR THE PETITIONERS</p> <p>6 BY MR. SOMMER:</p> <p>7 Q. Good morning, sir.</p> <p>8 A. Good morning.</p> <p>9 Q. I'm Andrew Sommer, as you just heard, and I</p> <p>10 think you know from before, I represent Macronix in</p> <p>11 connection with this proceeding. You -- I know you're</p> <p>12 a seasoned witness. I know you've testified a number</p> <p>13 of times according to your C.V., so unless you have</p> <p>14 procedural questions about how we're going to go about</p> <p>15 questions and answers today, I'm just going to get</p> <p>16 right to it. Do you have any procedural questions?</p> <p>17 A. No, thank you.</p> <p>18 Q. Okay. You understand that you must testify</p> <p>19 truthfully in this proceeding; is that right?</p> <p>20 A. Yes.</p> <p>21 Q. Is there any reason why you don't believe</p> <p>22 that you can testify truthfully today?</p>	8	<p>1 exhibit. This is Spansion Exhibit 2002. Sir, is that</p> <p>2 a copy of your declaration as submitted in connection</p> <p>3 with this proceeding?</p> <p>4 MR. DAVIS: Drew, do you have an extra copy</p> <p>5 of this?</p> <p>6 MR. SOMMER: Oh, yeah, I'm sorry.</p> <p>7 MR. DAVIS: Thank you.</p> <p>8 THE WITNESS: Yes, it is.</p> <p>9 BY MR. SOMMER:</p> <p>10 Q. And the statements in this declaration are</p> <p>11 truthful and correct; is that -- is that right?</p> <p>12 A. Yes.</p> <p>13 Q. And you declared that the statements in this</p> <p>14 declaration are true under the penalty of perjury; is</p> <p>15 that right?</p> <p>16 A. Correct.</p> <p>17 Q. So you take your obligations to be truthful</p> <p>18 in the declaration and during this deposition</p> <p>19 seriously; is that right?</p> <p>20 A. Absolutely.</p> <p>21 Q. Now, you've testified before on behalf of</p> <p>22 Spansion; is that correct?</p>
7	<p>1 A. No.</p> <p>2 Q. And you understand that you're here to</p> <p>3 testify regarding U.S. patent number 7,151,027; is</p> <p>4 that right?</p> <p>5 A. That's correct.</p> <p>6 MR. SOMMER: Jim, just to ask you a</p> <p>7 question, in the depositions of our witnesses, we had</p> <p>8 stipulated that we could do background once so that we</p> <p>9 can save some time, and that we could use the</p> <p>10 background testimony from the first day of deposition</p> <p>11 in connection with any of the IPRs. Is that</p> <p>12 acceptable?</p> <p>13 MR. DAVIS: We don't have a problem. That's</p> <p>14 fine.</p> <p>15 BY MR. SOMMER:</p> <p>16 Q. Okay. Now, you submitted a declaration</p> <p>17 recently in this proceeding; is that correct?</p> <p>18 A. Yes, I have.</p> <p>19 Q. And then you submitted a corrected</p> <p>20 declaration; is that right?</p> <p>21 A. That is correct.</p> <p>22 Q. I'm going to hand you a previously marked</p>	9	<p>1 A. I have.</p> <p>2 Q. You were retained by Spansion for the</p> <p>3 purposes of submitting that declaration that I've</p> <p>4 marked -- or that was previously marked as Exhibit</p> <p>5 2002; is that right?</p> <p>6 A. Yes.</p> <p>7 MR. DAVIS: And Drew, I don't mean to</p> <p>8 interrupt, just whenever -- can you clarify what you</p> <p>9 mean by background or at least do you want to</p> <p>10 demarcate it on the record when you -- when we've</p> <p>11 gotten to that point where you're done with the</p> <p>12 background and now when we're moving into the '027?</p> <p>13 MR. SOMMER: Yeah, I think -- I think it</p> <p>14 will be clear because we'll start talking about the</p> <p>15 '027 specifically, but yes, sure.</p> <p>16 MR. DAVIS: Thank you.</p> <p>17 BY MR. SOMMER:</p> <p>18 Q. How many depositions have you given before</p> <p>19 on behalf of Spansion?</p> <p>20 A. I have offered the deposition at an ITC</p> <p>21 case.</p> <p>22 Q. How many ITC cases have you testified on</p>

10	<p>1 behalf of Spansion in connection with?</p> <p>2 A. I believe -- related to Macronix and</p> <p>3 Spansion, I believe it's -- I believe it's one</p> <p>4 deposition, spent two days covering three patents.</p> <p>5 Q. Have you testified on behalf of Spansion in</p> <p>6 any other proceedings?</p> <p>7 A. There have been other proceedings prior</p> <p>8 involving different parties that I have testified at,</p> <p>9 yes.</p> <p>10 Q. How many other proceedings have you</p> <p>11 testified on behalf of Spansion in connection with?</p> <p>12 A. The one that I recall perhaps is the</p> <p>13 Spansion versus Samsung matter.</p> <p>14 Q. How many times did you testify on behalf of</p> <p>15 Spansion in the Spansion versus Samsung matter?</p> <p>16 A. At least once I believe. I don't recall if</p> <p>17 there have been others.</p> <p>18 Q. Did you testify in connection with an ITC</p> <p>19 proceeding on behalf of Spansion against Samsung?</p> <p>20 A. That's correct, yes, yes, so yes, you're</p> <p>21 right, you're reminding me that actually that there</p> <p>22 was an Eastern District of Virginia matter and there</p>	12	<p>1 here right now. There may have been an additional</p> <p>2 TFTLC related deposition, but I don't recall exactly.</p> <p>3 Q. Now, you've testified in two other</p> <p>4 proceedings regarding the '027 patent, is that</p> <p>5 correct, on behalf of Spansion?</p> <p>6 A. Yes, the previous one was the ITC, the</p> <p>7 latest ITC case that we discussed, and the one before</p> <p>8 that I believe was the Eastern District of Virginia.</p> <p>9 Q. Now, how many times have you appeared in</p> <p>10 court on behalf of Spansion?</p> <p>11 A. I recall testifying at an ITC trial on the</p> <p>12 Spansion versus Samsung matter.</p> <p>13 Q. Now, do you recall if that was the --</p> <p>14 actually, is that the 664 investigation four rows from</p> <p>15 the bottom on page 5 of Exhibit 2003?</p> <p>16 A. Sounds correct. I don't recall exactly, but</p> <p>17 yes, that sounds correct.</p> <p>18 Q. Beyond the trial testimony you provided in</p> <p>19 the 664 investigation, have you ever testified in</p> <p>20 court on behalf of Spansion?</p> <p>21 A. I don't believe so.</p> <p>22 Q. Are you -- do you hold yourself out as an</p>
11	<p>1 was an ITC matter, correct.</p> <p>2 Q. How many ITC matters were you involved with</p> <p>3 on behalf of Spansion as it pertained to Samsung?</p> <p>4 A. That I don't recall. I'd have to look at my</p> <p>5 list of testimony.</p> <p>6 Q. Okay. I'm going to hand you what's been</p> <p>7 previously marked as Spansion Exhibit 2003. This is a</p> <p>8 copy of your C.V.; is that correct?</p> <p>9 A. Yes, correct.</p> <p>10 Q. Is this an up-to-date copy of your C.V.?</p> <p>11 A. I believe it is, to the best of my</p> <p>12 recollection sitting here, yes.</p> <p>13 Q. This doesn't mention the ITC case between</p> <p>14 Spansion and Macronix, does it?</p> <p>15 A. That is correct, yes, that -- on the list of</p> <p>16 testimony within the past decade, correct, that has</p> <p>17 not yet been updated.</p> <p>18 Q. Are there any other things that have not</p> <p>19 been updated on this list beyond the Macronix versus</p> <p>20 Spansion testimony that you provided back in the</p> <p>21 spring?</p> <p>22 A. Not to the best of my recollection sitting</p>	13	<p>1 expert in semiconductor processing?</p> <p>2 A. Yes.</p> <p>3 Q. Have you previously built or designed</p> <p>4 semiconductors from a process perspective?</p> <p>5 A. Yes.</p> <p>6 Q. Have you designed or built flash memory?</p> <p>7 A. I have built double EPROM devices, yes.</p> <p>8 Q. And in what time period did you design and</p> <p>9 build double EPROM devices?</p> <p>10 A. That was during my research at Stanford from</p> <p>11 the time frames of '97 through to 2002, 2003,</p> <p>12 thereabouts. 2002.</p> <p>13 Q. And did Stanford have a semiconductor lab</p> <p>14 that you used to build those devices?</p> <p>15 A. That's correct, Stanford has a fabrication</p> <p>16 facility for semiconductor fabrication.</p> <p>17 Q. And you designed the process on which you</p> <p>18 built those EPROM -- double EPROM devices; is that</p> <p>19 right?</p> <p>20 A. That's correct, yes.</p> <p>21 Q. Were they floating gate devices?</p> <p>22 A. Those particular ones, yes.</p>

14	<p>1 Q. Did they include any form of spacers?</p> <p>2 A. I had not designed them with spacers back</p> <p>3 then. That was for research purposes.</p> <p>4 Q. Did you make a decision not to include</p> <p>5 spacers?</p> <p>6 A. No, my goal was to study -- not exactly. My</p> <p>7 goal was to study quality of films that are deposited.</p> <p>8 Q. Now, on a floating gate device, those</p> <p>9 devices have two gates; is that right?</p> <p>10 MR. DAVIS: I'm just going to object to the</p> <p>11 scope here to the extent it's beyond the scope, and</p> <p>12 are we done with the background section?</p> <p>13 BY MR. SOMMER:</p> <p>14 Q. No, we're not. This is background. I'm</p> <p>15 talking about the devices he built at Stanford. I'll</p> <p>16 rephrase the question. The devices that you built at</p> <p>17 Stanford, the double EPROM devices --</p> <p>18 A. Yes.</p> <p>19 Q. Did those have two gates for the memory</p> <p>20 cells?</p> <p>21 A. They did, yes.</p> <p>22 Q. And was one of those referred to as a</p>	16	<p>1 Q. These layers that you applied on these</p> <p>2 double EPROMs -- actually, let me -- let me back up.</p> <p>3 Did these double EPROM devices, were they functional</p> <p>4 memory units?</p> <p>5 A. I had not tested them to -- well, they're</p> <p>6 functional to the extent that the operation of the</p> <p>7 layers, yes, I was able to apply voltages and test</p> <p>8 them, and also test for the capacitance of the devices</p> <p>9 as well, yes.</p> <p>10 Q. So would these devices have included</p> <p>11 peripheral circuits?</p> <p>12 A. No, I did not -- I did not design them with</p> <p>13 peripheral circuits.</p> <p>14 Q. I'd like to move on to the '027 patent.</p> <p>15 This is --</p> <p>16 MR. DAVIS: I'm sorry, just as you're moving</p> <p>17 on, I was noting in Exhibit 2002, at least the version</p> <p>18 you handed me doesn't have color. I think there might</p> <p>19 have been color in the declaration.</p> <p>20 BY MR. SOMMER:</p> <p>21 Q. That's fine. If it becomes relevant, just</p> <p>22 let me know.</p>
15	<p>1 floating gate?</p> <p>2 A. Correct.</p> <p>3 Q. And the other one was a control gate?</p> <p>4 A. Correct.</p> <p>5 Q. Were they made of polysilicon?</p> <p>6 A. Yes.</p> <p>7 Q. And how was the floating gate, if at all,</p> <p>8 isolated from the control gate?</p> <p>9 A. At the time, I had used a insulation layer</p> <p>10 that I deposited using an oxide deposition technique.</p> <p>11 Q. And do you recall what that insulation layer</p> <p>12 in 2002 or before even, I think you said '97 --</p> <p>13 A. From '97 to 2002, correct.</p> <p>14 Q. Okay. In this time period, do you recall</p> <p>15 what materials you were using in that isolation?</p> <p>16 A. I had used a variety of films to understand</p> <p>17 the quality of the deposition, and that included LTO,</p> <p>18 which is a low-temperature oxide deposition, and in</p> <p>19 some cases I also followed up the LTO with a</p> <p>20 hydrogenation process to basically expose the films to</p> <p>21 a hydrogen gas to study the effect of passivating</p> <p>22 broken bonds and other defects.</p>	17	<p>1 A. I do -- I did bring with me a colored copy</p> <p>2 if you --</p> <p>3 Q. Yeah, if you need to refer to that, please</p> <p>4 feel free to do so. I'm going to hand to you what's</p> <p>5 been previously marked as Macronix MX027 dash 1001.</p> <p>6 It's a copy of the '027 patent that we've been</p> <p>7 discussing briefly this morning. Are you familiar</p> <p>8 with figure 1 of this patent, sir?</p> <p>9 A. Yes, I am.</p> <p>10 Q. And what is figure 1 showing us?</p> <p>11 A. If I may refer to the specification here in</p> <p>12 column 1, it says a -- around lines 32 a step exists</p> <p>13 where two adjacent structures have a different height</p> <p>14 as shown in figure 1. Then it goes on to say figure 1</p> <p>15 is a diagram of the side view of a portion of an</p> <p>16 interface area of an exemplary memory device 100 in</p> <p>17 accordance with the prior art.</p> <p>18 Q. So 110 in figure 1 -- that's substrate; is</p> <p>19 that right?</p> <p>20 A. It does refer to it in column 1 as substrate</p> <p>21 110.</p> <p>22 Q. And so is this figure showing that the</p>

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