

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of

**CERTAIN SEMICONDUCTOR
INTEGRATION CIRCUITS USING
TUNGSTEN METALLIZATION AND
PRODUCTS CONTAINING SAME**

Investigation No. 337-TA-648

COMMISSION OPINION

I. INTRODUCTION

On September 21, 2009, the presiding administrative law judge (“ALJ”) issued his final initial determination (“ID”) in the above-captioned investigation, finding no violation of section 337 of the Tariff Act of 1930, 19 U.S.C. § 1337 (“section 337”). On November 23, 2009, the Commission decided to review the ALJ’s invalidity findings with respect to claims 1, 3, and 4 of U.S. Patent No. 5,227,335 (“the ‘335 patent”) related to the so-called IBM Process A, IBM Process B, and the AMD prior art, and his finding regarding one respondent’s stipulation that its process meets the complete, third-recited step of claim 1 of the ‘335 patent. In addition, the Commission issued an order remanding the investigation to the ALJ for further proceedings relating to whether claim 4 of the ‘335 patent is obvious in light of IBM Process A and the prior art asserted by respondents and the Commission investigative attorney (“IA”).

On January 15, 2010, the ALJ issued his remand determination finding that claim 4 is not rendered obvious by IBM Process A and other prior art asserted by respondents and the IA. On March 22, 2010, the Commission determined to review the ALJ’s remand determination. On review of the remand determination and final ID, the Commission has determined to affirm the

ALJ's ultimate determination of no violation, but on different grounds with respect to claim 4 of the '335 patent.

II. BACKGROUND

The Commission instituted this investigation on May 21, 2008, based on a complaint filed by LSI Corporation of Milpitas, California and Agere Systems Inc. of Allentown, Pennsylvania (collectively "complainants"). *73 Fed. Reg.* 29534-35 (May 21, 2008). The amended complaint alleged violations of section 337 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain semiconductor integrated circuits using tungsten metallization and products containing the same by reason of infringement of claims 1, 3, and 4 of the '335 patent. The complaint, as amended, named over twenty respondents. Several respondents have been terminated from the investigation due to settlement or because they were not proper parties. The following six respondents remain in the investigation: Tower Semiconductor, Ltd. ("Tower") of Israel; Jazz Semiconductor ("Jazz") of Newport Beach, California; Powerchip Semiconductor Corporation of Taiwan; Grace Semiconductor Manufacturing Corporation of China; Integrated Device Technology, Inc. of San Jose, California; and Nanya Technology Corporation of Taiwan. The complaint further alleged that an industry in the United States exists as required by subsection (a)(2) of section 337.

On September 21, 2009, the ALJ issued his final ID finding no violation of section 337 by the six remaining respondents. He concluded that each respondent's accused process was covered by one or more of asserted claims 1, 3, and 4 of the '335 patent, but that all of the asserted claims were anticipated under 35 U.S.C. § 102(g) in view of IBM Process A. He also

asserted claims were anticipated under 35 U.S.C. § 102(g) in view of IBM Process A. He also found that none of the asserted claims were invalid under 35 U.S.C. § 102(g) or 35 U.S.C. § 103 in view of IBM Process B or the AMD prior art. On November 23, 2009, the Commission issued notice of its determination to review the following findings in the ALJ's final ID: (1) invalidity of claims 1, 3, and 4 of the '335 patent under 35 U.S.C. §§ 102(g) & 103 with respect to IBM Process A, IBM Process B, and the AMD prior art; and (2) Jazz's stipulation regarding whether its process meets the complete, third-recited step of claim 1, *i.e.*, "depositing a tungsten layer by chemical vapor deposition, said tungsten layer covering said glue layer on said dielectric and said exposed material." 74 *Fed. Reg.* 62592-93 (Nov. 30, 2009). The Commission determined not to review the remainder of the final ID.

The Commission also issued an order remanding the investigation to the ALJ for further proceedings relating to whether claim 4 is obvious in light of IBM Process A and the other prior art asserted by respondents and the IA. The Commission requested written submissions on the ALJ's remand determination, and briefing on remedy, the public interest, and bonding.

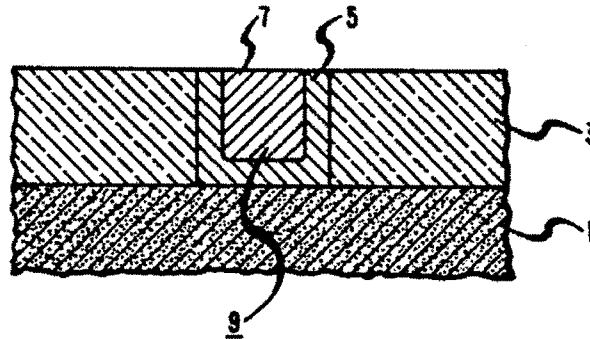
On January 15, 2010, the ALJ issued his remand determination finding that claim 4 is not rendered obvious by IBM Process A and the other prior art asserted by respondents and the IA. On January 21, 2010, the Commission extended the target date by two months to March 22, 2010, to accommodate the remand proceedings. On February 2 and 12, 2010, respectively, complainants and respondents each filed a brief and reply brief on the issues for which the Commission requested written submissions. On February 2 and 16, 2010, respectively, the IA filed a brief and a reply brief on the issues for which the Commission requested written submissions. In addition, Tower and Jazz also filed a joint reply brief on February 12, 2010.

A. Patented Process at Issue

This investigation pertains to a claimed process for making semiconductor integrated circuits (“ICs”), specifically ICs that use tungsten as the metal layer. ICs are used in a variety of products including mobile phones, cameras, and memory cards. ICs are made using transistors to build circuits on a silicon wafer. The circuits are usually of microscopic scope in order to allow millions of them to be built on a wafer. The semiconductor IC comprises a plurality of layers designed to enhance connectivity and operation - *e.g.*, an insulating layer, dielectric layer, and a metal layer from bottom to top - where the metal layer, tungsten (W) in this case, is used to make all of the electrical connections for the circuits. A particular process, *i.e.*, chemical vapor deposition (“CVD”), is used to effectively lay the metal layer on the silicon by inserting the tungsten through an opening or a window (a “via” or a “hole”) in the dielectric layer to generate better connectivity (contact) throughout the circuits. *See* ID at 8-12. As disclosed in the ‘335 patent specification, it is common to etch (or planarize) the deposited tungsten to form a planar surface with the wafer/dielectric layer thereby leaving only the top metal layer of tungsten exposed in the contact hole. *See* ‘335 patent, FIG. 2; col. 2:34-41; col. 4:52-53. The tungsten remaining in the contact hole is referred to as a “tungsten contact plug.” *Id.*

FIG. 2 of the ‘335 patent (shown below) illustrates this “tungsten contact plug” (7) deposited on top of a glue layer (5) in a contact hole (9) within a dielectric layer (3) that is above a silicon layer (1) in the semiconductor device. *Id.*

FIG. 2



One problem, however, with using tungsten is that it does not stick well to the dielectric layer. The asserted claims of the '335 patent pertain to the process of using a specialized glue layer inserted between the metal layer and dielectric layer to improve the adhesion of the tungsten to the dielectric. According to the invention, the glue layer (5), which is inserted using a window, covers both the sidewall dielectric layer and an exposed underlying layer (*e.g.*, silicon or a conducting silicide formed on the silicon surface) beneath the dielectric layer. As claimed, the specialized glue layer comprises at least one material selected from the group consisting of aluminum (Al) and conducting nitrides such as titanium nitride (TiN). Complainants contend that respondents make their semiconductor ICs using the processes recited in claims 1, 3, and 4 of the '335 patent.

Asserted claims 1, 3, and 4 read as follows:

1. A method of fabricating an integrated circuit comprising the steps of:

 patterning a dielectric layer to form holes which expose the underlying material, said exposed underlying material comprises an electrically conducting material;

 depositing a glue layer covering said dielectric and said exposed

underlying material;

depositing a tungsten layer by chemical vapor deposition, said tungsten layer covering said glue layer on said dielectric and said exposed material;

CHARACTERIZED IN THAT said glue layer comprises at least one member selected from the group consisting of conducting nitrides.

3. A method as recited in claim 1 in which said material comprises a metallic silicide.
4. A method as recited in claim 1 further comprising etching said tungsten and said glue layer to form a planar surface of said dielectric and said tungsten in said hole, said tungsten being etched before said glue layer.

B. Relevant Prior Art - IBM Process A

IBM Process A is described in an invention disclosure form created by John Cronin, Pei-Ing Lee, Carter Kaanta, and Mike Leach. It shows that the process was conceived and reduced to practice in October of 1985 by a team of IBM employees including John Cronin and Pei-Ing Lee, who were part of IBM's CMOS (complimentary metal oxide semiconductor technology) team. ID at 80. The CMOS team was working on a solution to adhesion problems related to tungsten interconnects in IBM semiconductor technology. *Id.*; *citing* Cronin, Tr. at 1962, 1972, 1977-78; Lee, Tr. at 1221-22; RX-216 (IBM Process A). The invention disclosure form also included a description of two related processes, IBM Process B¹ and IBM Process C. *Id.* IBM filed a patent application on IBM Process A on March 30, 1987, which resulted in issued U.S. Patent No. 5,760,475 ("the '475 patent"). The invention disclosure form specifically describes and illustrates a process for making a semiconductor IC that uses a glue layer of titanium

¹ Process B used reactive sputtering of TiN, rather than nitridization as in IBM Process A. ID at 88; RX-216.

nitride, where the glue layer is formed by sputtering titanium (Ti) onto the wafer surface and then the Ti layer is thermally annealed in nitrogen (nitridized) to form a TiN/Ti stack. *Id.* IBM Process A became part of the IBM “Process of Record,” which is the company’s standard process for building a device on a wafer. *Id.*; *citing* Lee at 1224, 1245-47, 1268-72.

III. DISCUSSION

For the reasons set forth below, we have determined to reverse the remand determination, affirm-in-part, reverse-in-part, and modify-in-part the final ID, and find no violation of section 337 by respondents. We adopt the ALJ’s findings in his final ID that are not inconsistent with our determinations and opinion.

A. Invalidity due to anticipation under 35 U.S.C. § 102(g)(2) in view of IBM Process A

We determined to review the ALJ’s finding that claims 1, 3, and 4 of the ‘335 patent are anticipated by IBM Process A under section 102(g)(2). Section 102(g)(2) provides that a person shall be entitled to a patent unless “before such person’s invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it.”

35 U.S.C. § 102(g)(2). Further, this subsection states that:

[i]n determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Id.

1. *Initial Determination*

The ALJ determined that respondents established by clear and convincing evidence that IBM Process A anticipates claims 1, 3, and 4 of the '335 patent. ID at 80-87. First, the ALJ found, and the parties do not dispute, that IBM Process A predates the claimed invention of the '335 patent because the evidence showed that IBM inventors disclosed IBM Process A in October of 1985 (*i.e.*, via the invention disclosure form), well before the earliest conception date for the '335 patent, March 1986. *Id.* at 80-81. The ALJ then found that IBM Process A was not abandoned, suppressed, or concealed under section 102(g). *Id.* at 81-82. Although there was a 17-month gap between the invention disclosure and the filing of the IBM patent application (leading to the '475 patent), the ALJ found that the evidence showed that during this period the inventors worked to commercialize IBM Process A, and that therefore in accordance with Federal Circuit precedent, it was not abandoned, suppressed, or concealed. *Id.* at 82. He further found that the invention disclosure was reviewed by IBM attorneys and engineers before an application could be filed, a process that usually took between six months and two years. *Id.* In addition, he found that the IBM inventors were working steadily to improve the part of the invention that pertains to a glue layer deposited by reactive sputtering (IBM Process B) and a description of this improvement was made a part of the '475 patent specification. *Id.* at 82-83 (*citing* Cronin, Tr. at 1976-1984).

The ALJ concluded that all of the steps recited in claims 1, 3, and 4 are disclosed by IBM Process A, including "depositing a glue layer" because IBM Process A teaches depositing a glue layer nitride using nitridization which he determined was encompassed by his claim construction. *Id.* at 83-88. In reaching his conclusion that dependent claim 4 is anticipated, the

ALJ determined that IBM Process A also discloses the “etching” step, *i.e.*, “etching said tungsten and said glue layer to form a planar surface of said dielectric and said tungsten in said hole, said tungsten being etched before said glue layer,” recited in that claim. *Id.* at 85-87. He relied on respondents’ expert and inventor testimony to find that although the IBM Process of Record (based on IBM Process A) may not have specifically included etching, the invention disclosure nevertheless teaches that tungsten can be etched back when it says that IBM Process A is integratable with metal “chemical mechanical polishing (CMP).” *Id.* at 86; *citing* Cronin, Tr. at 1980-81, 2014-16. Specifically, he noted that Mr. Cronin (one of the ‘475 patent inventors) testified that metal CMP, integratable with IBM Process A, was defined as “[polishing] back the metal to the surface of the wafer . . . it would only expose the metal in the contact holes.” *Id.*; *citing* Cronin, Tr. at 1980-81. The ALJ noted that Mr. Cronin’s testimony was corroborated by information including IBM documents, but the ALJ did not cite to any particular exhibit containing this corroborating information. *Id.* at 87; RX-216. Based on the foregoing, the ALJ found that claim 4 was anticipated by clear and convincing evidence.

2. *Analysis*

We agree with the ALJ’s determination that IBM Process A clearly and convincingly discloses each and every element of claims 1 and 3 and that therefore both claims are anticipated by IBM Process A. Thus, we adopt his invalidity conclusions regarding claims 1 and 3.

With respect to claim 4, we disagree with the ALJ’s conclusion. The ALJ found, based on Mr. Cronin’s testimony, that the invention disclosure form describes CMP and that this is sufficient to disclose etching the tungsten and the glue layer to form a planar surface as required by this claim. We agree, however, with the IA that the IBM Process A invention disclosure form

does not show that the inventors reduced the recited etching step to practice. Although Mr. Cronin, one of the inventors, testified that CMP means polishing back to the metal, testimony of reduction to practice of the recited etching step must be corroborated. *See Finnigan Corp. v. Int'l Trade Comm'n*, 180 F.3d 1354, 1367 (Fed. Cir. 1999) (quoting *Price v. Symsek*, 988 F.2d 1187, 1194 (Fed. Cir. 1993)). We do not believe that the IBM invention disclosure is sufficient evidence to corroborate his testimony. *See* RX-216 at 4; Cronin, Tr. at 1980-81. The invention disclosure form simply mentions CMP (“chemical mechanical polishing”), but makes no mention of (or illustrates) the recited step of etching both the tungsten and glue layer down to just the metal surface of the tungsten contact plug planarized with the dielectric. *Id.*

Although the respondents and their expert (Dr. Thomas) agree that CMP would be understood to mean polishing and planarizing the tungsten layer, we believe that this is insufficient evidence to suggest to one of ordinary skill in the art that the invention disclosure form discloses and reduces to practice etching of both the tungsten and glue layer. RX-216; Thomas, Tr. at 1624. This lack of clear and convincing evidence is especially true where proof of reduction to practice of the etching step is only supported by direct inventor (Mr. Cronin) testimony, which, as noted by the IA and complainants, is inconsistent with his testimony under cross-examination and is not supported or corroborated by documents or other inventor testimony. Cronin, Tr. at 1980-81; 2014-16; Lee, Tr. at 1367-69; Hartswick, Tr. at 1384. During cross-examination, Mr. Cronin testified that, in the Process of Record based on IBM Process A, the glue layer used was not etched back. Cronin, Tr. at 2014-16. Moreover, our conclusion that the invention disclosure form lacks clear and convincing evidence of reduction to practice is supported by the fact that both the commercialized IBM Process of Record and the

issued patent (the '475 patent), which were developed from the IBM Process A and B research, omit any mention of the recited step of etching to form a planar surface or CMP. RX-216; RX-3 (the '475 patent).

Accordingly, we reverse the ALJ's ruling that claim 4 is anticipated under 35 U.S.C. § 102(g) by IBM Process A. However, as described *infra*, we ultimately conclude there is no violation of section 337 because claim 4 is obvious in view of IBM Process A and the other prior art asserted by the IA and respondents.

B. Invalidity due to obviousness of claim 4 under 35 U.S.C. § 103 in view of IBM Process A and other asserted prior art

We remanded the issue of whether claim 4 is rendered obvious in view of IBM Process A and other prior art asserted by respondents and the IA, and determined to review the ALJ's remand determination on this issue.

1. *Remand Determination*

The ALJ determined that claim 4 is not obvious in view of IBM Process A and other prior art asserted by the IA and respondents. Remand Det. at 2-5. Particularly, the ALJ discounted their arguments that "tungsten plugs" predate the '335 patent, that the inventors admitted that over-etching to form a plug was "conventional," and the assertion that one of ordinary skill in the art would have been motivated to combine such additional prior art with IBM Process A to meet all of the limitations of claim 4. *Id.*; *citing* Respondents' Post-Hearing Br. at 46 (*citing* the '335 patent, col. 4:52-60) and IA's Post-Hearing Br. at 71. The ALJ found that they only provided conclusory generalizations of obviousness and found that they failed to

show both how and why the prior art references would have been combined. *Id.* (citing *Innogenetics N.V. v. Abbott Labs.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008)).

The ALJ further found that the prior art does not disclose the type of planarization required by claim 4 in connection with the fabrication of a device that meets all the limitations of the claim. Nor was there any substantive showing of how one of ordinary skill in the art would have made the specific combination consisting of IBM Process A and other prior art, or how one would have successfully accomplished such a combination of elements. Finally, he found lacking a discussion of secondary considerations. *Id.* Based on the foregoing, the ALJ concluded that neither the IA nor respondents had demonstrated by clear and convincing evidence that claim 4 of the '335 patent is invalid due to obviousness.

2. *Analysis*

Under 35 U.S.C. § 103(a), a patent is valid unless “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *See* 35 U.S.C. § 103(a). Once claims have been properly construed, “[t]he second step in an obviousness inquiry is to determine whether the claimed invention would have been obvious as a legal matter, based on underlying factual inquiries including: (1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art; and (4) secondary considerations of non-obviousness.” *See Smiths Indus. Med. Sys., Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1354 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)).

The ALJ concluded that the IA and respondents merely listed prior art references and failed to show how one of ordinary skill in the art would have been motivated to make a specific combination of IBM Process A with the other asserted prior art. *See* Remand Det. at 4. The ALJ also found that it was unclear how one of ordinary skill in the art would have successfully accomplished such a combination of elements. *Id.*

We find, however, that the IA and respondents did more than simply list prior art references. They sufficiently showed, through the references themselves and through expert testimony, how and why one of ordinary skill would have been motivated to successfully combine IBM Process A and the asserted prior art to arrive at the claimed invention. *See* Respondents' Post-Hearing Br. at 46-48; Respondents' Petition for Review of Final ID at 44-47; IA's Post-Hearing Br. at 71; IA's Petition for Review of Final ID at 6-7; Blewer, Tr. at 1906-11, 1955-57; Thomas, Tr. at 1569-71; Ho, Tr. at 2299-301. Particularly, the IA and respondents asserted that claim 4 is obvious in view of IBM Process A in combination with the Smith ("CVD Tungsten Contact Plugs by In Situ Deposition and Etchback" - 1985), Sachdev ("Blanket Tungsten Applications in VLSI Processing" - 1985), or Chow (U.S. Patent No. 4,789,648) prior art references by clear and convincing evidence. *Id.* They argued that Smith, Sachdev, and Chow each discloses the recited element of etching the metal, that Smith and Sachdev disclose the glue layer, and that it would have been obvious to one of ordinary skill in the art to combine any of these references with IBM Process A to arrive at the claimed invention. *See* Respondents' Post-Hearing Br. at 46-48; Respondents' Petition for Review of Final ID at 44-47; IA's Post-Hearing Br. at 71; IA's Petition for Review of Final ID at 6-7. We agree.

As mentioned above, we adopt the ALJ's conclusion that IBM Process A discloses all of the elements of claim 1. Accordingly, the only limitation left to be found in the prior art is claim 4's recitation of "etching said tungsten and said glue layer to form a planar surface of said dielectric and said tungsten in said hole, said tungsten being etched before said glue layer." See '335 patent, claim 4. The Smith and Sachdev references both disclose this limitation because they describe depositing a tungsten plug on top of a glue layer using CVD. As discussed earlier, a tungsten plug is the deposited tungsten etched back to form a planar surface with the dielectric layer of the semiconductor device. Thus, they both disclose etching back a tungsten layer and a glue layer to form a planar surface as required by claim 4. See RX-16 (Smith); RX-17 (Sachdev); Blewer, Tr. at 1906-09, 1955-57; Ho, Tr. at 2301. The Sachdev reference in particular shows a clear picture (see FIG. 1 below) of an etched-back tungsten "planarized plug," and respondents' expert, Dr. Blewer, testified that one of ordinary skill in the art would have recognized that the reference discloses tungsten plugs used with a glue layer. RX-17 at 480; Blewer, Tr. at 1955-57.

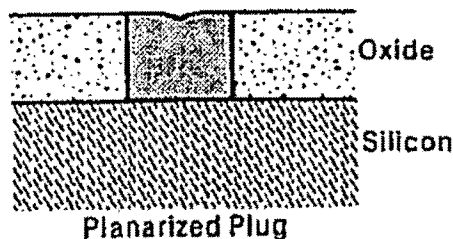


FIG. 1

In addition, Dr. Blewer testified that the inventors of the '335 patent were not the first to use tungsten plugs in view of this prior art. Blewer, Tr. at 1911. Dr. Blewer testified that Chow also discloses this limitation by teaching the use of CVD tungsten plugs without the use of a glue

layer. RX-131; Blewer, Tr. at 1910. Finally, during prosecution, the inventors of the '335 patent admitted that the dependent claims (*e.g.*, issued claim 4) stand or fall with claim 1 (which does not include the etching step), thereby admitting that the etching step is not novel. RX-242 at 128538.

Thus, the recited etching step of dependent claim 4 is simply the application of a well-known technique to prior art ready for the improvement, which the Supreme Court indicated would render the claimed invention obvious. *See KSR Int'l Co. v. Teleflex Inc.*, 500 U.S. 398, 417 (2007) (“[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”). The known technique disclosed in the Smith, Sachdev, and Chow references is etching back tungsten plugs to form a planar surface, and in these references, the technique was used to improve a tungsten metallization semiconductor device. A tungsten metallization semiconductor device is so similar to the claimed tungsten metallization semiconductor integrated circuit using a glue layer of conducting nitrides that a person of ordinary skill in the art would have recognized that it could improve a tungsten metallization semiconductor integrated circuit in the same manner. Accordingly, one of ordinary skill would have been motivated to use the well-known technique to improve the prior art device, *i.e.*, a tungsten metallization semiconductor device using a glue layer of conducting nitrides, to arrive at the claimed combination of claim 4. One of ordinary skill in the art reading Smith, Sachdev, or Chow would have been motivated and able to combine any one of these prior art references with IBM Process A - a tungsten metallization semiconductor integrated circuit using a glue layer of conducting nitrides - by etching the

tungsten and glue layer back to form a planar surface of tungsten and the dielectric. Moreover, nothing suggests that doing so would be beyond such a person's skill. See Blewer, Tr. at 1906-11, 1955-57.

Moreover, one of ordinary skill in the art would have been further motivated to combine IBM Process A with Smith, Sachdev, or Chow because they all cover the same subject matter. The '335 patent and this prior art all relate to and disclose a semiconductor integrated circuit using CVD tungsten as the metal layer. Both Smith and Sachdev disclose all of the elements of claim 4, including a glue layer, except for a glue layer comprising "conducting nitrides." Further, the inventors of the '335 patent have previously cited to Smith for its teaching that tungsten films can be etched to form tungsten plugs, and have admitted during deposition that it was well-known that tungsten needed to be etched back to form a plug. See CX-246C at 0487011, 19; CX-248C at 0486966, 82; CX-242, col. 56:12-19, 57:18-21. Thus, the combination of IBM Process A and the asserted prior art would have resulted in a successful, improved device that produced an etched-back tungsten plug that formed a planar surface on the IBM Process A semiconductor integrated circuit device as recited in claim 4.

Further regarding motivation, the Smith reference, consistent with respondents' expert testimony, discloses the advantages of using such tungsten plugs with a glue layer in a semiconductor device by stating that the "[t]ungsten contact plugs were fabricated in a low pressure chemical vapor deposition reactor with etching capability . . . [t]he deposition itself nearly planarized the surface . . . CVD tungsten is attractive as an interconnect metallization for VLSI [Very Large Scale Integration] circuits . . ." RX-16 at 350. Also, Smith states that "[t]he thick tungsten, if used as the first level metal presents difficult[ies] . . . [a] more favorable

solution is to plug planarize the contact using tungsten, then deposit a thin (3000 Å) aluminum alloy layer as the interconnect layer.” RX-16 at 350-51; Thomas, Tr. at 1569-71; RDX-19. The prior art further states that “[t]he goals in producing planarized non-selective contact plugs are [to:] 1) develop a highly uniform deposition minimizing the voiding problem . . . 2) [d]evelop a uniform high rate tungsten etch which is selective to oxide.” RX-16 at 352. Thus, we see no impediment to combining these references, and one of ordinary skill in the art would have been motivated to combine them to produce the claimed invention of claim 4, a tungsten metal layer etched back to form a planar surface with the semiconductor device. Dr. Ho, complainants’ expert, fails to adequately rebut this obviousness evidence as he points to no evidence why any omission of a glue layer with conducting nitrides negatively impacts the desirability of tungsten plugs, and specifically fails to adequately rebut the Sachdev reference which clearly discloses a glue layer. Ho, Tr. at 2299-30.

Accordingly, the submitted evidence clearly and convincingly shows how and why it would have been obvious to one of ordinary skill in the art to use the prior art etched-back tungsten plugs in combination with IBM Process A to arrive at the claimed invention of claim 4. And although we note the commercial success of complainants’ domestic product, this strong *prima facie* showing of obviousness is not overcome by secondary considerations. See *Agrizap, Inc. v. Woodstream Corp.*, 520 F.3d 1337, 1344 (Fed. Cir. 2008); *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

Accordingly, we reverse the ALJ’s remand determination and find that claim 4 is obvious, by clear and convincing evidence, under 35 U.S.C. § 103 in view of IBM Process A in

combination with Smith (1985), Sachdev, or Chow. Thus, we ultimately conclude that there is no violation of section 337.

C. Invalidity due to anticipation under 35 U.S.C. § 102(g) in view of IBM Process B or the AMD prior art, and due to obviousness under 35 U.S.C. § 103 in view of IBM Process B or the AMD prior art.

We determined to review whether claims 1 and 3 are anticipated by IBM Process B, whether claim 1 is anticipated by the AMD prior art, and whether claims 1, 3, and/or 4 are rendered obvious in view of IBM Process B or the AMD prior art. As discussed *supra*, the Commission concludes that there is no violation of section 337 based on invalidity of all asserted claims in view of IBM Process A. Thus, it is unnecessary for us to reach the issues of whether claims 1, 3, and/or 4 are invalid in view of IBM Process B or the AMD prior art. Accordingly, the Commission takes no position on these issues. *Beloit Corp. v. U.S. Int'l Trade Comm'n*, 742 F.2d 1421, 1423 (Fed. Cir. 1984).

D. Jazz's stipulation regarding claim 1

We determined to review the ALJ's finding that Jazz stipulated to practicing both portions of the third recited step of claim 1 of the '335 patent. We find that a slight error was made and that Jazz only stipulated to the first portion of the third recited step of claim 1, *i.e.*, "depositing a tungsten layer by chemical vapor deposition," but not the second portion of this step, *i.e.*, "said tungsten layer covering said glue layer on said dielectric and said exposed material." *See* ID at 73-75; Tower/Jazz's Pet. at 5-6; IA's resp. at 22-23; '335 patent, col. 6:1-3. Accordingly, we modify the ALJ's ruling to find that Jazz's stipulation to the third step in claim 1 only includes the step of "depositing a tungsten layer by chemical vapor deposition." This modification has no impact on the ALJ's unreviewed conclusion, that each respondent's accused

process is covered by one or more of asserted claims 1, 3, and 4 of the '335 patent.

IV. CONCLUSION

In view of our findings that the asserted claims of the '335 patent are invalid, we terminate the investigation with a finding of no violation of section 337.

By order of the Commission.

A handwritten signature in black ink, appearing to read "Marilyn R. Abbott". The signature is fluid and cursive, with a large initial "M" and "A".

Marilyn R. Abbott
Secretary to the Commission

Issued: April 19, 2010

**CERTAIN SEMICONDUCTOR INTEGRATED CIRCUITS
USING TUNGSTEN METALLIZATION AND PRODUCTS
CONTAINING SAME**

337-TA-648

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **COMMISSION OPINION** has been served by hand upon the Commission Investigative Attorney, Rett Snotherly, Esq., and the following parties as indicated, on APR 20 2010.



Marilyn R. Abbott, Secretary
U.S. International Trade Commission
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