UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY LTD.
Petitioner,

v.

MARLIN SEMICONDUCTOR LTD.
Patent Owner.

Case No. IPR2026-00261
U.S. Patent No. 7,888,195

DECLARATION OF ROBERT W. BAHR

TSMC 1032
TSMC v. Marlin, IPR2026-00261

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I, Robert W. Bahr, declare as follows:

I. INTRODUCTION

1. I am submitting this declaration on behalf of Taiwan Semiconductor Manufacturing Company Ltd. ("TSMC") in connection with a petition for *inter partes* review of U.S. Patent No. 7,888,195 ("'195 patent"), which I understand will be submitted to the Patent Trial and Appeal Board ("PTAB") of the United States Patent and Trademark Office ("USPTO").

2. I am a partner at the law firm of Maier & Maier PLLC, where I specialize in USPTO patent policy, practice, and procedure. My expertise includes USPTO patent policy, practice, and procedures, and advising attorneys and our clients on complex patent prosecution matters. My curriculum vitae is attached hereto as **Appendix A**.

3. TSMC has retained me as an expert to investigate the file history of U.S. Patent No. 7,888,195 ('195 patent) and provide my expert opinion relating to the search and examination of the application leading to the '195 patent: U.S. Patent Application No. 12/198,128 ("'128 application"). I have been asked to provide information about the relevant procedures that govern patent application examination, and the applicable rules and guidance provided by the editions of the Manual of Patent Examining Procedure ("MPEP") that were in effect during the

examination of the ’128 application,[1] and I have compared these standard procedures with what occurred during the actual search and examination of the ’128 application. I am being compensated for my work at my standard hourly rate. My compensation is not in any way contingent on the substance of my opinions or the outcome of these proceedings.

4. It is my opinion, based on my experience and knowledge of the relevant procedures governing patent examination, that the file history of the ’195 patent indicates that the searches conducted during the examination of the ’128 application were deficient as unduly narrow, resulting in the failure to uncover pertinent prior art, including U.S. Patent Application Publication No.

[1] All references to the MPEP are to Revision Eight (July 2010) of the Eighth Edition (Aug. 2001). The provisions of MPEP chapters 700 and 900 cited herein were in effect throughout the entire pendency of the ’195 patent (*i.e.*, from August of 2008 until February 2011). In addition, all references to 35 U.S.C. § 102 or 103 are to pre-AIA 35 U.S.C. § 102 or 103.

2007/0138559 to Bohr ("Bohr" or "Bohr publication") and U.S. Patent Application Publication No. 2005/0233527 to Brask et al. ("Brask" or "Brask publication").[2]

5. Specifically, the searches for the '195 patent included at least the following deficiencies:

- The keyword search queries were overly restrictive due to: (1) insufficient use of synonyms or alternates, (2) nonuse of truncation symbols or wildcards, and (3) overuse of the restrictive operator "with" (requires that search terms be in the same sentence).

- The keyword search queries were not sufficiently incremental, with many searches going directly from retrieving too many documents to review during the few minutes in which the searches were conducted to too few documents to avoid excluding pertinent prior art.

[2] I understand from the petition for *inter partes* review ("TSMC IPR petition") of the '195 patent that TSMC has taken the position that: (1) claims 1 through 11 of the '195 patent are either anticipated under 35 U.S.C. § 102 by Bohr (TSMC-1004), or unpatentable under 35 U.S.C. § 103 over Bohr either alone or in combination with other prior art documents; and (2) claims 1 through 11 of the '195 patent are either anticipated under 35 U.S.C. § 102 by Brask (TSMC-1005), or unpatentable under 35 U.S.C. § 103 over Brask either alone or in combination with other prior art documents. TSMC IPR Petition at 1-2.

- Each of the keyword searches sessions were completed in two to three minutes, which was not a sufficient amount of time given nature of the search queries and their results.

- The keyword search excluded foreign patent document and nonpatent literature databases without justification.

- The classification search excluded pertinent patent application publications due to the misclassification of these patent application publications.

Without these deficiencies, the examiner would have uncovered the Bohr publication and the Brask publication that, according to the IPR petition, are prior art to the ’195 patent and should have been used to reject claims 1 through 11 during examination of the application for the ’195 patent.

II. BACKGROUND AND QUALIFICATIONS

6. I worked at the USPTO for over 38 years. I began my career at the USPTO in September 1984, and was a patent examiner in Examining Group 330 (now Technology Center 3700) until April 1994. Between March 2016 and August 2023, I served as the Deputy Commissioner for Patents responsible for the patent examination policy area (“Deputy Commissioner for Patent Examination Policy”).[3]

[3] From 2016 to 2020, this position was titled “Deputy Commissioner for Patent Examination Policy,” and in October 2020 that title changed to “Deputy

I also served as the acting Deputy Commissioner for Patent Examination Policy from August of 2015 until March 2016, and from November 2009 until December 2011. Between November 2000 and March 2016, I served as the Senior Patent Counsel to the Deputy Commissioner for Patent Examination Policy (except when I was acting Deputy Commissioner). Between April 1994 and July 2000, I was a Legal Advisor in the Office of Patent Legal Administration (OPLA).

7. I led the implementation of numerous rulemakings while at the USPTO, most notably the patent examination provisions of the Leahy-Smith America Invents Act (AIA), including the changes to the patent rules and examination guidelines to implement the first inventor to file provisions of the AIA, the Patent Law Treaty provisions of the Patent Law Treaties Implementation Act (PLTIA), and the request for continued examination, patent term adjustment, and eighteen-month publication provisions of the American Inventors Protection Act of 1999 (AIPA). I also provided training to patent examiners on various changes to the patent laws, regulations, and examining procedures, including the first inventor to

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Commissioner for Patents." This position was titled "Associate Commissioner for Patent Examination Policy" from 2009 to 2011.

file provisions of the AIA, and the continued examination, patent term adjustment, and eighteen-month publication provisions of the AIPA.

8. I completed my undergraduate studies at the University of Maryland in 1983 with a Bachelor of Science in Mechanical Engineering. I attended the National Law Center of George Washington University, receiving my Juris Doctor in law with honors in May of 1993. I am a member of the Virginia State Bar and the Bars of the U.S. Court of Appeals for the Federal Circuit (Federal Circuit), and U.S. Supreme Court. I am registered to practice as a patent attorney before the U.S. Patent and Trademark Office.

III. USPTO SEARCH SYSTEMS AND GUIDANCE IN THE RELEVANT TIMEFRAME

A. Examiner Search Tools

9. In the 2008-2010 timeframe, the USPTO employed two desktop search tools for examiners to search U.S. patents and U.S. patent application publications: the Examiner's Automated Search Tool ("EAST") and the Web-based Examiner Search Tool ("WEST"). *See* MPEP § 902.03(e). EAST and WEST each provide examiners with access to a common text-searchable database of U.S. patents and U.S. patent application publications, and each permit an examiner to view retrieved the patent documents as either images or text.

B. Examiner Search Guidance

10. The MPEP instructs examiners that: (1) "the breadth of the claims in the application should always be carefully noted"; (2) they "should be fully aware of what the claims do *not* call for, as well as what they do require"; and (3) "[d]uring patent examination and reexamination, the claims are given the broadest reasonable interpretation consistent with the specification." *See* MPEP § 904.01. The MPEP specifically notes that "[f]requently, a claim includes within its breadth or scope one or more variant embodiments that are not disclosed in the application, but which would anticipate the claimed invention if found in a reference," and that "[t]he claim must be so analyzed and any such variant encountered during the search should be recognized." *See* MPEP § 904.01(a).

11. The USPTO instructs examiners that U.S. patent application publications are, for purposes of (pre-AIA) 35 U.S.C. §§ 102(a) and (b), publications as of their publication date, regardless of whether the underlying application is subsequently abandoned or patented. *See* MPEP §§ 901.02 and 901.03. In addition, U.S. patent application publications are prior art under (pre-AIA) 35 U.S.C. § 102(e) as of the earliest effective U.S. filing date of the published application. *See* MPEP §§ 901.02 and 901.03. Moreover, patent application publications are usually the first publication of a patent application as

patent applications are typically published as patent application publications before they issue as patents.[4]

12. The MPEP instructs examiners with respect to formulating a search:

> When determining the field of search, three reference sources must be considered - domestic patents (including patent application publications), foreign patent documents, and nonpatent literature (NPL). None of these sources can be eliminated from the search unless the examiner has and can justify a reasonable certainty that no references, more pertinent than those already identified, are likely to be found in the source(s) eliminated.

See MPEP § 904.02.

13. Thus, an examiner may eliminate, for example, a foreign patent document or nonpatent literature search only if the examiner has and can justify a reasonable certainty that no references more pertinent than those already identified in a search of domestic patent documents are likely to be found in a foreign patent document or nonpatent literature search.

[4] MPEP § 901.04(a) (explaining that after March of 2001 patent application publications are "A" documents as the first publication of patent applications and that patents are now "B" documents as the second publication of patent applications).

14. The MPEP indicates that the automated search tools covering patent documents (EAST and WEST) provide both a classified and text search capability, and that text search can be powerful, especially where the art includes well-established terminology and the search need can be expressed with reasonable accuracy in textual terms. *See* MPEP § 904.02 The MPEP, however, also advises that it is rare that a text search alone will constitute a thorough search of patent documents, and that some combination of text search with other criteria, in particular classification, would be a normal expectation in most technologies. *Id*.

15. The MPEP notes that it is sometimes difficult to express search needs accurately in textual terms, and that this occurs often, though not exclusively, in mechanical arts where, for example, spatial relationships or shapes of mechanical components constitute important aspects of the claimed invention. *See* MPEP § 904.02. The MPEP instructs that in these situations text searching can still be useful by employing broader text terms, but that the traditional process of browsing all patent documents in one or more classifications continues to be an important part of the search strategy. *Id*.

16. The MPEP instructs examiners that great care should be taken so as to clearly indicate the places searched and the date(s) on which the search was conducted. *See* MPEP § 719.05. The MPEP also instructs examiners that: (1) if a

complete search of a subclass is conducted (including all domestic and foreign patent documents), the complete classification (class and subclass) should be recorded (MPEP § 719.05(I)(A)); but (2) if a limited or cursory search or scan of a subclass is conducted, the class and subclass should be recorded with parentheses defining the limitation of the search (*e.g.*, "(cursory review)") (MPEP §§ 719.05(I)(B) and (II)(B)). The MPEP instructs examiners that any search updates should include all of the databases and the search queries and classifications employed in the original search. *See* MPEP § 904.

IV. SUMMARY OF THE PROSECUTION AND EXAMINATION OF THE APPLICATION FOR THE '195 PATENT

A. Examination and Allowance of the Application for the '195 Patent

17. The application for the '195 patent was filed on August 26, 2008, and was assigned Application No. 12/198,128 (the '128 application). The USPTO issued three Office actions prior to the allowance of the '128 application.

18. The examiner issued a first Office action (a non-final Office action) in the '128 application on September 14, 2009. TSMC-1002, 93. The Office action of September 14, 2009 included: (1) a rejection of claims 1, 2, 4, 5, 7 through 13, 15, and 17 through 20 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent Application Publication No. 2006/0065939 to Doczy et al. ("Doczy"); and (2) a rejection of claims 3, 6, 14, and 16 under 35 U.S.C. § 103 as unpatentable over

Doczy, U.S. Patent Application Publication No. 2004/0173886 to Carley ("Carley"), and U.S. Patent Application Publication No. 2009/0017563 to Jiang et al. ("Jiang"). TSMC-1002, 95-98. Applicant filed a response on November 20, 2009 to the Office action of September 14, 2009, which response included an amendment to claims 11 and 12 with no amendments to any other claims. TSMC-1002, 81-85 and 88-91.

19. The examiner issued a second Office action (a final Office action) in the '128 application on February 23, 2010. TSMC-1002, 72. The Office action of February 23, 2010 included: (1) a rejection of claims 12, 13, 15, and 17 through 20 under 35 U.S.C. § 102(b) as anticipated by Doczy; and (2) a rejection of claims 14 and 16 under 35 U.S.C. § 103 as unpatentable over Doczy, Carley, and Jiang. TSMC-1002, 74-76. The Office action of February 23, 2010 indicated that claims 1 through 11 are allowed, with the following examiner's statement of reasons for allowance:

> The following is an examiner's statement of reasons for allowance: the prior art taken alone or in combination neither discloses nor makes obvious the instant invention including depositing a first cap layer on a high-k dielectric layer covering a dielectric layer and surface openings, removing the first cap layer disposed in a second transistor region, and forming a metal layer on the first cap layer of a first transistor region and the high-k dielectric layer of the second transistor region. For example, the prior art reference used, Doczy et al (US 2006/0065939 A1), discloses depositing a first cap layer 115a on a high-k dielectric layer 180 covering a dielectric layer 112 and

> surface openings (Figures 9 and 10, and Paragraph 0048), but does not teach removing the first cap layer disposed in a second transistor region, and forming a metal layer on the first cap layer of a first transistor region and the high-k dielectric layer of the second transistor region. Therefore, the prior art of record neither anticipates nor renders obvious the claimed subject matter.

TSMC-1002, 76-77.

20. Applicant filed a request for continued examination ("RCE") on May 20, 2010 in response to the final Office action of February 23, 2010. TSMC-1002, 50-51. The RCE of May 20, 2010 included an amendment to claim 12, canceled claim 14, and amended no other claims. TSMC-1002, 53-59.

21. The examiner issued a third Office action (a non-final Office action) in the '128 application on June 25, 2010. TSMC-1002, 39. The Office action of June 25, 2010 included a rejection of claims 12, 13, and 15 through 20 under 35 U.S.C. § 103 as unpatentable over Doczy, U.S. Patent Application Publication No. 2005/0263829 to Song et al. ("Song"), Carley, and Jiang. TSMC-1002, 41-44. The Office action of June 25, 2010 again indicated that claims 1 through 11 are allowed, and repeated the reasons for allowance from the Office action of February 23, 2010. TSMC-1002, 44. Applicant filed a response on September 24, 2010 to the Office action of June 25, 2010, which response canceled claims 12 through 20. TSMC-1002, 32-34.

22. The USPTO issued a notice of allowance and notice of allowability (Notice of Allowance) on October 8, 2010, indicating that claims 1 through 11 were allowed, and again repeating the reasons for allowance from the Office action of June 25, 2010, and February 23, 2010. TSMC-1002, 20-25. The '128 application issued as the '195 patent on February 15, 2011. Claim 1, the sole independent claim of the '195 patent, reads as follows:

> Claim 1: A method for fabricating metal gate transistor, comprising:
> providing a substrate having a first transistor region and a second transistor region;
> forming a plurality of dummy gates on the substrate and within the first transistor region and the second transistor region;
> forming a source/drain region at two sides of each dummy gate;
> forming a dielectric layer to cover the dummy gates;
> removing the dummy gates to form a plurality of openings in the dielectric layer of the first transistor region and the second transistor region;
> forming a high-k dielectric layer to cover the dielectric layer and surface of each opening;
> depositing a first cap layer on the high-k dielectric layer;
> removing the first cap layer disposed in the second transistor region; and
> forming a metal layer on the first cap layer of the first transistor region and the high-k dielectric layer of the second transistor region.

TSMC-1001 ('195 patent), 6:10-30.

B. Searches Conducted for the '128 Application

23. The file history of the '128 application indicates that the examiner conducted a classification search and a keyword (automated) search using the

Examiner's Automated Search Tool ("EAST") prior to the Office action of September14, 2009, the Office action of June 25, 2010, and the Notice of Allowance of October 8, 2010.[5] TSMC-1002, 28, 30-31, 48-49, and 102-04.

1. The first search conducted for the '128 application

24. The file history of the '128 application indicates that on September 2, 2009, the examiner conducted a classification search of U.S. Patent Classification ("USPC")[6] class 438, subclasses 183, 188, 199, 270, 272, 926, FOR187, and FOR216, and of USPC class 257, subclasses 69, 204, e21.444, e21.453, e27.046, e27.108, and e21.632. TSMC-1002, 102 (Search Notes).

[5] The file history of the '128 application does **not** indicate that the examiner conducted a search prior to the Office action of February 23, 2010.

[6] The USPTO began the process of migrating from the U.S. Patent Classification (USPC) system to the Cooperative Patent Classification (CPC) system in 2013, but was assigning patent applications and conducting classification searches of patent applications using the USPC system in the 2008-2010 timeframe.

25. The following is a screen shot image of the Search Notes from the history file of the '195 patent:

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12198128	LIN ET AL.
	Examiner	Art Unit
	JOANNIE A GARCIA	2895

SEARCHED

Class	Subclass	Date	Examiner
438	183,188,199,270,272,926,FOR187,FOR216	09/02/2009	JAG
257	69,204,e21.444,e21.453,e27.046,e27.108,e21.632	09/02/2009	JAG

SEARCH NOTES

Search Notes	Date	Examiner
EAST search attached	09/02/2009	JAG

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner

26. The file history of the '128 application also indicates that the examiner conducted a keyword search in EAST of the U.S. patent ("USPAT") and U.S.

patent application publication ("PGPUB") databases ("September 2009" search queries). TSMC-1002, 103-04 (East Search History Printout).[7]

[7] The databases referenced in the East Search History Printout are as follows: (1) USPAT is a database of U.S. patents from 1971; and (2) US-PGPUB is a database of U.S. patent application publications.

27. The following is a screen shot image of the corresponding EAST Search History Printout from the file of the ’195 patent:

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	8479	("high-k" or "high k") with (layer or film)	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L2	47097	cap with (layer or film)	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L3	69453	dummy	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L4	0	1 with 2 with 3	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L5	110	1 with 2	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L6	1	3 and 5	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L7	6433718	@ad<"20080826"	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L8	1	6 and 7	US-PGPUB; USPAT	OR	ON	2009/09/03 04:57
L9	18930	"115a"	US-PGPUB; USPAT	OR	ON	2009/09/03 04:58
L10	1	8 and 9	US-PGPUB; USPAT	OR	ON	2009/09/03 04:58
L11	164034	(Al or aluminum or Cu or copper or W or tungsten) with (AlN or "aluminum nitride" or "aluminum-nitride" or Al2O3 or "aluminum oxide" or "aluminum-oxide" or "Al.sub.2O.sub.3" or "Al.sub.2O.sub.3")	US-PGPUB; USPAT	OR	ON	2009/09/03 05:06
L12	326	2 with 11	US-PGPUB; USPAT	OR	ON	2009/09/03 05:06

L13	322	7 and 12	US-PGPUB; USPAT	OR	ON	2009/09/03 05:07
L14	8233	((438/183) or (438/188) or (438/199) or (438/270) or (438/272) or (438/926) or (257/69) or (257/204) or (257/e21.444) or (257/e21.453) or (257/e27.046) or (257/e27.108) or (257/e21.632)).CCLS.	US-PGPUB; USPAT	OR	OFF	2009/09/03 05:39
L15	12	5 and 14	US-PGPUB; USPAT	OR	ON	2009/09/03 05:39
L16	0	3 and 15	US-PGPUB; USPAT	OR	ON	2009/09/03 05:39
L17	1180	3 and 14	US-PGPUB; USPAT	OR	ON	2009/09/03 05:40
L18	214	1 and 17	US-PGPUB; USPAT	OR	ON	2009/09/03 05:40
L19	30	2 and 18	US-PGPUB; USPAT	OR	ON	2009/09/03 05:40
L20	30	7 and 19	US-PGPUB; USPAT	OR	ON	2009/09/03 05:40

9/3/09 5:40:49 AM
C:\Documents and Settings\jgarcia1\My Documents\EAST\Workspaces\12198128.wsp

28. The EAST Search History Printouts for the keyword searches conducted for the '128 application indicate that the default operator was set to "OR" and that plurals was set to "ON"[8] (meaning that a search for "cap" would also search for

[8] Except for the searches on September 3, 2009 and September 30, 2010 for U.S. patent documents within subclasses for which a classification search was

"caps"), and that the examiner also used the operators "with" and "and" in the search queries (in addition to the operator "or"). The operator "and" requires that the terms be within the same document. The operator "with" requires that the terms be within the same sentence in the document.[9] The EAST Search History Printouts for each of the searches conducted for the '128 application indicates that truncation symbols or wildcards (?, $, or *)[10] were **not** used in any of the search queries.

29. The East Search History Printout in the file history of the '128 application indicate that the September 2009 search queries involved three groups

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conducted (the September 2009 L14 search query and the September 2010 L1 search query).

[9] There are additional operators available to examiners. For example, the operator "same" requires that the terms be in the same paragraph in the document, the operator "withX" requires that the terms be within "X" sentences of each other in the document, and the operator "sameX" require that the terms be within "X" paragraphs of each other in the document.

[10] Truncation symbols and wildcards allow search queries to also retrieve documents having variations of a word: *e.g.*, micro$ would retrieve documents

or sessions: (1) search queries L1 through L10; (2) search queries L11 through L13; and (3) search queries L14 through L20.

30. The first group of September 2009 search queries (L1 through L10) included variations of: (1) ("high-k" or "high k") with ("layer" or "film"); (2) "cap" with ("layer" or "film"); (3) "dummy"; and (4) "115a." The time stamp indicates that this first group of searches was conducted in a first session between 4:56 and 4:58 am on September 3, 2009. TSMC-1002, 103.

31. Stating the search logic of the September 2009 search queries in prose:

> (1) The L1 search was for U.S. patents and patent application publications ("U.S. patent documents") having "high-k" or "high k" within the same sentence as "layer" or "film." The L1 search retrieved 8,479 documents (hits).
>
> (2) The L2 search was for U.S. patent documents having "cap" within the same sentence as "layer" or "film." The L2 search retrieved 47,097 documents.
>
> (3) The L3 search was for U.S. patent documents having "dummy." The L3 search retrieved 69,453 documents.

32. The September 2009 L4 through L6 search queries are combinations of the September 2009 L1, L2 and L3 search queries:

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having "micro," "micrometer," "micromanagement." The question mark wildcard ("?") can be placed at the beginning, middle, or end of a word or word fragment.

(4) The L4 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," "cap," and "dummy" all within the same sentence. The L4 search retrieved no (0) documents.

(5) The L5 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence. The L5 search retrieved 110 documents.

(6) The L6 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence, and also "dummy" within the same document. The L6 search retrieved a single (1) document.

33. The remaining searches of the first group of September 2009 search queries are as follows:

(7) The L7 search was for U.S. patent documents having a filing date prior to August 26, 2008. The L7 search retrieved 6,433,718 documents.

(8) The L8 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence, "dummy" within the same document (L6), and also having a filing date prior to August 26, 2008. The L8 search, like the L6 search, retrieved a single document.

(9) The L9 search was for U.S. patent documents having "115a." The L9 search retrieved 18,930 documents.

(10) The L10 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence, and "dummy" and "115a" within the same document, and also having a filing date prior to August 26, 2008. The L10 search, like the L6 and L8 searches, retrieved a single (1) document.

34. The second group of September 2009 search queries (L11 through L13) were to various specific cap layer metals. The time stamp indicates that this second group of searches was conducted in a second session between 5:06 and 5:07 am on September 3, 2009. TSMC-1002, 103-04.

> (11) The L11 search was for U.S. patent documents having one of "Al," "aluminum," "Cu," "copper," "W," or "tungsten" within the same sentence as one of "AIN," "aluminum nitride," "aluminum-nitride," "Al2O3," "aluminum oxide," "aluminum-oxide," "Al.sub.2O.sub.3" (Al_2O_3), or "Al.sub.2 O.sub3" ($Al_2 O_3$). The L11 search retrieved 164,034 documents.
>
> (12) The L12 search was for U.S. patent documents having one of "Al," "aluminum," "Cu," "copper," "W," or "tungsten"; one of "AIN," "aluminum nitride," "aluminum-nitride," "Al2O3," "aluminum oxide," "aluminum-oxide," "Al.sub.2O.sub.3," or "Al.sub.2 O.sub3"; "cap"; and either "layer" or "film," all within the same sentence. The L12 search retrieved 326 documents.
>
> (13) The L13 search was for U.S. patent documents having one of "Al," "aluminum," "Cu," "copper," "W," or "tungsten"; one of "AIN," "aluminum nitride," "aluminum-nitride," "Al2O3," "aluminum oxide," "aluminum-oxide," "Al.sub.2O.sub.3," or "Al.sub.2 O.sub3"; "cap"; and either "layer" or "film," all within the same sentence (L12), and also having a filing date prior to August 26, 2008. The L13 search retrieved 322 documents.

35. The third group of September 2009 search queries (L14 through L20) included searches limited to subclasses for which a classification search was conducted. These search queries are limited classification searches: *i.e.*, a search of a patent document classification database limited by a text query or a set of text

queries or other means. *See* MPEP § 719.05(II)(A). The time stamp indicates that this group of searches was conducted in a third session between 5:39 and 5:40 am on September 3, 2009. TSMC-1002, 104.

> (14) The L14 search was for all U.S. patent documents within subclasses for which a classification search was conducted ("classification limited U.S. patent documents"). The L14 search retrieved 8,233 documents.
>
> (15) The L15 search was for classification limited U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence. The L15 search retrieved 12 documents.
>
> (16) The L16 search was for classification limited U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence, and also having "dummy." The L16 search retrieved no (0) documents.
>
> (17) The L17 search was for classification limited U.S. patent documents having "dummy." The L17 search retrieved 1,180 documents.
>
> (18) The L18 search was for classification limited U.S. patent documents having "dummy," and also having "high-k" or "high k" within the same sentence as "layer" or "film." The L17 search retrieved 214 documents.
>
> (19) The L19 search was for classification limited U.S. patent documents having "dummy," also having "high-k" or "high k" within the same sentence as "layer" or "film," and also having "cap" within the same sentence as "layer" or "film." The L19 search retrieved 30 documents.
>
> (20) The L20 search was for classification limited U.S. patent documents having "dummy," also having "high-k" or "high k" within the same sentence as "layer" or "film," also having "cap" within the

same sentence as "layer" or "film" (L19), and also having a filing date prior to August 26, 2008. The L20 search retrieved 30 documents.

2. The second search conducted for the '128 application

36. The file history of the '128 application indicates that on June 14, 2010 the examiner again conducted a classification search of USPC class 438, subclasses 183, 188, 199, 270, 272, 926, FOR187, and FOR216, and of USPC class 257, subclasses 69, 204, e21.444, e21.453, e27.046, e27.108, and e21.632. TSMC-1002, 48 (Search Notes).

37. The following is a screen shot image of these Search Notes from the file of the ’195 patent:

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12198128	LIN ET AL.
	Examiner	Art Unit
	JOANNIE A GARCIA	2895

SEARCHED			
Class	Subclass	Date	Examiner
438	183,188,199,270,272,926,FOR187,FOR216	06/14/2010	JAG
257	69,204,e21.444,e21.453,e27.046,e27.108,e21.632	06/14/2010	JAG

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search attached	06/14/2010	JAG

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

38. The Search Notes in the file history of the ’128 application also indicates that on June 14, 2010 the examiner conducted a keyword search in EAST. TSMC-1002, 48.

39. The following is a screen shot image of the corresponding EAST Search History Printout from the file of the '195 patent (TSMC-1002, 49):

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	8479	("high-k" or "high k") with (layer or film)	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L2	47097	cap with (layer or film)	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L3	69453	dummy	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L4	0	1 with 2 with 3	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L5	110	1 with 2	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L6	1	3 and 5	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L7	6433718	@ad<"20080826"	US-PGPUB; USPAT	OR	ON	2009/09/03 04:56
L8	1	6 and 7	US-PGPUB; USPAT	OR	ON	2009/09/03 04:57

9/3/09 4:57:34 AM
C:\Documents and Settings\jgarcia1\My Documents\EAST\Workspaces\12198128.wsp

40. This EAST Search History Printout in the file history of the '128 application, however, appears to be an EAST Search History Printout for the September 2009 L1 through L8 search queries. Specifically, this EAST Search History Printout bears a time stamp of 4:57 am on September 3, 2009 (TSMC-

1002, 49), which corresponds to the time stamp of September 2009 L8 search query (TSMC-1002, 103). The file history of the ’128 application does not indicate what, if any, keyword search was actually conducted in June of 2010.

3. The third search conducted for the ’128 application

41. The file history of the ’128 application indicates that on September 29, 2010 the examiner again conducted a classification search of USPC class 438, subclasses 183, 188, 199, 270, 272, 926, FOR187, and FOR216, and of USPC class 257, subclasses 69, 204, e21.444, e21.453, e27.046, e27.108, and e21.632. TSMC-1002, 28 (Search Notes).

42. The following is a screen shot image of these Search Notes from the file of the '195 patent (TSMC-1002, 28):

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12198128	LIN ET AL.
	Examiner	Art Unit
	JOANNIE A GARCIA	2895

SEARCHED			
Class	Subclass	Date	Examiner
438	183,188,199,270,272,926,FOR187,FOR216	09/29/2010	JAG
257	69,204,e21.444,e21.453,e27.046,e27.108,e21.632	09/29/2010	JAG

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search attached	09/29/2010	JAG

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
438	183,188,199,270,272,926	09/29/2010	JAG

43. The file history of the '128 application also indicates that on September 29, 2010 the examiner conducted a keyword search in EAST again of the U.S. patent and U.S. patent application publication databases ("September 2010" search queries). TSMC-1002, 30-31.

44. The following is a screen shot image of the corresponding EAST Search History Printout from the file of the ’195 patent:

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	9076	((438/183) or (438/188) or (438/199) or (438/270) or (438/272) or (438/926) or (257/69) or (257/204) or (257/e21.444) or (257/e21.453) or (257/e27.046) or (257/e27.108) or (257/e21.632)).CCLS.	US-PGPUB; USPAT	OR	OFF	2010/09/30 06:31
L2	10517	("high-k" or "high k") with (layer or film)	US-PGPUB; USPAT	OR	ON	2010/09/30 06:31
L3	52529	cap with (layer or film)	US-PGPUB; USPAT	OR	ON	2010/09/30 06:31
L4	163	L2 with L3	US-PGPUB; USPAT	OR	ON	2010/09/30 06:31
L5	23	L4 and L1	US-PGPUB; USPAT	OR	ON	2010/09/30 06:31
L6	163	L2 with L3	US-PGPUB; USPAT	OR	ON	2010/09/30 06:31
L7	6768903	@ad<"20080826"	US-PGPUB; USPAT	OR	ON	2010/09/30 06:32
L8	183076	(Al or aluminum or Cu or copper or W or tungster) with (AlN or "aluminum nitride" or "aluminum-nitride" or Al2O3 or "aluminum oxide" or "aluminum-oxide" or "Al.sub.2O.sub.3" or "Al.sub.2O.sub.3")	US-PGPUB; USPAT	OR	ON	2010/09/30 06:32
L9	365	L3 with L8	US-PGPUB; USPAT	OR	ON	2010/09/30 06:32
L10	345	L7 and L9	US-PGPUB; USPAT	OR	ON	2010/09/30 06:32

L11	78035	dummy	US-PGPUB; USPAT	OR	ON	2010/09/30 06:32
L12	2	L2 with L3 with L11	US-PGPUB; USPAT	OR	ON	2010/09/30 06:32
L13	6816	LaO or DyO or "Dy.sub.2O. sub.3" or "Dy.sub.2 O. sub.3" or "lanthanide oxide" or "lanthanide-oxide"	US-PGPUB; USPAT	OR	ON	2010/09/30 06:33
L14	327822	(barrier or adhesion) with (layer or film)	US-PGPUB; USPAT	OR	ON	2010/09/30 06:33
L15	45	L13 with L14	US-PGPUB; USPAT	OR	ON	2010/09/30 06:33
L16	6768903	@ad<"20080826"	US-PGPUB; USPAT	OR	ON	2010/09/30 06:33
L17	35	L15 and L16	US-PGPUB; USPAT	OR	ON	2010/09/30 06:33
L18	10	L15 not L17	US-PGPUB; USPAT	OR	ON	2010/09/30 06:33
L19	1	7 and 12	US-PGPUB; USPAT	OR	ON	2010/09/30 06:33

9/30/10 6:37:56 AM
C:\Documents and Settings\jgarcia1\My Documents\EAST\Workspaces\12198128.3.wsp

45. Stating the search logic of the September 2010 search queries in prose:

(1) The L1 search was for all U.S. patent documents within subclasses for which a classification search was conducted ("classification limited U.S. patent documents"). This search query corresponds to the September 2009 L14 search query. The L1 search retrieved 9,076 documents.

(2) The L2 search was for U.S. patent documents having "high-k" or "high k" within the same sentence as "layer" or "film." This search query corresponds to the September 2009 L1 search query. The L2 search retrieved 10,517 documents.

(3) The L3 search was for U.S. patent documents having "cap" within the same sentence as "layer" or "film." This search query corresponds to the September 2009 L2 search query. The L3 search retrieved 52,529 documents.

(4) The L4 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence. This search query corresponds to the September 2009 L5 search query. The L4 search retrieved 163 documents.

(5) The L5 search was for classification limited U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence. This search query corresponds to the September 2009 L15 search query. The L5 search retrieved 23 documents.

(6) The L6 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," and "cap" all within the same sentence. This search was a duplicate of the September 2010 L4 search and yielded the same results: 163 documents.

(7) The L7 search was for U.S. patent documents having a filing date prior to August 26, 2008. This search query corresponds to the September 2009 L7 search query. The L7 search retrieved 6,768,903 documents.

(8) The L8 search was for U.S. patent documents having one of "Al," "aluminum," "Cu," "copper," "W," or "tungsten" within the same sentence as one of "AIN," "aluminum nitride," "aluminum-nitride," "Al2O3," "aluminum oxide," "aluminum-oxide," "Al.sub.2O.sub.3," or "Al.sub.2 O.sub3." This search query corresponds to the September 2009 L11 search query. The L8 search retrieved 183,076 documents.

(9) The L9 search was for U.S. patent documents having one of "Al," "aluminum," "Cu," "copper," "W," or "tungsten"; one of "AIN," "aluminum nitride," "aluminum-nitride," "Al2O3," "aluminum oxide," "aluminum-oxide," "Al.sub.2O.sub.3," or

"Al.sub.2 O.sub3"; "cap"; and either "layer" or "film" all within the same sentence. This search query corresponds to the September 2009 L12 search query. The L9 search retrieved 365 documents.

(10) The L10 search was for U.S. patent documents having one of "Al," "aluminum," "Cu," "copper," "W," or "tungsten"; one of "AIN," "aluminum nitride," "aluminum-nitride," "Al2O3," "aluminum oxide," "aluminum-oxide," "Al.sub.2O.sub.3," or "Al.sub.2 O.sub3"; "cap"; and either "layer" or "film" all within the same sentence (L9), and also having a filing date prior to August 26, 2008. This search query corresponds to the September 2009 L13 search query. The L10 search retrieved 345 documents.

(11) The L11 search was for U.S. patent documents having "dummy." This search query corresponds to the September 2009 L3 search query. The L11 search retrieved 78,035 documents.

(12) The L12 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," "cap," and "dummy" all within the same sentence. This search query corresponds to the September 2009 L4 search query. The L12 search retrieved two (2) documents.

(13) The L13 search was for U.S. patent documents having the one of "LaO," "DyO," "Dy.sub.2O.sub.3" (Dy_2O_3), "Dy.sub.2 O.sub.3" ($Dy_2 O_{3)}$, "lanthanide oxide," or "lanthanide-oxide." This search query has no corresponding September 2009 search query. The L13 search retrieved 6,816 documents.

(14) The L14 search was for U.S. patent documents having "barrier" or "adhesion" within the same sentence as "layer" or "film." This search query also has no corresponding September 2009 search query. The L14 search retrieved 327,822 documents.

(15) The L15 search was for U.S. patent documents having one of "LaO," "DyO," "Dy.sub.2O.sub.3," "Dy.sub.2 O.sub.3," "lanthanide oxide," or "lanthanide-oxide"; "barrier" or "adhesion";

and also "layer" or "film" all within the same sentence. The L15 search retrieved 45 documents.

(16) The L16 search was for U.S. patent documents having a filing date prior to August 26, 2008. This search was a duplicate of the September 2010 L7 search and yielded the same results: 6,768,903 documents.

(17) The L17 search was for U.S. patent documents having one of "LaO," "DyO," "Dy.sub.2O.sub.3," "Dy.sub.2 O.sub.3," "lanthanide oxide," or "lanthanide-oxide"; "barrier" or "adhesion"; and also "layer" or "film" all within the same sentence (L15), and also having a filing date prior to August 26, 2008. The L17 search retrieved 35 documents.

(18) The L18 search was for U.S. patent documents having one of "LaO," "DyO," "Dy.sub.2O.sub.3," "Dy.sub.2 O.sub.3," "lanthanide oxide," or "lanthanide-oxide"; "barrier" or "adhesion"; and also "layer" or "film" all within the same sentence, but **not** having a filing date prior to August 26, 2008 (**not** L17). The L18 search retrieved 10 documents: the 10 documents of the 45 documents retrieved by the September 2010 L15 search **not** among the 35 documents retrieved by the L17 search.

(19) The L19 search was for U.S. patent documents having "high-k" or "high k," "layer" or "film," "cap," and "dummy" all within the same sentence (L12), and also having a filing date prior to August 26, 2008. The L19 search retrieved a single (1) document.

V. THE SEARCHES FOR THE '195 PATENT WERE DEFICIENT AND NON-COMPLIANT

A. The Keyword Search Queries Were Unduly Narrow

46. The examiner's keyword search queries were not formulated or conducted in a manner that would retrieve the most pertinent prior art for the '195 patent.

1. The keyword search queries were overly restrictive

47. The keyword search queries did not make sufficient use of synonyms or alternatives for critical search terms, and also did not make use of truncation symbols or wildcards for any of the search terms. This led to the search queries excluding prior art pertinent to the '195 patent. For example:

48. The September 2009 L1 search query requiring "layer or film" within the same sentence as "high k" or "high-k" would exclude any document that has a high-k dielectric layer, but refers to it without including the term "layer" or "film" in the same sentence (*e.g.*, such as "high-k gate dielectric"). The terms high-k gate dielectric or high-k dielectric, however, are also used in the semiconductor art to refer to such a layer. Had the examiner conducted the September 2009 L3 search with "dielectric" as an alternative to "layer" or "film" (or requiring either "high-k" or "high k" with "dielectric"), she would have retrieved the Bohr publication (TSMC-1004, 0022, 0038).[11]

[11] The Brask publication has "high-k" and "layer" in the same sentence throughout and should have been retrieved by the September 2009 L1 search query. However, the examiner is unlikely to have considered Brask, or any

49. The September 2009 L3 search query is limited to U.S. patent documents having the term "dummy" (or dummies) and excludes any document that does not use the term "dummy" for a structure that performs a dummy gate function (*i.e.*, a "dummy" gate by another name). There are other terms in the semiconductor art for this type of gate, such as "sacrificial," "placeholder," "replacement," or "temporary." Had the examiner used the term "sacrificial" as an alternative to "dummy" in the September 2009 L3 search, she would have retrieved the Bohr publication (TSMC-1004, 0024, 0029, 0051). Even the term "replacement" as an (additional) alternative to "dummy" in the September 2009 L3 search would have retrieved the Brask publication (*see, e.g.,* TSMC-1005, 0003, 0004, 0013, and 0051).

50. The September 2009 L2 search query requiring "cap" (within the same sentence as layer or film) would exclude any document that does not use the word "cap" (or caps). That is, this search query is limited to U.S. patent documents having the term "cap" and excludes any document that has such a layer, but does not use the word "cap" (or caps). There are other terms in the semiconductor art for

---

document retrieved by the September 2009 L1 search query, as this broad search query retrieved over 8,400 documents.

this type of layer, such as "protective" layer, "sealing" (or "seal$") layer, "encapsulation" layer, "barrier" layer, "passivation" layer or "diffusion" layer. Given the number of possible alternatives or synonyms for a layer (or film) that can be considered a "cap" or as "capping," the use of this term alone to gather the pertinent prior art is questionable.

51. The keyword search queries also did not make any use of truncation symbols or wildcards. The September 2009 L2 search query requiring "cap" (within the same sentence as layer or film) excludes "capping" which is used by Brask. Had the examiner used a truncation symbol ($) after cap (*e.g.*, "cap$") in the September 2009 L2 search query, she would have retrieved the Brask publication as it contains multiple instances of "capping" and "layer" within the same sentence.[12] TSMC 1005, ¶¶ 0030 and 0031.

52. The September 2009 L4-L6, L8, L10, L12-L13, and L15-L20 search queries use the September 2009 L1, L2 or L3 search queries, and thus the overly

[12] As discussed previously, the Brask publication has "high-k" and "layer" in the same sentence throughout and should have been retrieved by the September 2009 L1 search query. Thus, the use of a truncation symbol also would have retrieved the Brask publication in the September 2009 L5 search query as well.

restrictively nature of the L1, L2 and L3 search queries also impacts these additional September 2009 search queries. The September 2010 L2, L3 and L11 search queries correspond to the September 2009 L1, L2 and L3 search queries, and the September 2010 L4-L6, L9-L10, and L12 search queries use the September 2010 L2, L3 or L11 search queries. Thus, the September 2010 L2-L6 and L9-L12 search queries are also overly restrictively for the reasons discussed with respect to the September 2009 L1, L2 and L3 search queries.

53. In sum, the September 2009 L1-L6, L8, L10, L12-L13, and L15-L20 search queries, and the September 2010 L2-L6 and L9-L12 search queries, employed overly restrictive search terms, resulting in these search queries excluding prior art pertinent to the ’195 patent.

2. The keyword search queries did not follow an appropriate broad to narrow approach

54. When following a broad to narrow search strategy, the search queries need to be incrementally narrowed to avoid eliminating pertinent prior art. The initial September 2009 search queries—L1, L2, and L3—each retrieved thousands of documents. Following a broad to narrow search strategy, an initial broad search (or searches) by design retrieves a large number of documents, which are then successively narrowed until a search (or searches) results in a reasonable number

of documents for the examiner to review, without being so few as to be excluding pertinent prior art.

55. The next set of September 2009 search queries did not successively narrow these searches to a manageable number of documents. The September 2009 L4 search query narrowed the search abruptly to no U.S. patent documents by using the "with" operator, which requires that all of the search terms ("high-k" or "high k," "layer" or "film," "cap," and "dummy") appear within the **same sentence**. The September 2009 search L5 query narrowed the search incrementally to 110 U.S. patent documents, but the September 2009 search query L6 then narrowed to a search all the way to a single (1) U.S. patent document. This entire set of September 2009 search queries (L1-L6) were conducted at 4:56 am on September 3, 2009. TSMC-1002, 103.

56. The next set of September 2009 search queries did not refocus on seeking a reasonable number of documents: *e.g.*, by using more flexible operators (such as "withX," "same," or "sameX"), by employing alternatives/synonyms, or by employing wildcards (or truncation)). Rather, the remaining September 2009

search queries in this first group focused on further limiting the September 2009 L6 search query that retrieved a single U.S. patent document.[13]

3. Keyword search queries did not consider the breadth of the claims of the '195 patent

57. The September 2009 L11 search query, and September 2010 L8, L13, and L14 search queries contain only terms not found in claim 1, the sole independent claim of the '195 patent. The September 2009 L11 search query, and

[13] As discussed previously, the September 2009 L7 search query was a comprehensive search for all U.S. patent documents having a filing date before August 26, 2008. It is not clear why an examiner would use that search query to further limit a search query that retrieved a single U.S. patent document (September 2009 L6 search query), as the filing date of that single U.S. patent document (Doczy) would have been readily apparent from just looking at the single document retrieved by the September 2009 L6 search query. The two succeeding searches—September 2009 L9 and L10 search queries—do not appear to be a search for "115a" as such (September 2009 L9 search query), but an attempt to find (highlight) the reference numeral "115a" in the single document (Doczy) retrieved in the September 2009 L6 and L8 search queries.

September 2010 L8 and L13 search queries appear to be directed to finding documents containing features of dependent claims.[14]

58. Search queries directed to the features of the dependent claims are expected and appropriate. Such search queries, however, are by their nature not search queries directed to the full scope or breadth of the claims. The search queries directed to the features of the dependent claims, namely the September 2009 L11-L13 search queries, and September 2010 L8-L10, L13, L15, and L17-L18 search queries,[15] are not queries directed to the full scope of the claims of the '195 patent (*i.e.*, directed solely to claim limitations that appear in independent

[14] The September 2010 L14 search query requires patent documents containing "barrier or "adhesion" (in the same sentence as "layer" or "film"). This search query retrieved over three hundred thousand documents. Neither the claims nor the written description (specification) of the '195 patent contains either the term "barrier or the term "adhesion."

[15] The September 2009 L12 and L13 search queries, and September 2010 L9, L10, L15, L17, and L18 search queries which use the September 2009 L11 search query, and September 2010 L8, L13, and L14 search queries, and thus are likewise directed only to features of the dependent claims.

claim 1). Therefore, these search queries cannot **not** make up for deficiencies that exist in search queries that appear to have been directed to the full scope of the claims.

4. The duration of the search query sessions renders them unlikely to have retrieved the most pertinent prior art

59. The September 2009 search queries were conducted in three sessions, each spanning two to three minutes. The September 2010 L14 search queries were conducted in a single session spanning two to three minutes. A well pre-planned search may be capable of completion relatively quickly. The search queries for the '195 patent, however, are more iterative in nature. There is nothing intrinsically wrong with an efficient well pre-planned search being completed promptly, nor is there is anything intrinsically wrong with a more iterative (trial and error) or dynamic approach to the search. That being said, search sessions conducted through an iterative approach being completed in two to three minutes are unlikely to retrieve the most pertinent prior art.

B. The Keyword Searching Was Limited to U.S. Patent Documents

60. As discussed previously, the MPEP instructs examiners that three reference sources must be considered—domestic patents (including patent application publications), foreign patent documents, and nonpatent literature, and that none of these sources can be eliminated from the search unless the examiner

has and can justify a reasonable certainty that no references, more pertinent than those already identified, are likely to be found in the eliminated source. There was no reason for the examiner to eliminate foreign patent documents and nonpatent literature from the keyword searches.[16]

61. The USPC includes subclasses that have been harmonized with subclasses from the European Patent Office (EPO) and the Japan Patent Office (JPO), and these subclasses were (in the 2009-2010 timeframe) regularly populated with documents from the EPO and JPO databases. *See* MPEP § 903.06. The examiner appreciated that at least foreign patent documents could be relevant by including in the classification search of the '195 patent these foreign patent document collections in class 438 (*i.e.*, class 438, subclass FOR187 and FOR 216), and the patent documents in "E" subclasses of class 257 (the searched "E" subclasses of class 257 contain patent documents as classified by the EPO). Thus, the examiner did not follow the MPEP instructions to also search foreign patent

[16] The following databases were also available to patent examiners through EAST (or WEST) in the 2009-2010 timeframe: (1) European Patent Office (EPO) Abstracts; (2) Japan Patent Office (JPO) Abstracts; (3) the Derwent World Patent Index; and (4) IBM Technical Disclosure Bulletins.

documents (and nonpatent literature) in this situation, a situation in which the examiner did not and could not justify to a reasonable certainty that no references, more pertinent than those already identified, are likely to be found in the foreign patent documents and nonpatent literature. *See* MPEP § 904.02.

C. The Examiner Did NOT Provide Complete Search History Information For the '195 Patent

62. As discussed previously, the EAST Search History Printout in the file history of the '195 patent (TSMC-1002, 49) appears to be an EAST Search History Printout for the L1 through L8 of the September 2009 search queries. The file history of the '195 patent does **not** contain an EAST Search History Printout for a keyword search conducted in June of 2010. The file history of the '195 patent, however, indicates that an EAST search was conducted on June 14, 2010. TSMC-1002, 48. Thus, the examiner either did not conduct a keyword search in June of 2010—contrary to the indication in the Search Notes in the file history of the '128 application that the examiner conducted a keyword search in EAST on June 14, 2010 (TSMC-1002, 48), or did not follow the MPEP instructions to include a complete search history in the form of a printout placed in the application file for the EAST search conducted in June of 2010. *See* MPEP § 719.05.

VI. SEARCH DEFICIENCIES RESULTED IN THE FAILURE TO UNCOVER PERTINENT PRIOR ART FOR THE '195 PATENT

63. The searches that were conducted for the '195 patent failed to uncovered the Bohr publication as well as the Brask publication. The IPR petition indicates that the Bohr publication and the Brask publication are each prior art to the '195 patent and should have been used to reject claims 1 through 11 during examination of the application for the '195 patent. The failure to uncover these U.S. patent documents during examination of the application for the '195 patent is the result of deficiencies in the searches for the '195 patent.

64. As previously discussed, the keyword search queries would have retrieved the Bohr publication had the examiner taken the time to consider what reasonable alternatives or synonyms there are for the search terms "cap," "dummy," and "high-k" "layer" in the semiconductor art, and/or what additional operators could be employed to retrieve a suitable number of documents for review. Also, the keyword search queries would have retrieved the Brask publication had the examiner taken the time to consider what reasonable alternatives or synonyms (or truncations) there are for the search terms "cap" and "dummy" in the semiconductor art, and/or what additional operators could be employed to retrieve a suitable number of documents for review. Examiners are instructed and trained to consider what alternatives or synonyms, or possible

truncations, there are for search terms, and on the process of narrowing a broad search down to a suitable number of documents for review.

65. In addition to the deficiencies in the keyword searches, the Bohr publication and the Brask publication were misclassified. This resulted in the Bohr publication and the Brask publication not being considered during the examiner's classification search.

66. Accordingly, the examiner not considering the Bohr publication and the Brask publication during the examination of the '195 patent is the result of the above-mentioned deficiencies in the keyword search and the misclassification of both the Bohr publication and the Brask publication.[17]

[17] The Bohr and Brask publications are U.S. patent documents. Thus, the examiner's failure to consider foreign patent document and NPL databases during the keyword search did not result in the examiner not considering the Bohr and Brask publications during the examination of the application leading to '195 patent. In addition, while a keyword search was either not conducted or not properly made of record in the file history of the '195 patent in June of 2010, its impact on the examiner not considering the Bohr and Brask publications during the examination of the '195 patent is unknowable. Nevertheless, these search

VII. CONCLUSION

67. The keyword searches for the ’195 patent involved a series of overly restrictive search queries hastily conducted in a manner that would not retrieve the prior art most pertinent to the full scope of the claims. For the previously discussed reasons, keyword searches for the ’195 patent properly conducted would have retrieved the Bohr publication and the Brask publication. Moreover, both the Bohr publication and the Brask publication were each misclassified, ensuring that these publications would not be considered during the examiner’s classification search. The failure to consider the Bohr publication and the Brask publication during the examination of the ’195 patent is the result of these deficiencies in the keyword search and the misclassification of both the Bohr publication and the Brask publication

68. I hereby declare that all the statements made herein of my own knowledge are true and are the whole truth, and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made

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deficiencies indicate a pattern of noncompliant search and recordation practices during the examination of the application leading to the ’195 patent.

are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the results of this proceeding.

69. I declare under penalty of perjury that the foregoing is true and correct.

Respectfully submitted,

May 26, 2026 Robert W. Bahr

APPENDIX A
ROBERT W. BAHR CV

Robert W. Bahr
Partner

Maier & Maier
345 S. Patrick Street
Alexandria, VA 22314

Current Position: Partner, Maier & Maier. Specializes in all areas of patent practice, including includes post-issuance proceedings at the United States Patent Office (USPTO), advising attorneys and our clients on complex patent prosecution matters, patent litigation strategy, and USPTO patent policy, practice and procedure.

Prior USPTO Experience: I began my career at the U.S. Patent and Trademark Office (PTO) in 1984. The greater part of my career at the PTO was spent in the patent examination policy area, first beginning in 1994 as a Legal Advisor in the Office of Patent Legal Administration (OPLA), then as the Senior Patent Counsel to the Deputy Commissioner for Patent Examination Policy beginning in November 2000, and ultimately as Deputy Commissioner for Patent Examination Policy beginning in 2016.

March 2016 – August 2023: Deputy Commissioner for Patent Examination Policy (title change to Deputy Commissioner for Patents in October 2020)

As the Deputy Commissioner for Patent Examination Policy, I —

- Oversaw day-to-day operation of the Office of Patent Legal Administration (OPLA), the Office of Petitions, the Office of Patent Quality Assurance (OPQA), the Central Reexamination Unit (CRU), and the Manual of Patent Examining Procedure (MPEP) staff.

- Led the development/implementation of the—
    - 2019 Revised Patent Subject Matter Eligibility Guidance and the Deferred Subject Matter Eligibility Response (DSMER) program
    - 2019 guidance for Examining Computer-Implemented Functional Limitations for Compliance with 35 U.S.C. 112,
    - Patent examination aspects of the CARES (Coronavirus Aid, Relief, and Economic Security) Act,
    - Federal Circuit patent term adjustment decision in *Supernus v. Iancu*,
    - Revision of the sequence listing rules to implement WIPO Standard ST.26,
    - 2016 proposed rule to harmonize the PTO duty of disclosure standard with the Federal Circuit inequitable conduct standard adopted in *Therasense, Inc. v. Becton, Dickinson & Co*., and
    - January 2018, June 2020, and February 2023 revisions of the MPEP.

- Issued memoranda on changes in patent law and procedure to the Patent Examining Corps.
- Gave numerous presentations on specialized subjects in patent law and procedure to patent examiners, the patent bar, and members of the public ranging from leading members of the patent bar to inexperienced inventors.

November 2009 – December 2011 and August 2015 – March 2016: Acting Deputy Commissioner for Patent Examination Policy

As the Acting Deputy Commissioner for Patent Examination Policy, I —

- Oversaw day-to-day operation of the organizations under the Deputy Commissioner for Patent Examination Policy.

- Led the development/implementation of the—
    - Federal Circuit patent term adjustment decision in *Wyeth v. Kappos,*
    - Supreme Court subject matter eligibility decision in *Bilski v. Kappos*,
    - 2011 examination guidelines for determining compliance with 35 U.S.C. 112,
    - 2011 proposed rule to harmonize the PTO duty of disclosure standard with the Federal Circuit inequitable conduct standard adopted in *Therasense, Inc. v. Becton, Dickinson & Co*.,
    - 2010 update to the 35 U.S.C. 103 examination guidelines to incorporate post-*KSR* case law developments, and
    - July 2010 revision of the MPEP.

- Issued memoranda on changes in patent law and procedure to the Patent Examining Corps.
- Gave presentations on specialized subjects in patent law and procedure to patent examiners, the patent bar, and members of the public.

November 2000 – November 2009 and January 2012 – August 2015: Senior Patent Counsel, Office of the Deputy Commissioner for Patent Examination Policy

As the Senior Patent Counsel to the Deputy Commissioner for Patent Examination Policy, I—

- Managed patent-related rulemakings and advised the Deputy Commissioner for Patent Examination Policy and Commissioner for Patents on patent-related procedure or policy decisions.
- Led the rulemaking effort to implement the patent examination provisions of the Leahy-Smith America Invents Act (AIA), Patent Law Treaties Implementation Act (PLTIA), the Cooperative Research and Technology Enhancement Act of 2004 (CREATE Act), and the Federal Circuit patent term adjustment decision in *Novartis v. Lee*.
- Developed and formulated new examining practices and procedures, and revised existing practices and procedures, prepared and reviewed official notices and memoranda to the Patent Corps as to PTO policy.

- Identified issues on which there is a need for a statement of policy, handled inquiries from the public requesting assistance in properly interpreting PTO practices, and reviewed decisions on petitions relating to matters before the Deputy Commissioner for Patent Examination Policy or Commissioner for Patents which require treatment of unusual issues involving patent policy and procedure.
- Represented the PTO in dealings with attorneys, industry representatives, and patent law associations in various matters, especially those concerning PTO practice and procedure.
- Acted as the Commissioner for Patents liaison with other organizations within the PTO on matters of patent law, regulations, procedures, and practices, and with members of the Patent Public Advisory Committee (PPAC), and foreign dignitaries during Trilateral meetings and other meetings with officials from foreign patent offices, such as the European Patent Office, the Korean Patent Office, and the Japan Patent Office.

July 2000 – November 2000: Administrative Patent Judge

In 2000, I was appointed as an administrative patent judge on the Board of Patent Appeals and Interferences (now Patent Trial and Appeal Board), but was detailed to the Commissioner for Patents until November 2000 to complete the rulemakings to implement the continued examination (RCE), patent term adjustment, and eighteen-month publication provisions of the American Inventors Protection Act of 1999 (AIPA).

April 1994 – July 2000: Legal Advisor, Office of Patent Legal Administration

As a Legal Advisor in the OPLA, I—

- Recommended and implemented revisions to the PTO's procedures concerning application filing dates and the revival of abandoned applications, including drafting proposed and final rules, other Federal Register notices, and MPEP provisions.
- Led the rulemaking effort to implement the continued examination, patent term adjustment, and eighteen-month publication provisions of the American Inventors Protection Act of 1999.
- Drafted rulemaking notices and documents pertaining to patent law and procedure for publication in the Federal Register or Official Gazette.
- Drafted decisions on petitions delegated to the Deputy Commissioner for Patent Examination Policy.
- Prepared and delivered training on specialized subjects in patent law and procedure to patent examiners and the PTO's technical support staff.
- Responded to inquiries concerning patent law and procedure and PTO policies through letters, phone calls, lectures, presentations, and other contacts with members of the public and the patent bar.

September 1984 – April 1994: Patent Examiner

I was an examiner in Examining Group 330 (now Technology Center 3700). I became a primary examiner in May 1990, and my primary docket was exercise and physical therapy equipment.

Awards:

- Department of Commerce Gold Medal in 2014 for implementation of the AIA.
- Department of Commerce Gold Medal in 2015 for implementation of the Federal Circuit decision in *Novartis*.
- Department of Commerce Bronze Medals in 1990 and 1997 for sustained superior performance.
- USPTO Award for Distinguished Achievement in 2001 for implementation of the AIPA.

Education:
Juris Doctor: George Washington University (May 1993).

Bachelor of Science in Mechanical Engineering: University of Maryland, College Park (December 1983).

Bar memberships:
Virginia bar (also admitted to the Supreme Court, Federal Circuit, and Fourth Circuit).

Registered to practice before the USPTO.

USPTO Memoranda (https://www.uspto.gov/patents/laws/examination-policy/memoranda-examining-corps):

Changes to Restriction Form Paragraphs (1-2010)

Revised Procedure for Appeal Brief Review (3-2010)

Revised Procedure for Appeal Brief Review of Ex Parte Reexamination Proceedings (5-2010)

Supreme Court Decision in Bilski v. Kappos (6-2010)

Interim Guidance for Determining Subject Matter Eligibility for Process Claims in View of Bikski v. Kappos (7-2010)

Streamlined Procedure for Appeal Brief Review and Examiner's Answers in Inter Partes Reexamination Proceedings (8-2010)

Supplementary Examination Guidelines for Determining Compliance with 35 U.S.C. § 112 and for Treatment of Related Issues in Patent Applications (2-2011)

Analogous Art for Obviousness Rejections (7-2011)

Requirement for a Disclosure of the Best Mode (9-2011)

Claims Directed to or Encompassing a Human Organism (9-2011)

Tax Strategies Are Deemed To Be Within the Prior Art (9-2011)

Recent Subject Matter Eligibility Decisions (Enfish, LLC v. Microsoft Corp. and TLI Communications LLC v. A.V. Automotive, LLC) (5-2016)

Recent Subject Matter Eligibility Rulings (Rapid Litigation Management v. CellzDirect and Sequenom v. Ariosa) (7-2016)

Recent Subject Matter Eligibility Decisions (11-2016)

Clarification of Written Description Guidance For Claims Drawn to Antibodies and Status of 2008 Training Materials (2-2018)

Recent Subject Matter Eligibility Decisions (4-2018)

Critical reference date under pre-AIA 35 U.S.C. § 102(e) of a U.S. patent or U.S. published application claiming benefit of a prior U.S. provisional application during examination of an application (4-2018)

Changes in Examination Procedure Pertaining to Subject Matter Eligibility, Recent Subject Matter Eligibility Decision (Berkheimer v. HP, Inc.) (4-2018)

Recent Subject Matter Eligibility Decision: Vanda Pharmaceuticals Inc. v. West-Ward Pharmaceuticals (7-2018)

Recent U.S. Supreme Court Decision (Helsinn Healthcare S. A. v. Teva Pharmaceuticals USA, Inc.) Concerning the Phrase "On Sale" in AIA 35 U.S.C. § 102(a)(1) (2-2019)

Amgen Inc. v. Sanofi (5-2023)

Publications:

Double Patenting, Recent Developments, and Practical Considerations, Japan Intellectual Property Association, Intellectual Property Management, Vol.75 No.8 pp.979-991 (8-2025).

The AIA Grace Period : Not Your Parents's Grace Period (9-2024) https://maierandmaier.com/the-aia-grace-period-not-your-parents-grace-period/

New Proposal Requirements for Terminal Disclaimers Filed to Overcome Non-Statutory double Patenting (5-2024) https://maierandmaier.com/new-proposal-requirements-for-terminal-disclaimers-filed-to-overcome-non-statutory-double-patenting/

Federal Circuit rulings about patent term adjustment that patent prosecutors must know (3-2024) https://www.iam-media.com/article/federal-circuit-rulings-about-patent-term-adjustment-patent-prosecutors-must-know

A Perspective on USPTO Rulemaking Following In re Chestek (2-2024) https://ipwatchdog.com/2024/02/27/perspective-uspto-rulemaking-following-re-chestek/id=173735/

Expert Witness Engagements:

United States ex rel. Silbersher v. Janssen Biotech, Inc., Civil Action No. 19-12107-MEF-CLW (D.N.J.) (expert report, deposition).

FaceTec, Inc. v. Jumio Corp., Case No. 5:24-cv-3623-RFL (N.D. Cal.) (declaration).

OssiFi-Mab LLC v. Amgen, Inc., Civil Action No. 1:23-cv-10861-DJC (D. Mass.) (expert report, deposition).

Zest Labs, Inc. et al. v. Walmart Inc., Civil Action No. 4:18-cv-500-JM (E.D. Ark.) (expert report, deposition, testimony).

CareFirst of Maryland, Inc., et al. v. Johnson and Johnson, et al., Case No. 2:23-cv-00629-JKW-LRL (E.D. Va) (expert report, deposition).

In re Bhattacharyya, Patent Cooperation Treaty Application No. PCT/US2016/032408 (USPTO) (declaration).

Allergan, Inc. et al v. *Amneal Pharmaceuticals of New York, LLC et al.,* Civil Action No. 2:23-cv-06208-NJC-ST (E.D.N.Y.) (expert report, deposition).

Impulse Downhole Solutions, LTP., et al. v. Downhole Well Solutions, LLC, Civil Action No. 4:23-cv-02954 (S.D. Tex.) (expert report, deposition).

SK Microworks America, Inc. v. Far Eastern New Century Corporation and Multi-Plastics, Inc., Case No.: 2:23-cv-10322-JAK-ADS (C.D. Cal.) (expert report, deposition).

Softex LLC v. Absolute Software Corporation and Absolute Software Inc., Case No. 2:22-cv-01308-DAE (W.D. Tex.) (expert report, deposition).

Taiwan Semiconductor Manufacturing Company, LTD. v. Marlin Semiconductor LTD., *Inter Partes* Review No. IPR2025-01082 (USPTO) (declaration).

Medtronic Inc. v. Moskowitz Family LLC., *Inter Partes* Review No. IPR2025-01598 (USPTO) (declaration).