

Receipt date: 11/30/2017

15/335,180 - GAU: 2893

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)

Approved for use through 07/31/2016. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15335180
	Filing Date	2016-10-26
	First Named Inventor	Igor Polishchuk
	Art Unit	2893
	Examiner Name	YUSHIN, NIKOLAY K
	Attorney Docket Number	PM07027D1CIP1C3

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.						T ⁵

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	Attorney Docket Number	PM07027D1CIP1C3	

/N.K.Y/	1	SIPO Office Action for Application Number 20120000107.5 (PM07002CIP1CN) dated 09/20/2017; 6 pages
/N.K.Y/	2	SIPO Office Action for Application Number 201380031840.8 (PM07027D1CIP1CN) dated 09/25/2017; 6 pages
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Examiner Signature	/NIKOLAY K YUSHIN/	Date Considered 12/18/2017
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.		
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.		

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

- ☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

- ☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

- ☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Christopher Jordan/	Date (YYYY-MM-DD)	2017-11-28
Name/Print	Christopher Jordan	Registration Number	65809

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
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/N.K.Y/	1	20090065849	A1	2009-03-12	Noda	Entire Document		
/N.K.Y/	2	20100270609	A1	2010-10-28	Olsen et al.	Entire Document		
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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
/N.K.Y/	1	USPTO Non-Final Rejection for Application Number 15/099,025 (PM07002C2) dated 10/06/2017; 11 pages	
/N.K.Y/	2	USPTO Non-Final Rejection for Application Number 15/189,668 (PM07002CIP2C1) dated 09/22/2017; 11 pages	
/N.K.Y/	3	USPTO Notice of Allowance for Application Number 14/605,231 (PM07024CIP1C1) dated 10/18/2017; 8 pages	

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Examiner Signature	/NIKOLAY K YUSHIN/	Date Considered	12/18/2017
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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86	6917072	B1	2005-07-12	Noguchi et al.	
87	6946349	B1	2005-09-20	Lee et al.	Entire Document
88	6958511	B1	2005-10-25	Halliyal et al.	Entire Document
89	7012299	B1	2006-03-14	Mahajani et al.	
90	7015100	B1	2006-03-21	Lee et al.	Entire Document
91	7018868	B1	2006-03-28	Yang et al.	Entire Document
92	7033890	B2	2006-04-25	Shone	Entire Document
93	7033957	B1	2006-04-25	Shiraiwa et al.	Entire Document
94	7042054	B1	2006-05-09	Ramkumar et al.	Entire Document
95	7045424	B2	2006-05-16	Kim et al.	Entire Document
Change(s) applied to document, /D.D./ 10/17/2017	96	7084032	B1	08-2006 ~~2010-12-07~~	Crivelli et al.

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

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REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL **(Submitted Only via EFS-Web)**

Application Number	15/335,180	Filing Date	2016-10-26	Docket Number (if applicable)	PM07027D1CIP1C3	Art Unit	2893
First Named Inventor	Igor Polishchuk			Examiner Name	YUSHIN, NIKOLAY K		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
 (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503781

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

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Signature of Registered U.S. Patent Practitioner			
Signature	/StoychoDDraganoff#56181/	Date (YYYY-MM-DD)	2018-01-02
Name	Stoycho D. Draganoff	Registration Number	56181

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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	1	5179038	A	1993-01-12	Kinney et al.	Entire Document		
	2	6573149	B2	2003-06-03	Kizilyalli et al.	Entire Document		
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15335180
	Filing Date		2016-10-26
	First Named Inventor	Igor Polishchuk	
	Art Unit	2893	
	Examiner Name	YUSHIN, NIKOLAY K	
	Attorney Docket Number	PM07027D1CIP1C3	

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	USPTO Final Rejection for Application Number 15/376,282 (PM07027D1C4) dated 12/19/2017; 19 pages	

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EXAMINER SIGNATURE	
Examiner Signature	Date Considered

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/StoychoDDraganoff#56181/	Date (YYYY-MM-DD)	2018-01-02
Name/Print	Stoycho D. Draganoff	Registration Number	56181

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PILOT PROGRAM	
Non-Provisional Application Number: 15/335,180	Filing Date: 10/26/2016
First Named Inventor: Igor Polishchuk	Title of Invention: MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION
THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION. 1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee. 2. Check the box next to the appropriate selection: ☐ Each item of information contained in the IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(1). OR ☒ No item of information contained in the IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2). OR ☐ See attached certification statement in compliance with 37 CFR 1.97(e). 3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. <u>503781</u>. 4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a Web-based ePetition. WARNING: Do <u>not</u> submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE. 5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith. 6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned. 7. This certification and request is being filed as a Web-based ePetition and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.	
Signature <u>/StoychoDDraganoff#56181/</u>	Date 01/02/2018
Name (Print/Typed) Stoycho D. Draganoff	Practitioner Registration Number 56181 (If applicable)
Note: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.*	
☒ *Total of <u>1</u> forms are submitted.	

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/376,282	12/12/2016	Igor Polishchuk	PM07027D1C4	6123
60909 7590 12/19/2017 CYPRESS SEMICONDUCTOR CORPORATION 198 CHAMPION COURT SAN JOSE, CA 95134-1709			EXAMINER YUSHIN, NIKOLAY K	
			ART UNIT 2893	PAPER NUMBER
			NOTIFICATION DATE 12/19/2017	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@cypress.com

Office Action Summary	Application No. 15/376,282	Applicant(s) POLISHCHUK ET AL.	
	Examiner NIKOLAY YUSHIN	Art Unit 2893	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/12/2016.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-5,7-14 and 17-20 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-5,7-14 and 17-20 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date 11/01/2017.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 4) ☐ Other: ____.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Status of Claims

Applicant's cancellation of claims 6 and 15 in the reply filed on 10/11/2017 is acknowledged.

Applicant's amendment of claims 1, 10, 16, and 19 in the reply filed on 10/11/2017 is acknowledged.

Claims 1-5, 7-14, and 17-20 are under consideration in this Office Action.

Claim Rejections - 35 USC § 103

In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if 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. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1- 3, 5- 9, 19, and 20 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Nachumovsky, US 6,174,758 (listed in a previous Office Action), in view of Rathor et al., US 6,818,558 (listed in a previous Office Action)

In re Claim 1, Nachumovsky discloses a semiconductor device 100 (Fig. 1) comprising: a non-volatile memory transistor 140; a logic transistor (120, 130) comprising: a second gate electrode (126, 136), and an oxide (125, 135) disposed between the second gate electrode (126, 136) and the substrate 110; and an isolation structure 150 disposed between the non-volatile memory transistor 140 and the logic transistor (120, 130), wherein the first gate electrode 160 and the second (126, 136) gate electrodes (being made by doped polysilicon (column 3, lines 63-66; column 4, lines 7-10 and 28 -33) are inherently high work function gate electrodes (Fig. 1; column 3, line 34 –column 4, line 45). It is inherently because according to MPEP2112.01

WHEN THE STRUCTURE RECITED IN THE REFERENCE IS SUBSTANTIALLY IDENTICAL TO THAT OF THE CLAIMS, CLAIMED PROPERTIES OR FUNCTIONS ARE PRESUMED TO BE INHERENT. In the instant case the first and second electrode being doped polysilicon as the claimed one inherently possesses the claimed property - high work function. Moreover, Kinney, US 5,179,038 explicitly lectures that the doped polysilicon has a high work function (Abstract). Let's note that Kinney's reference is presented her only as an evidence of inherency (See MPEP2131.01.I).

Nachumovsky does not specify that the non-volatile memory transistor 140 comprising: a charge trapping layer, a tunnel dielectric disposed between the charge trapping layer and a substrate, and a blocking oxide disposed between the charge trapping layer and a first gate electrode.

The only difference between the Applicants' claim 1 and Nachumovsky's reference is in the specified structure of the non-volatile memory transistor.

Rathor teaches a non-volatile memory transistor (812, 816, 818, 820, 828, 830, 836) (Fig. 8H) comprising: a charge trapping layer (816, 818, 820), a tunnel dielectric 814 disposed between the charge trapping layer (816, 818, 820) and a substrate 812 and a blocking oxide 824 disposed between the charge trapping layer (816, 818, 820) and a first gate electrode 828 (Figs. 7 and 8; column 11, line 8 - column 14, line 47).

It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute Nachumovsky's non-volatile memory transistor with Rathor's non-volatile memory transistor, to have lower programming voltages than other conventional nonvolatile devices, such as some types of floating gate devices as taught by Rathor (column 1, lines 49-56).

In re Claim 2, Nachumovsky taken with Rathor discloses the semiconductor device of claim 1, wherein the charge trapping layer (816, 818, 820) (Rathor: Fig. 8H; column 11, line 8 - column 14, line 47) comprises: a charge-trapping oxynitride layer 818; and a substantially trap-free oxynitride layer 816 disposed between the charge-trapping oxynitride layer 818 and the tunnel dielectric 814.

In re Claim 3, Nachumovsky taken with Rathor discloses all limitations of claim 3, including that the charge-trapping oxynitride layer 818 has a first thickness (Rathor: column 12,

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lines 57-59) and the substantially trap-free oxynitride layer 816 has a second thickness (Rathor: column 12, lines 57-59), except for that a ratio of the first thickness and the second thickness is approximately 4:1.

It is known in the art that the thickness is a result effective variable – because mass depends on it. Due to high level of knowledge and skills of personal capable to operate very sophisticated and expensive equipment in semiconductor technology, it would have been an obvious matter of design choice of one of ordinary skill in the semiconductor art to use the specified ratio of the thicknesses, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (MPEP2144.04).

In re Claim 5, Nachumovsky taken with Rathor discloses the semiconductor device of claim 1, further comprising: first sidewall spacers 836 (Rathor: Fig. 8H) formed adjacent to the non-volatile memory transistor (812, 816, 818, 820, 828, 830, 836) (Fig. 8H); and second sidewall spacers (129, 139) (Nachumovsky: Fig. 1) formed adjacent to the logic transistor (120, 130).

In re Claim 7, Nachumovsky taken with Rathor discloses the semiconductor device of claim 1, wherein the non-volatile memory transistor 140 is an N-type transistor and wherein the logic transistor (120, 130) is a P-type transistor (Nachumovsky: Fig. 1; column 3, line 46 – column 4, line 20).

In re Claim 8, Nachumovsky taken with Rathor discloses the semiconductor device of claim 1, wherein the first 828 (Rathor: Fig. 8H; column 13, lines 60-66) and second gate (126, 136) (Nachumovsky: Fig. 1; column 3, lines 63-66; column 4, lines 7-10) electrodes are formed

from a doped polysilicon with doped concentration such that the minimum energy to remove an electron from the first and second gate electrodes is inherently from approximately 4.8-5.3 electron volts (eV). It is inherently because according to MPEP2112.01 WHEN THE STRUCTURE RECITED IN THE REFERENCE IS SUBSTANTIALLY IDENTICAL TO THAT OF THE CLAIMS, CLAIMED PROPERTIES OR FUNCTIONS ARE PRESUMED TO BE INHERENT. In the instant case the first and second electrodes being doped polysilicon as the claimed one inherently possesses the claimed function - high work function.

In re Claim 9, Nachumovsky taken with Rathor discloses the semiconductor device of claim 1, wherein the isolation structure 150 (Nachumovsky: Fig. 1) is one of a local oxidation silicon (LOCOS) region or structure, a **field oxidation** (FOX) region or structure, or a shallow trench isolation (STI) structure.

In re Claim 19, Nachumovsky discloses a memory device comprising: a non-volatile memory transistor 140 a first gate electrode 160; a logic transistor (120, 130) comprising: a second gate electrode (126, 136), and an oxide (125, 135) disposed between the second gate electrode (126, 136) and the substrate 110; and an isolation structure 150 disposed between the non-volatile memory transistor 140 and the logic transistor (120, 130), wherein the first gate electrode 160 and the second gate (126, 136) electrodes (being made by doped polysilicon (column 3, lines 63-66; column 4, lines 7-10 and 28-33) are inherently high work function gate electrodes (Fig. 1; column 3, line 34 –column 4, line 45). It is inherently because according to MPEP2112.01 WHEN THE STRUCTURE RECITED IN THE REFERENCE IS SUBSTANTIALLY IDENTICAL TO THAT OF THE CLAIMS, CLAIMED PROPERTIES OR FUNCTIONS ARE PRESUMED TO BE INHERENT. In the instant case the first and second

Art Unit: 2893

electrode being doped polysilicon as the claimed one inherently possesses the claimed property - high work function. Moreover, Kinney, US 5,179,038 explicitly teaches that the doped polysilicon has a high work function (Abstract), let's not that Kinney's reference is presented here only as an evidence of inherency (See MPEP2131.01.I).

Nachumovsky does not specify that the non-volatile memory transistor 140 comprising: a charge trapping layer, a tunnel dielectric disposed between the charge trapping layer and a substrate, and a blocking oxide disposed between the charge trapping layer and a first gate electrode.

The only difference between the Applicants' claim 1 and Nachumovsky's reference is in the specified structure of the non-volatile memory transistor.

Rathor teaches a non-volatile memory transistor (812, 816, 818, 820, 828, 830, 836) (Fig. 8H) comprising: a charge trapping layer (816, 818, 820), a tunnel dielectric 814 disposed between the charge trapping layer (816, 818, 820) and a substrate 812 and a blocking oxide 824 disposed between the charge trapping layer (816, 818, 820) and a first gate electrode 828 (Figs. 7 and 8; column 11, line 8 - column 14, line 47).

It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute Nachumovsky's non-volatile memory transistor with Rathor's non-volatile memory transistor, to have lower programming voltages than other conventional nonvolatile devices, such as some types of floating gate devices as taught by Rathor (column 1, lines 49-56).

In re Claim 20, Nachumovsky taken with Rathor discloses the memory device of claim 19, wherein the charge trapping layer (816, 818, 820) (Rathor: Fig. 8H; column 11, line 8 - column 14, line 47) comprises: a charge-trapping oxynitride layer 818; and a substantially trap-

free oxynitride layer 816 disposed between the charge-trapping oxynitride layer 818 and the tunnel dielectric 814.

Claims 10 – 13, 17 and 18 are rejected under pre-AIA 35 U.S.C. 102(b) as being unpatentable over Rathor, in view of Nachumovsky.

In re Claim 10, Rathor discloses a memory transistor (Figs. 7 and 8) comprising: a dielectric stack (814, 816, 818, 820, 824) comprising, a first oxide layer 814 formed on a substrate 812, a first nitride layer 816 formed on the first oxide layer 814, a second nitride layer 818 formed on the first nitride layer 816, and a second oxide layer 824 formed the second nitride layer 816; and a gate electrode 828 formed on the second oxide layer 824 of the dielectric stack (814, 816, 818, 820, 824) (Figs. 7 and 8; column 11, line 8 - column 14, line 47).

Rathor does not explicitly disclose that the gate electrode 828 (made of polysilicon) is a high work function gate electrode.

Nachumovsky teaches a translator wherein the gate electrode (126, 136, 162) (made of doped polysilicon) (column 3, lines 49 -51 and 63-66; column 4, lines 7-10 and 31-33) that is inherently a high work function gate electrode. It is inherently because according to MPEP2112.01 WHEN THE STRUCTURE RECITED IN THE REFERENCE IS SUBSTANTIALLY IDENTICAL TO THAT OF THE CLAIMS, CLAIMED PROPERTIES OR FUNCTIONS ARE PRESUMED TO BE INHERENT. In the instant case the first and second electrode being doped polysilicon as the claimed one inherently possesses the claimed property - high work function. Moreover, Kinney, US 5,179,038 explicitly teaches that the doped

polysilicon has a high work function (Abstract), let's not that Kinney's reference is presented her only as an evidence of inherency (See MPEP2131.01.I).

Due to high level of knowledge and skills of personal capable to operate very sophisticated and expensive equipment in semiconductor technology, it would have been an obvious matter of design choice of one of ordinary skill in the semiconductor art to substitute Rathor's polysilicon gate electrode with since it has been held to be within Nachumovsky' doped polysilicon electrode that inherently has a high work function, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin, 125 USPQ 416* (See MPEP2144.07).

In re Claim 11, Rathor taken with Nachumovsky discloses the memory transistor of claim 10, wherein the first oxide layer 814 is a tunneling oxide (Rathor: column 11, line 59).

In re Claim 12, Rathor taken with Nachumovsky discloses the memory transistor of claim 10, wherein the first nitride layer 816 comprises a substantially trap-free oxynitride (Rathor: column 12, lines 26-48; column 13, lines 52-59).

In re Claim 13, Rathor taken with Nachumovsky discloses the memory transistor of claim 10, wherein the second nitride layer 818 comprises a charge-trapping oxynitride (Rathor: column 13, lines 52-59).

In re Claim 17, Rathor taken with Nachumovsky discloses all limitations of claim 17 except for that the first nitride layer has a first thickness and the second nitride layer as a second thickness, and wherein a ratio of the first thickness and the second thickness is approximately

4:1. It is known in the art that the thickness is a result effective variable – because mass depends on it. Due to high level of knowledge and skills of personal capable to operate very sophisticated and expensive equipment in semiconductor technology, it would have been an obvious matter of design choice of one of ordinary skill in the semiconductor art to use the specified ratio of the thicknesses, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (MPEP2144.04).

In re Claim 18, Rathor with Nachumovsky discloses the memory transistor of claim 10 further comprising sidewall spacers 836 formed adjacent to the dielectric stack (814, 816, 818, 820, 824) and the gate electrode 828 (Rathor: Fig. 8H).

Claim 16 is rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Rathor and Nachumovsky as applied to claim 10 above, and further in view of Kizilyalli et al., US 2002/0048893 (corresponding to US 6,573,149).

In re Claim 16, Rathor with Nachumovsky discloses all limitations of claim 16 except for that the gate electrode 828 (Rathor: Figs. 7 and 8) is formed from a doped polysilicon with doped concentration such that the minimum energy to remove an electron from the gate electrode is from approximately 4.8-5.3 electron volts (eV).

Kizilyalli teaches a transistor wherein the gate electrode (155, 160) (Fig. 1; 0022-0025) is formed from a doped polysilicon with doped concentration such that the minimum energy to remove an electron from the gate electrode is from about 5.2 eV to about 5.3 eV (0024J) that is within the claimed range of from approximately 4.8-5.3 electron volts (eV), therefore anticipates

the range (MPEP2131.03.I). Let's remind that a dictionary definition of work function is (in physics) the minimum energy required to transfer an electron from a point within a solid to a point just outside its surface (at <https://www.collinsdictionary.com/us/dictionary/english/work-function>).

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine teachings of Rathor, Nachumovsky and Kizilyalli, and to use the specified doped polysilicon to enhance device performance as taught by Kizilyalli ([0001]).

Claims 4 and 14 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Nachumovsky taken with Rathor as applied to claim 1 above, and Rathor taken with Nachumovsky as applied to claim 10 above, respectively, and further in view of Kuwazawa, US 2002/0048200 (listed in a previous Office Action).

In re Claim 4, Nachumovsky taken with Rathor discloses all limitations of claim 4 except for the blocking oxide layer 824 (Rathor: Fig. 8H) is a high- temperature-oxide (HTO) blocking oxide.

In re Claim 14, Rathor taken with Nachumovsky discloses all limitations of claim 14 except for that the second oxide layer 824 (Fig. 8H) is a high- temperature-oxide (HTO) blocking oxide.

Kuwazawa teaches a memory transistor wherein the oxide layer is a high- temperature-oxide (HTO) blocking oxide ([0013]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute Rathor's blocking/second oxide film 824 with Kuwazawa's high- temperature-oxide

(HTO) blocking oxide, to improve the dielectric strength of the intermediate insulation film, the dielectric film and the other dielectric film as taught by Kuwazawa ([0013]).

Response to Arguments

Applicant's arguments filed 10/11/2017 have been fully considered but they are not persuasive.

It is argued, at pages 8 and 9 of the remarks, that

“Claims 10-13, 15, and 18 were rejected under pre-AIA 35 USC 102(b) as allegedly anticipated by Rathor et al. (US Patent No. 6,818,558, hereinafter “Rathor”). Applicant respectfully traverses the rejection. Merely in the interest of advancing prosecution and without conceding the propriety of the rejection, Applicant has amended claim 10 to recite, in part: “a gate electrode formed on the second oxide layer of the dielectric stack, wherein the gate electrode is a high work function gate electrode.” Applicant submits that amended claim 10 recites the features of claim 15, which is now cancelled.

Claim 15, which is cancelled and the features of which incorporated into amended claim 10, was rejected by the Examiner as allegedly anticipated by Rathor. The Examiner cites to gate electrode 828 of Rathor, stating that the gate electrode is polysilicon and is therefore inherently a high work function gate electrode. The Examiner cites to MPEP 2112.01 -1 Applicant agrees with the Examiner that “when the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent.” However, Applicant submits that the structure recited in the reference is not substantially identical to that of the claims.

As such, a presumption that the properties or functions are inherent is improper.

The Examiner asserts that the electrode 828 is polysilicon and therefore inherently possesses the claimed functions: high work function. Applicant submits that the Examiner is attributing features to electrode 828 that are not disclosed in Rathor to support his presumed inherency. The polysilicon gate electrode 828 of Rathor is not a

high work function gate. Not all polysilicon can be used to form a high work function gate. The dopant of the polysilicon defines the work function properties. For normal function gates, phosphorous may be used as the dopant. For a high work function gate, is claimed in amended claim 10 and described in the instant specification, **the polysilicon is doped with a P⁺ dopant, such as boron (B⁺) or difluoroborane (BF₂).**

It appears to the Applicant that the Examiner is taking official notice of the high work function properties of a polysilicon gate electrode, generally. However, Applicant submits that such official notice is improper under MPEP 2144.03. Applicant invites the Examiner to provide “specific factual findings predicated on sound technical and scientific reasoning to support his ... conclusion of common knowledge.”

Absent support of official notice or references to support the Examiner’s assertion that a polysilicon gate is inherently high work function, Applicant submits that amended claim 10 is in condition for allowance and respectfully requests notification of same.”
(Emphasis added)

First-of-all, it is noted that the features upon which applicant relies (i.e., **the polysilicon is doped with a P⁺ dopant, such as boron (B⁺) or difluoroborane (BF₂)**”) are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Secondly, Applicants’ Arguments are essentially about the inherency of the doped polysilicon electrodes as high work function gate electrodes.

However, it is Applicants’ own admission that “the high work function gate electrode comprises a doped polycrystalline silicon or polysilicon (poly) layer.” ([0010] of published

Application US 2017/0186883) (let's note that according to MPEP2112.II. INHERENT FEATURE NEED NOT BE RECOGNIZED AT THE TIME OF THE INVENTION). Therefore Nachumovsky's doped polysilicon electrodes are inherently high work function gate electrodes. Moreover, Kinney, US 5,179,038 explicitly lectures that the doped polysilicon has a high work function (Abstract).

Applicants may like to submit an affidavit signed by inventors (not by Attorney (MPEP2145.I)) with an evidence that Nachumovsky's doped polysilicon electrodes are not high work function gate electrodes.

It is argued, at pages 9 - 11 of the remarks, that

“Claims 11-13 and 18 depend from independent claim 10 and incorporate all of the features therein. Claims 11-13 and 18 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claims 11-13 and 18 to further distinguish over Rathor, as applied in the Non-Final Office Action mailed July 11,2017, and Applicant reserves the right to present arguments to this effect at a later date.

Claims 10, 15, and 16 were rejected under pre-AIA 35 USC 102(b) as allegedly anticipated by Yan et al. (US Published Application No. 2008/0135946, hereinafter “Yan”). Applicant respectfully traverses the rejection. Merely in the interest of advancing prosecution and without conceding the propriety of the rejection, Applicant has amended claim 10 to recite, in part: “a gate electrode formed on the second oxide layer of the dielectric stack, wherein the gate electrode is a high work function gate (“In one embodiment, the polysilicon layer 216 is doped following the growth or formation In the

LPCVD process using ion Implantation process. For example, the polysilicon layer 216 can be doped by implanting boron (6+) or BF₂ ions at an energy of from about 5 to about 100 kilo-electron volts (keV), and a dose of from about 1e4 cm⁻² to about 1e6 cm² to form an N-type (NMOS) SONGS memory transistor and, preferably, a P-type (PMOS) logic transistor having high work function gate electrodes. More preferably, the polysilicon layer 216 is doped to a concentration or dose selected so that the minimum energy needed to remove an electron from the gate electrode is from at least about 4.8 electron volts (eV) to about 5.3 eV.” electrode.” Applicant submits that amended claim 10 recites the features of claim 15, which is now cancelled.

For at least the reasons stated above with regard to the Examiner’s rejection of claim 10 as allegedly anticipated by Rathor, Applicant submits that the presumption of inherency of the gate electrode of Yan as a high work function gate is improper. Amended claim 10 is therefore in condition for allowance and Applicant respectfully requests notification of same.

Claim 16 depends from independent claim 10 and incorporates all of the features therein. Claim 16 is also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claim 16 to further distinguish over Yan, as applied in the Non-Final Office Action mailed July 11, 2017, and Applicant reserves the right to present arguments to this effect at a later date.

§ 103 Rejections

Claims 1-3, 5-9, 19, and 20 were rejected under pre-AIA 35 USC 103(a) as allegedly unpatentable over Nachumovsky (US Patent No. 6,174,758, hereinafter “Nachumovsky”) in view of Rathor. Applicant respectfully traverses the rejection. Merely in the interest of advancing prosecution and without conceding the propriety of the rejection, Applicant has amended claims 1 and 19 to recite, in part: “wherein **the first gate electrode and the second gate electrodes are high work function gate electrodes.**” Applicant submits that amended claims 1 and 19 recite the features of claim 6, which is now cancelled. For at least the reasons stated above with regard to the Examiner’s rejection of claim 10 as allegedly anticipated by Rathor and anticipated by Yan, Applicant submits that the

presumption of inherency of the gate electrodes of Nachumovsky and Rathor as high work function gates is improper. Amended claims 1 and 19 are therefore in condition for allowance and Applicant respectfully requests notification of same.

Claims 2, 3, 5, 7-9, and 20 depend from independent claims 1 or 19 and incorporate all of the features therein. Claims 2, 3, 5, 7-9, and 20 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same.

Applicant considers additional elements of claims 2, 3, 5, 7-9, and 20 to further distinguish over Nachumovsky in view of Rathor, as applied in the Non-Final Office Action mailed July 11, 2017, and Applicant reserves the right to present arguments to this effect at a later date.

Claims 4 and 14 were rejected under pre-AIA 35 USC 103(a) as allegedly unpatentable over Nachumovsky in view of Rathor, and further in view of Kuwazawa (US Published Application No. 2002/0048200, hereinafter “Kuwazawa”). Applicant respectfully traverses the rejection.

Claims 4 and 14 depend from independent claims 1 or 10 and incorporate all of the features therein. Claims 4 and 14 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claims 4 and 14 to further distinguish over Nachumovsky in view of Rathor and further in view of Kuwazawa, as applied in the Non-Final Office Action mailed July 11, 2017, and Applicant reserves the right to present arguments to this effect at a later date.

Claim 17 was rejected under pre-AIA 35 USC 103(a) as allegedly unpatentable in view of Rathor. Applicant respectfully traverses the rejection.

Claim 17 depend from independent claim 10 and incorporates all of the features therein. Claim 17 are also asserted to be allowable for the reasons presented above, and Applicant respectfully requests notification of same. Applicant considers additional elements of claim 17 to further distinguish over Rathor, as applied in the Non-Final Office Action mailed July 11, 2017, and Applicant reserves the right to present arguments to this effect at a later date.” (Emphasis added).

Here, Applicants repeat their arguments about inherency of doped polysilicon electrode. As explained above, it is Applicants' own admission that "the high work function gate electrode comprises a doped polycrystalline silicon or polysilicon (poly) layer." ([0010] of published Application US 2017/0186883). In addition, Kinney, US 5,179,038 explicitly lectures that the doped polysilicon has a high work function (Abstract).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NIKOLAY YUSHIN whose telephone number is (571)270-7885. The examiner can normally be reached on 8 AM - 5 PM PST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NIKOLAY YUSHIN/
Primary Examiner, Art Unit 2893

Notice of References Cited	Application/Control No. 15/376,282	Applicant(s)/Patent Under Reexamination POLISHCHUK ET AL.	
	Examiner NIKOLAY YUSHIN	Art Unit 2893	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-5,179,038 A	01-1993	Kinney; Wayne I.	H01L21/763	257/E21.572
*	B	US-2002/0048893 A1	04-2002	Kizilyalli, Isik C.	H01L21/28079	438/383
*	C	US-6,573,149 B2	06-2003	Kizilyalli; Isik C.	H01L21/28079	257/E21.202
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PILOT PROGRAM	
Non-Provisional Application Number: 15/335,180	Filing Date: 10/26/2016
First Named Inventor: Igor Polishchuk	Title of Invention: MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION
THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION. 1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee. 2. Check the box next to the appropriate selection: ☒ Each item of information contained in the IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(1). OR ☐ No item of information contained in the IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2). OR ☐ See attached certification statement in compliance with 37 CFR 1.97(e). 3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. <u>503781</u>. 4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a Web-based ePetition. WARNING: Do <u>not</u> submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE. 5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith. 6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned. 7. This certification and request is being filed as a Web-based ePetition and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.	
Signature <u>/StoychoDDraganoff#56181/</u>	Date 01/02/2018
Name (Print/Typed) Stoycho D. Draganoff	Practitioner Registration Number 56181 (If applicable)
Note: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.* ☒ *Total of <u>1</u> forms are submitted.	

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

拒絶査定

特許出願の番号	特願2015-503338
起案日	平成29年11月29日
特許庁審査官	宮本 博司 6313 5F00
発明の名称	多層酸窒化物層を有する酸化物-窒化物-酸化物積層体
特許出願人	サイプレス セミコンダクター コーポレーション
代理人	杉村 憲司 (外 2名)

この出願については、平成29年 2月17日付け拒絶理由通知書に記載した理由2によって、拒絶をすべきものです。

なお、意見書及び手続補正書の内容を検討しましたが、拒絶理由を覆すに足りる根拠が見いだせません。

備考

●理由2（特許法第29条第2項）について

- ・請求項 1
- ・引用文献等 1、2
- ・備考

引用文献1（段落[0025]、[0029]、[0030]、[0044]、[0045]、図2）には、

「基板（208）（基板に相当）に形成され、メモリデバイス（メモリデバイスに相当）のソース及びドレイン（210）（ソース及びドレインに相当）を接続するチャネル領域（212）（チャネルに相当）と、

前記チャネル領域（212）を覆うトンネル酸化物層（216）（トンネル酸化物層に相当）と、

前記トンネル酸化物層（216）上の酸素リッチな下部酸窒化物層（220B）（第1の酸窒化物層に相当）、及び、前記下部酸窒化物層（220B）上の酸素リッチな上部酸窒化物層（220A）（第2の酸窒化物層に相当）を含む多層電荷蓄積層（204）（多層電荷蓄積層に相当）と、
を備えるメモリデバイスであり、

前記下部酸窒化物層（220B）の化学量論的組成は、前記下部酸窒化物層（

220B)のトラップを前記上部酸化窒化物層(220A)のトラップの1/1000以下とし、

前記上部酸化窒化物層(220A)の化学量論的組成は、前記上部酸化窒化物層(220A)のトラップ密度を高くする、メモリデバイス。」が記載されている。

請求項1に係る発明と引用文献1に記載された発明とを対比すると、チャンネルは、請求項1に係る発明では、「基板の表面を覆うとともに基板の表面から分離した半導体材料から形成される」のに対し、引用文献1に記載された発明では、そのように特定されていない点(以下、「相違点1」という。)で相違する。

上記相違点1について検討すると、引用文献2の段落[0031]、[0035]、[0048]、図5、7には、集積回路基板上の絶縁層(110)の上に設けられ、ソース/ドレイン領域(128-130)間を接続するチャンネル領域を有するシリコン半導体材料片(111、113)を備えるNAND型フラッシュメモリが記載されている。

このように、集積回路基板上の絶縁層の上に設けられ、ソース/ドレイン領域間を接続するチャンネル領域を有するシリコン半導体材料片を備えるNAND型フラッシュメモリは、本願出願前に周知技術である。

してみると、引用文献1に記載された発明のチャンネル領域に替えて、集積回路基板上の絶縁層の上に設けられ、ソース/ドレイン領域間を接続するチャンネル領域である上記周知技術を採用することは、当業者が容易に想到し得るものである。

出願人は、平成29年8月18日付け意見書において、「引用文献1は、『基板の表面を覆うとともに前記基板の前記表面から分離した半導体材料から形成され、メモリデバイスのソース及びドレインを接続するチャンネル』を有する実施形態を開示していません。

また引用文献2-7にも、基板の表面を覆うとともに前記基板の前記表面から分離した半導体材料から形成され、メモリデバイスのソース及びドレインを接続するチャンネルを有する構成は、記載も示唆もされていません。」旨の主張をしている。

しかしながら、上記のとおり、出願人の主張する構成は、引用文献2に記載されているように周知技術である。

したがって、出願人の主張は採用できない。

- ・請求項 2-8
- ・引用文献等 1-4
- ・備考

上記請求項1についての判断及び平成29年2月17日付け拒絶理由通知書の理由2の請求項2-8についての判断を参照されたい。

- ・請求項 9
- ・引用文献等 1、2、4、5
- ・備考

補正後の請求項9に係る発明は、補正前の請求項9に係る発明に、導電チャネルは、「基板の表面を覆うとともに前記基板の前記表面から分離した半導体材料から形成される」という発明特定事項を追加した発明である。

上記の追加された発明特定事項は、請求項1において検討したように、周知技術（例えば、引用文献2に記載されている。）であるので、補正後の請求項9に係る発明は、当業者が容易に想到し得るものである。

- ・請求項 10-14
- ・引用文献等 1-7
- ・備考

上記請求項9についての判断及び平成29年2月17日付け拒絶理由通知書の理由2の請求項10-14についての判断を参照されたい。

- ・請求項 15
- ・引用文献等 1、5

出願人は、平成29年8月18日付け意見書において、「引用文献5のシリコン柱403は、補正後の請求項15の垂直チャネルに相当するものではありません。引用文献5の段落[0190]-[0191]及び図25を参照すると、ソース432が図25の下部に存在し、ドレイン431が図25の上部に存在します。そして、ソース432とドレイン431との間に基板401が延在しています。そのため、ソース432とドレイン431との間に形成されるチャネルは、基板401の延在方向（紙面の上下方向）と平行に延びています。本願における用語で言い換えれば、引用文献5のチャネルは、垂直チャネルではなく、横式のチャネルです。これに対し、本願の図11Fに示すように、本願発明15のチャネル（1124）は、基板（1106）の延在方向（紙面の左右方向）に直交して延在する（すなわち紙面の上下方向に延在する）、垂直チャネルです。」旨の主張している。

しかしながら、引用文献5の段落[0189]には、シリコン基板（401）

に、格子状の溝（４０２）により分離された複数のシリコン柱（４０３）が配列されていることが記載されているので、シリコン柱（４０３）は、シリコン基板（４０１）に溝（４０２）を設けることにより形成されているといえる。そして、シリコン基板にどのようにシリコン柱を形成するかは、当業者が適宜なし得る設計事項である。（例えば、シリコン基板に溝を設けてシリコン柱を形成する場合や、シリコン基板に選択的にシリコンを堆積することによりシリコン柱を形成する場合が想定される。）したがって、シリコン柱は、シリコン基板が延在したものではなく、シリコン基板に形成されたものと認められる。

また、引用文献５の段落〔０１８９〕、〔０１９０〕には、シリコン柱（４０３）の周囲を取り囲むように、第１の絶縁膜（４１１）、第２の絶縁膜（４１２）、第３の絶縁膜（４１３）、第４の絶縁膜（４１４）及び第５の絶縁膜（４１５）がこの順に形成され、さらにその外側にゲート電極（４２０）が形成され、シリコン柱（４０３）の上部にドレイン（４３１）が形成され、シリコン柱（４０３）の下方にソース（４３２）が形成されたＭＯＳＦＥＴ構造の縦型メモリセルが記載されているので、チャネルは、基板に対して垂直であるといえる。

したがって、出願人の主張は採用できない。

- ・請求項 １６－２０
- ・引用文献等 １－３、５
- ・備考

上記請求項１５についての判断及び平成２９年２月１７日付け拒絶理由通知書の理由２の請求項１６－２０についての判断を参照されたい。

<引用文献等一覧>

- １．米国特許出願公開第２０１１／０２４８３３２号明細書
- ２．特開２０１２－１９２１１号公報（周知技術を示す文献）
- ３．国際公開第２０１０／１０６９２２号（周知技術を示す文献）
- ４．特開２００８－１７２１９５号公報
- ５．特開２００９－２７１３４号公報
- ６．特開２００９－２９５６９４号公報（周知技術を示す文献）
- ７．特開２００９－２５２７７４号公報（周知技術を示す文献）

この査定に不服があるときは、この査定の謄本の送達があった日から３月以内（在外者にあつては、４月以内）に、特許庁長官に対して、拒絶査定不服審判を請求することができます（参照条文：特許法第１２１条第１項）。

<行政事件訴訟法第46条第2項に基づく教示>

この査定に対しては取消訴訟を提起することはできません。この査定についての審判請求に対する審決に対してのみ取消訴訟を提起することができます（参照条文：特許法第178条第6項）。

<審判請求時に補正をする際の注意>

（1）明細書、特許請求の範囲について補正をする場合は、補正により記載を変更した個所に下線を引いてください（特許法施行規則様式第13備考6、7）。

（2）補正は、この出願の国際出願日における国際特許出願の明細書若しくは図面（図面の中の説明に限る。）の翻訳文、国際出願日における国際特許出願の請求の範囲の翻訳文（特許協力条約第19条（1）の規定に基づく補正後の請求の範囲の翻訳文が提出された場合にあっては、当該翻訳文）又は国際出願日における国際特許出願の図面（図面の中の説明を除く。）（以下、翻訳文等という。）

（誤訳訂正書を提出して明細書、特許請求の範囲又は図面について補正をした場合にあっては、翻訳文等又は当該補正後の明細書、特許請求の範囲若しくは図面）に記載した事項の範囲内で行わなければなりません。さらに、特許請求の範囲について補正をする際には、請求項の削除、特許請求の範囲の限定的減縮、誤記の訂正又は明瞭でない記載の釈明（拒絶の理由に示す事項についてするものに限る）を目的とする補正に限られます。また、審判請求書の請求の理由において、各補正事項について補正が適法なものである理由を、根拠となる翻訳文等（誤訳訂正書を提出して明細書、特許請求の範囲又は図面について補正をした場合にあっては、翻訳文等又は当該補正後の明細書、特許請求の範囲若しくは図面）の記載箇所を明確に示したうえで主張してください。

（3）特許請求の範囲について補正をする際には、特許請求の範囲の全文を単位として補正をしてください（特許法施行規則様式第13備考7）。

上記はファイルに記録されている事項と相違ないことを認証する。

認証日 平成29年11月30日 経済産業事務官 山田 忠男

CONCISE EXPLANATION UNDER 37 CFR § 1.98(a)(3) OF FOREIGN LANGUAGE DOCUMENTS

To the Honorable Commissioner of Patents and Trademarks:

In connection with an Information Disclosure Statement filed on even date herewith, Applicant hereby submits the following concise explanation under 37 CFR § 1.98(a)(3) of a foreign language document or documents disclosed therein:

Each foreign language document contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a related foreign application.

Pursuant to 37 CFR 1.97(g), the filing of the Information Disclosure Statement shall not be construed as a representation that a search has been made.

Pursuant to 37 CFR 1.97 (h), the filing of the Information Disclosure Statement shall not be construed to be an admission that the information cited in the statement is, or is considered to be, material to patentability as defined in 37 CFR § 1.56(b).

Respectfully submitted by:

Date: 01/02/2018

Signature: /StoychoDDraganoff#56181/

Name: Stoycho D. Draganoff

Reg. No.: 56181

Electronic Patent Application Fee Transmittal				
Application Number:		15335180		
Filing Date:		26-Oct-2016		
Title of Invention:		MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE		
First Named Inventor/Applicant Name:		Igor Polishchuk		
Filer:		Stoycho Doncheff Draganoff/Daniel Pheng		
Attorney Docket Number:		PM07027D1CIP1C3		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 1st Request	1801	1	1200	1200
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1340



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Decision Date : January 2, 2018

In re Application of :

Igor Polishchuk

DECISION ON PETITION

UNDER CFR 1.313(c)(2)

Application No : 15335180

Filed : 26-Oct-2016

Attorney Docket No : PM07027D1CIP1C3

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed January 2, 2018 , to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 2893 for processing of the request for continuing examination under 37 CFR 1.114 .

Office of Petitions

Electronic Acknowledgement Receipt	
EFS ID:	31384811
Application Number:	15335180
International Application Number:	
Confirmation Number:	6223
Title of Invention:	MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE
First Named Inventor/Applicant Name:	Igor Polishchuk
Customer Number:	60909
Filer:	Stoycho Doncheff Draganoff/Daniel Pheng
Filer Authorized By:	Stoycho Doncheff Draganoff
Attorney Docket Number:	PM07027D1CIP1C3
Receipt Date:	02-JAN-2018
Filing Date:	26-OCT-2016
Time Stamp:	17:50:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 1340
RAM confirmation Number	010318INTEFSW00004196503781
Deposit Account	503781
Authorized User	Timothy Croll
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition automatically granted by EFS	petition-request.pdf	31657	no	2
			7bd20097488e2ca37649cb9f692901024e83e884		
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	PM07027D1CIP1C3_RCE_01022018.pdf	697638	no	3
			4cb8e100d74c51596a88e02e13323426876739d9		
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	PM07027D1CIP1C3_IDS_US_01022018.pdf	1053902	no	4
			c43130e797b75cc9a417629acd6d8d9c1f7cfd42		
Warnings:					
Information:					
4	Quick Path Information Disclosure Statement	PM07027D1CIP1C3_QPIDSform_US_01022018.pdf	342718	no	2
			4559a2d36a4f21a8c63e8238d185c32ea3fec84e		
Warnings:					
Information:					
5	Non Patent Literature	PM07027D1C4_FinalRejection_12192017.pdf	804168	no	20
			085b0c3a5aa866ff775e686c7047d1d829f44a09		
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	PM07027D1CIP1C3_IDS_Foreign_01022018.pdf	1053763	no	4
			9d62fd5df8c5151e58a3bec5049b348701aff4473		
Warnings:					
Information:					

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
7	Quick Path Information Disclosure Statement	PM07027D1CIP1C3_QPIDSform_Foreign_01022018.pdf	342715 7b20c5fff440c87e1105f861f9c6d289e9db8e54	no	2
Warnings:					
Information:					
8	Non Patent Literature	PM07002CIP2JP_Foreign_OA_JP_Language_12052017.pdf	2484132 c4ac33520ce81c46ecd6e1e5916c2c4d83d19e1	no	5
Warnings:					
Information:					
9	Transmittal Letter	PM07027D1CIP1C3_ConciseExplanationUnderRule1_01022018.pdf	32598 24fb695e7d12c718534eb8b72a4aaff4c813b59	no	1
Warnings:					
Information:					
10	Fee Worksheet (SB06)	fee-info.pdf	32138 c2dfc80ec8f4660d1710e2ede3659d23365ef49d	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			6875429		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web		PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce			
Electronic Petition Request	PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)				
Application Number	15335180				
Filing Date	26-Oct-2016				
First Named Inventor	Igor Polishchuk				
Art Unit	2893				
Examiner Name	NIKOLAY YUSHIN				
Attorney Docket Number	PM07027D1CIP1C3				
Title	MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE				
An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary. APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c). A grantable petition requires the following items: (1) Petition fee; and (2) One of the following reasons: (a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable; (b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or (c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).					
Petition Fee <table border="1"> <tr> <td>☐ Small Entity</td> </tr> <tr> <td>☐ Micro Entity</td> </tr> <tr> <td>☒ Regular Undiscounted</td> </tr> </table>			☐ Small Entity	☐ Micro Entity	☒ Regular Undiscounted
☐ Small Entity					
☐ Micro Entity					
☒ Regular Undiscounted					
Reason for withdrawal from issue					

- ☐ One or more claims are unpatentable
- ☒ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees)
- ☐ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).

RCE request, submission, and fee.

- ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that:
The RCE request, submission, and fee have already been filed in the above-identified application on
- ☒ Are attached.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

- ☒ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application.
- ☐ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity.
- ☐ A sole inventor
- ☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application
- ☐ A joint inventor; all of whom are signing this e-petition

Signature	/StoychoDDraganoff#56181/
Name	Stoycho D. Draganoff
Registration Number	56181

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15335180
	Filing Date	2016-10-26
	First Named Inventor	Igor Polishchuk
	Art Unit	2893
	Examiner Name	YUSHIN, NIKOLAY K
	Attorney Docket Number	PM07027D1CIP1C3

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.						T ⁵

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15335180
	Filing Date		2016-10-26
	First Named Inventor	Igor Polishchuk	
	Art Unit	2893	
	Examiner Name	YUSHIN, NIKOLAY K	
	Attorney Docket Number	PM07027D1CIP1C3	

1	Japanese Office Action for Japanese Application Number 2015-503338 (PM07002CIP2JP) dated 12/05/2017; 5 pages		
If you wish to add additional non-patent literature document citation information please click the Add button Add			
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Examiner Signature			Date Considered
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

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	First Named Inventor	Igor Polishchuk	
	Art Unit	2893	
	Examiner Name	YUSHIN, NIKOLAY K	
	Attorney Docket Number	PM07027D1CIP1C3	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/StoychoDDraganoff#56181/	Date (YYYY-MM-DD)	2018-01-02
Name/Print	Stoycho D. Draganoff	Registration Number	56181

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/335,180	10/26/2016	Igor Polishchuk	PM07027D1CIP1C3	6223
60909 7590 01/11/2018 CYPRESS SEMICONDUCTOR CORPORATION 198 CHAMPION COURT SAN JOSE, CA 95134-1709			EXAMINER YUSHIN, NIKOLAY K	
			ART UNIT 2893	PAPER NUMBER
			NOTIFICATION DATE 01/11/2018	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@cypress.com

Corrected Notice of Allowability	Application No. 15/335,180	Applicant(s) POLISHCHUK ET AL.	
	Examiner NIKOLAY YUSHIN	Art Unit 2893	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to QPIDS filed on 01/02/2018.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 21-26,28-33 and 35-40. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. ☐ Notice of References Cited (PTO-892) | 5. ☐ Examiner's Amendment/Comment |
| 2. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date See Continuation Sheet | 6. ☒ Examiner's Statement of Reasons for Allowance |
| 3. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. ☐ Other _____. |
| 4. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/NIKOLAY YUSHIN/
Primary Examiner, Art Unit 2893

Continuation of Attachment(s) 2. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date: 01/02/3018; 01/02/2018.

The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement filed 01/02/2018 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because no English translation of Japanese Office Action dated 12/05/2017 has been submitted. It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Allowable Subject Matter

Claims 21-26, 28-33, and 35-40 stand allowed.

The following is an examiner's statement of reasons for allowance:

In re Claim 21, Kim et al., US 2008/0272424, as well as Wang, US 2006/0113586 and Lue et al., US 2007/0029625, discloses all limitations of claim 21 except for that "an anti-tunneling layer disposed between the first and second dielectric layers, wherein the anti-tunneling layer includes an oxide layer." Therefore, the claimed device differs from prior art devices on this point and there is no evidence it would have been obvious to make this change.

In re Claim 33, Hagemeyer et al., US 20060008959, taken with Wang discloses all limitations of claim 33 except for that “the channel is vertical and oriented substantially perpendicular to a semiconductor material structure, and a tunnel dielectric layer, a multi-layer charge trapping layer, and a blocking dielectric layer disposed between the gate structure and the channel.” Therefore, the claimed device differs from prior art devices on this point and there is no evidence it would have been obvious to make this change.

In re Claim 38, Hagemeyer taken with Kim discloses all limitations of claim 38 except for that “the channel is vertical and oriented substantially perpendicular to a semiconductor material structure; and a metal oxide semiconductor (MOS) logic device including a gate oxide layer and a second high work function gate electrode disposed thereon.” Therefore, the claimed device differs from prior art devices on this point and there is no evidence it would have been obvious to make this change.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NIKOLAY YUSHIN whose telephone number is (571)270-7885. The examiner can normally be reached on 8 AM - 5 PM PST.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is

encouraged to use the USPTO Automated Interview Request (AIR) at
<http://www.uspto.gov/interviewpractice>.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NIKOLAY YUSHIN/
Primary Examiner, Art Unit 2893

Receipt date: 01/02/2018

15/335,180 - GAU: 2893

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)

Approved for use through 07/31/2016. OMB 0651-0031

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Signature	/StoychoDDraganoff#56181/	Date (YYYY-MM-DD)	2018-01-02
Name/Print	Stoycho D. Draganoff	Registration Number	56181

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/N.K.Y/	1	USPTO Final Rejection for Application Number 15/376,282 (PM07027D1C4) dated 12/19/2017; 19 pages	

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OR

☒ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/StoychoDDraganoff#56181/	Date (YYYY-MM-DD)	2018-01-02
Name/Print	Stoycho D. Draganoff	Registration Number	56181

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

To: patents@cypress.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 60909

Jan 11, 2018 04:24:43 AM

Dear PAIR Customer:

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 60909 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:

The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
15335180	NOA	01/11/2018	PM07027D1CIP1C3
	1449	01/11/2018	PM07027D1CIP1C3
	1449	01/11/2018	PM07027D1CIP1C3

To view your correspondence online or update your email addresses, please visit us anytime at <https://sportal.uspto.gov/secure/myportal/privatepair>.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

PRINTER RUSH
(PTO ASSISTANCE)

Application: 15335180

Examiner: Yushin

GAU: 2893

From: Peter Gaughan

Location: RTFM

Creation Date: 01/12/2018

Week Date: 10/2/2017

<u>DOC CODE</u>	<u>DOC DATE</u>	<u>MISCELLANEOUS</u>
☐ 1449 ☐ IDS ☐ CLM ☐ IIFW/FWCLM ☐ SRFW ☐ DRW ☐ OATH ☒ 312 ☐ SPEC		

[RUSH] Message:

Please respond to the 12/18/17 A.NA.

Thank you,
PG

[XRUSH] Response:

Initials: _____

Examiner: PUBS contact - James Leija, (703) 756-1197

NOTE: This form will be included as part of the official USPTO record with the response document coded as XRUSH.

REV: AUG 16

PRINTER RUSH
(PTO ASSISTANCE)

Application: 15335180

Examiner: Yushin

GAU: 2893

From: Peter Gaughan

Location: RTFM

Creation Date: 01/12/2018

Week Date: 10/2/2017

<u>DOC CODE</u>	<u>DOC DATE</u>	<u>MISCELLANEOUS</u>
☐ 1449 ☐ IDS ☐ CLM ☐ IIFW/FWCLM ☐ SRFW ☐ DRW ☐ OATH ☒ 312 ☐ SPEC		

[RUSH] Message:

Please respond to the 12/18/17 A.NA.

Thank you,
PG

[XRUSH] Response:

Done !

/N.K.Y/

Initials: _____

Examiner: PUBS contact - James Leija, (703) 756-1197

NOTE: This form will be included as part of the official USPTO record with the response document coded as XRUSH.

REV: AUG 16

OK TO ENTER: /N.K.Y/
01/15/2018

Application No. 15/335,180
Attorney's Docket No. PM07027D1CIP1C3
Page 1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	) Group Art Unit: 2893
	)
Igor Polishchuk, et al.	) Examiner: YUSHIN, NIKOLAY K
	)
Application No.: 15/335,180	) Confirmation No.: 6223
	)
Filed: 10-26-2016	)
	)
For: MEMORY TRANSISTOR WITH	)
MULTIPLE CHARGE STORING	)
LAYERS AND A HIGH WORK	)
FUNCTION GATE ELECTRODE	)

AMENDMENT UNDER 37 C.F.R. § 1.312

&

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicant is in receipt of a Notice of Allowance and Fee Due Form, mailed October 04, 2017, and a Notice to File Corrected Application Papers ("NOTICE"), mailed November 03, 2017, in connection with the above-identified application. In response to the NOTICE, applicant hereby submits replacement sheets for FIG. 4A and FIG. 4B. Also in response to the NOTICE and pursuant to 37 C.F.R. § 1.312, the Examiner is respectfully requested to favorably consider and enter the following amendments to the present application.

Customer No.: 60909

Electronic Acknowledgement Receipt

EFS ID:	31384811
Application Number:	15335180
International Application Number:	
Confirmation Number:	6223
Title of Invention:	MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE
First Named Inventor/Applicant Name:	Igor Polishchuk
Customer Number:	60909
Filer:	Stoycho Doncheff Draganoff/Daniel Pheng
Filer Authorized By:	Stoycho Doncheff Draganoff
Attorney Docket Number:	PM07027D1CIP1C3
Receipt Date:	02-JAN-2018
Filing Date:	26-OCT-2016
Time Stamp:	17:50:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$1340
RAM confirmation Number	010318INTEFSW00004196503781
Deposit Account	503781
Authorized User	Timothy Croll
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

Electronic Patent Application Fee Transmittal				
Application Number:		15335180		
Filing Date:		26-Oct-2016		
Title of Invention:		MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE		
First Named Inventor/Applicant Name:		Igor Polishchuk		
Filer:		Stoycho Doncheff Draganoff/Daniel Pheng		
Attorney Docket Number:		PM07027D1CIP1C3		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 1st Request	1801	1	1200	1200
Pages:				
Claims:				
Adjustment date: 01/19/2018 SDIRETA1 01/03/2018 INTRFSW 00004196 503781 15335180 02 FC:1051 1200.00 CR				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/335,180	02/20/2018	9899486	PM07027D1CIP1C3	6223

60909 7590 01/31/2018
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Igor Polishchuk, Fremont, CA;
Cypress Semiconductor Corporation, San Jose, CA
Sagy Charel Levy, Zichron Yaakov, ISRAEL;
Krishnaswamy Ramkumar, San Jose, CA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

To: patents@cypress.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 60909

Feb 01, 2018 03:48:09 AM

Dear PAIR Customer:

CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709
UNITED STATES

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The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
15335180	ISSUE.NTF	01/31/2018	PM07027D1CIP1C3

To view your correspondence online or update your email addresses, please visit us anytime at <https://portal.uspto.gov/secure/myportal/privatepair>.

If you have any questions, please email the Electronic Business Center (EBC) at EBC@uspto.gov with 'e-Office Action' on the subject line or call 1-866-217-9197 during the following hours:

Monday - Friday 6:00 a.m. to 12:00 a.m.

Thank you for prompt attention to this notice,

UNITED STATES PATENT AND TRADEMARK OFFICE
PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

CERTIFICATION AND REQUEST FOR CONSIDERATION OF AN INFORMATION DISCLOSURE STATEMENT FILED AFTER PAYMENT OF THE ISSUE FEE UNDER THE QPIDS PILOT PROGRAM	
Non-Provisional Application Number: 15/335,180	Filing Date: 10/26/2016
First Named Inventor: Igor Polishchuk	Title of Invention: MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION
THE UNDERSIGNED HEREBY CERTIFIES AND REQUESTS THE FOLLOWING FOR THE ABOVE-IDENTIFIED APPLICATION. 1. Consideration is requested of the information disclosure statement (IDS) submitted herewith, which is being filed after payment of the issue fee. 2. Check the box next to the appropriate selection: ☒ Each item of information contained in the IDS was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(1). OR ☐ No item of information contained in the IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the IDS was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the IDS. See 37 CFR 1.97(e)(2). OR ☐ See attached certification statement in compliance with 37 CFR 1.97(e). 3. Please charge the IDS fee set forth in 37 CFR 1.17(p) to Deposit Account No. <u>503781</u>. 4. A Petition to Withdraw from Issue After Payment of the Issue Fee (37 CFR 1.313(c)(2)), including the petition fee set forth in 37 CFR 1.17(h), is submitted herewith as a Web-based ePetition. WARNING: Do <u>not</u> submit the petition as a follow-on paper via EFS-Web. Submit the petition as a Web-based ePetition by signing on to EFS-Web as a registered user, selecting the radio button next to "Existing application/patent," and then selecting the radio button next to "ePetition (for automatic processing and immediate grant, if all petitions requirements are met)." Failure to use the Web-based ePetition interface will result in automatic entry of the RCE. 5. A request for continued examination (RCE) under 37 CFR 1.114 and the RCE fee under 37 CFR 1.17(e) are submitted herewith. 6. The RCE will be treated as a "conditional" RCE. In the event the examiner determines that any item of information contained in the IDS necessitates the reopening of prosecution in the application, the undersigned understands that (i) the RCE will be processed and treated as an RCE under 37 CFR 1.114 and therefore (ii) the IDS fee under 37 CFR 1.17(p) will be returned in accordance with 37 CFR 1.97(b)(4). In the event that no item of information in the IDS necessitates reopening prosecution, the undersigned understands that the RCE will not be processed and the RCE fee under 37 CFR 1.17(e) will be returned. 7. This certification and request is being filed as a Web-based ePetition and is not accompanied by an amendment to the application. Inclusion of an amendment will result in automatic entry of the RCE.	
Signature <u>/Kin Hung Lai/</u>	Date 02/15/2018
Name (Print/Typed) Kin Hung Lai	Practitioner Registration Number 69251 (If applicable)
Note: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required in accordance with 37 CFR 1.33 and 11.18. Please see 37 CFR 1.4(d) for the form of the signature. If necessary, submit multiple forms for more than one signature, see below.*	
☒ *Total of <u>1</u> forms are submitted.	

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15335180
	Filing Date	2016-10-26
	First Named Inventor	Igor Polishchuk
	Art Unit	2893
	Examiner Name	YUSHIN, NIKOLAY K
	Attorney Docket Number	PM07027D1CIP1C3

U.S.PATENTS							Remove	
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
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U.S.PATENT APPLICATION PUBLICATIONS							Remove	
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ² i	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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NON-PATENT LITERATURE DOCUMENTS							Remove	
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.						T ⁵

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15335180
	Filing Date		2016-10-26
	First Named Inventor	Igor Polishchuk	
	Art Unit	2893	
	Examiner Name	YUSHIN, NIKOLAY K	
	Attorney Docket Number	PM07027D1CIP1C3	

1	SIPO Office Action for Chinese Application No. 2013800168932 (PM07002CIP2CN) dated 01/26/2018; 11 pages
2	SIPO Office Action for Chinese Application Number 2013800319699 (PM07024CIP1CN) dated 01/29/2018; 7 pages

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		15335180
	Filing Date		2016-10-26
	First Named Inventor	Igor Polishchuk	
	Art Unit	2893	
	Examiner Name	YUSHIN, NIKOLAY K	
	Attorney Docket Number	PM07027D1CIP1C3	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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See attached certification statement.

☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Kin Hung Lai/	Date (YYYY-MM-DD)	2018-02-15
Name/Print	Kin Hung Lai	Registration Number	69251

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

CONCISE EXPLANATION UNDER 37 CFR § 1.98(a)(3) OF FOREIGN LANGUAGE DOCUMENTS

To the Honorable Commissioner of Patents and Trademarks:

In connection with an Information Disclosure Statement filed on even date herewith, Applicant hereby submits the following concise explanation under 37 CFR § 1.98(a)(3) of a foreign language document or documents disclosed therein:

Each foreign language document contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a related foreign application.

Pursuant to 37 CFR 1.97(g), the filing of the Information Disclosure Statement shall not be construed as a representation that a search has been made.

Pursuant to 37 CFR 1.97 (h), the filing of the Information Disclosure Statement shall not be construed to be an admission that the information cited in the statement is, or is considered to be, material to patentability as defined in 37 CFR § 1.56(b).

Respectfully submitted by:

Date: 02/15/2018

Signature: /Kin Hung Lai/

Name: Kin Hung Lai

Reg. No.: 69251



中华人民共和国国家知识产权局

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北京市海淀区学清路8号B座1601A 北京安信方达知识产权代理有限公司
周靖 郑霞

发文日:

2018年01月29日



申请号或专利号: 201380031969.9

发文序号: 2018012401906260

申请人或专利权人: 赛普拉斯半导体公司

发明创造名称: 用于制造非易失性电荷俘获存储器装置的自由基氧化工艺

第三次审查意见通知书

1. ☒ 审查员已经收到申请人于 2017 年 10 月 12 日提交的意见陈述书,在此基础上审查员对上述专利申请继续进行实质审查。

☐ 根据国家知识产权局专利复审委员会于____年____月____日作出的复审决定,审查员对上述专利申请继续进行实质审查。

☐

2. ☐ 经审查,申请人于____提交的修改文件,不符合专利法实施细则第 51 条第 3 款的规定,不予接受。

3. 继续审查是针对下列申请文件进行的:

☐ 上述意见陈述书中所附的经修改的申请文件。

☒ 前次审查意见通知书所针对的申请文件以及上述意见陈述书中所附的经修改的申请文件替换文件。

☐ 前次审查意见通知书所针对的申请文件。

☐ 上述复审决定所确定的申请文件。

☐

4. ☒ 本通知书未引用新的对比文件。

☐ 本通知书引用下列对比文件(其编号续前,并在今后的审查过程中继续沿用):

编号	文件号或名称	公开日期 (或抵触申请的申请日)
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5. 审查的结论性意见:

关于说明书:

☐ 申请的内容属于专利法第 5 条规定的不授予专利权的范围。

☐ 说明书不符合专利法第 26 条第 3 款的规定。

☐ 说明书的修改不符合专利法第 33 条的规定。

☐ 说明书的撰写不符合专利法实施细则第 17 条的规定。

☐

关于权利要求书:

☐ 权利要求____不符合专利法第 2 条第 2 款的规定。

☐ 权利要求____不符合专利法第 9 条第 1 款的规定。

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纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



中华人民共和国国家知识产权局

- ☐ 权利要求_____不具备专利法第 22 条第 2 款规定的新颖性。
- ☒ 权利要求 1-19 不具备专利法第 22 条第 3 款规定的创造性。
- ☐ 权利要求_____不具备专利法第 22 条第 4 款规定的实用性。
- ☐ 权利要求_____属于专利法第 25 条规定的不授予专利权的范围。
- ☐ 权利要求_____不符合专利法第 26 条第 4 款的规定。
- ☐ 权利要求_____不符合专利法第 31 条第 1 款的规定。
- ☐ 权利要求_____的修改不符合专利法第 33 条的规定。
- ☐ 权利要求_____不符合专利法实施细则第 19 条的规定。
- ☐ 权利要求_____不符合专利法实施细则第 20 条的规定。
- ☐ 权利要求_____不符合专利法实施细则第 21 条的规定。
- ☐ 权利要求_____不符合专利法实施细则第 22 条的规定。
- ☐ _____

☐ 申请不符合专利法第 26 条第 5 款或者实施细则第 26 条的规定。

☐ 申请不符合专利法第 20 条第 1 款的规定。

☐ 分案申请不符合专利法实施细则第 43 条第 1 款的规定。

上述结论性意见的具体分析见本通知书的正文部分。

6. 基于上述结论性意见, 审查员认为:

☐ 申请人应当按照通知书正文部分提出的要求, 对申请文件进行修改。

☐ 申请人应当在意见陈述书中论述其专利申请可以被授予专利权的理由, 并对通知书正文部分中指出的不符合规定之处进行修改, 否则将不能授予专利权。

☒ 专利申请中没有可以被授予专利权的实质性内容, 如果申请人没有陈述理由或者陈述理由不充分, 其申请将被驳回。

☐ _____

7. 申请人应注意下列事项:

(1) 根据专利法第 37 条的规定, 申请人应当在收到本通知书之日起的 2 个月内陈述意见, 如果申请人无正当理由逾期不答复, 其申请将被视为撤回。

(2) 申请人对其申请的修改应当符合专利法第 33 条的规定, 不得超出原说明书和权利要求书记载的范围, 同时申请人对专利申请文件进行的修改应当符合专利法实施细则第 51 条第 3 款的规定, 按照本通知书的要求进行修改。

(3) 申请人的意见陈述书和/或修改文本应当邮寄或递交国家知识产权局专利局受理处, 凡未邮寄或递交给受理处的文件不具备法律效力。

(4) 未经预约, 申请人和/或代理人不得前来国家知识产权局与审查员举行会晤。

8. 本通知书正文部分共有 5 页, 并附有下列附件:

☐ 引用的对比文件的复印件共 _____ 份 _____ 页。

☐ _____

审查员: 王雪梅

联系电话: 0512-88995790

审查部门: 专利审查协作江苏中心电学发明审查部

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纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



中华人民共和国国家知识产权局

第三次审查意见通知书

申请号:2013800319699

申请人于 2017 年 10 月 12 日提交了意见陈述书且对权利要求进行了修改, 审查员在阅读了上述文件后, 对本案继续进行审查, 再次提出如下审查意见:

1. 权利要求 1-19 不符合专利法第二十二条第三款有关创造性的规定。

权利要求 1 要求保护一种制造存储器装置的方法。对比文件 2 (US2008/0293255A1) 是最接近的现有技术, 其公开了一种制造存储器装置的方法, 并具体公开了以下技术特征(参见说明书第 0001-0106 段, 图 1-13B): 图 5-6E 所述方法, 包括: 使衬底 600 经受第一氧化工艺以形成覆盖沟道 614 的作为隧穿介质层的第一介质层 602 (即隧穿氧化物层), 所述沟道 614 连接在所述衬底 600 中形成的所述存储器装置的源极和漏极 612; 形成覆盖所述第一介质层 602 的多层电荷存储层, 所述多层电荷存储层包括底部富氧的氮氧化硅部分(相当于富氧的第一层)和顶部富硅的氮氧化硅部分(相当于贫氧的第二层), 所述底部富氧的氮氧化硅部分含有氮化物、在所述第一介质层 602 上, 所述顶部富硅的氮氧化硅部分含有氮化物、在所述底部富氧的氮氧化硅部分上, 本领域技术人员可以直接毫无疑问的确定其中所述底部富氧的氮氧化硅部分的化学计量组成导致其大体上没有陷阱, 其中所述顶部富硅的氮氧化硅部分的化学计量组成导致其是陷阱密集的; 以及使所述衬底 600 经受第二氧化工艺以消耗所述顶部富硅的氮氧化硅部分的一部分并且形成覆盖所述多层电荷存储层的制程温度为 600-900 摄氏度的第二介质层 606 (相当于高温氧化物 HTO 层), 其中所述第一氧化工艺和所述第二氧化工艺中的至少一个是在 600-900 摄氏度如 700-800 摄氏度的范围内的温度下在 0.5-5 托的范围内的压力下持续 100-150 分钟的范围内的持续时间所执行的基团氧化工艺(相当于自由基氧化工艺, 第 0043、0050、0057 段)。

该权利要求的技术方案与对比文件 2 相比, 其区别技术特征是: 其中所述沟道包括多晶硅; 所述第一层通过含有氧化物的反隧穿层与所述第二层分开。基于此区别技术特征, 该权利要求实际所要解决的技术问题是沟道的材料选择及减少泄漏电流。

对比文件 3 (KR10-2004-0070669A) 中公开了一种制造存储器装置的方法(参见说明书第 1 页第 1 行到第 5 页最后一行, 图 1-3): 缓冲氮化层 103 (相当于第一层) 通过缓冲氧化层 104 (相当于包括氧化物的反隧穿层) 与俘获氮化层 105 (相当于第二层) 分开。可见对比文件 3 给出了在电荷存储结构中的两个氮化层之间设置一个氧化层, 最终形成 SONOS, 从而提高其保持特性减少电荷泄漏的技术启示。在此启示下, 本领域技术人员有动机将其应用到对比文件 2 中, 即在底部富氧的氮氧化硅部分和顶部富硅的氮氧化硅部分之间设置包括氧化物的反隧穿层。此外, 根据实际应用需要, 选择多晶硅做为沟道材料, 仅属于本领域的常规选择之一。由此可知, 在对比文件 2 的基础上结合对比文件 3 及公知常识得到权利要求 1 所要保护的技术方案, 对本领域技术人员来说是显而易见的, 因此权利要求 1 所要保护的技术方案不具备突出的实质性特点和显著的进步, 不符合专利法第 22 条第 3 款关于创造性的规定。

权利要求 8 要求保护一种制造存储器装置的方法。对比文件 2 (US2008/0293255A1) 是最接近的现有技术, 其公开了一种制造存储器装置的方法, 并具体公开了以下技术特征(参见说明书第 0001-0106 段, 图 1-13B): 图 5-6E 所述方法, 包括: 使衬底 600 经受第一氧化工艺以形成覆盖沟道 614 的作为隧穿介质层的第一介质层 602 (即隧穿氧化物层), 所述沟道 614 连接在所述衬底 600 中形成的所述存储器装置的源极和漏极 612; 形成覆盖所述第一介质层 602 的多层电荷存储层, 所述多层电荷存储层包括靠近所述第一介质层 602 的、含有氮化物的底部富氧的氮氧化硅部分(相当于第一层)和含有氮化物的顶部富硅的氮氧化硅部分(相当于第二层); 以及使所述衬底 600 经受第二氧化工艺以消耗所述顶部富硅的氮氧化硅部分的一部分并且形成覆盖所述多层电荷存储层的制程温度为 600-900 摄氏度的第二介质层 606 (相当于高温氧化物 HTO 层), 其中所述第一氧化工艺和所述第二氧化工艺中的至少一个是在 600-900 摄氏度如 700-800 摄氏度的范围内的温度下在 0.5-5 托的范围内的压力下持续 100-150 分钟的范围内的持续时间所执行的基团氧化工艺(相当于自由基氧化工艺, 第 0043、0050、0057 段)。

该权利要求的技术方案与对比文件 2 相比, 其区别技术特征是: 其中所述沟道包括多晶硅, 其中所述第一层通过含有氧化物的反隧穿层与所述第二层分开。基于此区别技术特征, 该权利要求实际所要解决的技术问题是沟道的材料选择及减少泄漏电流。

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纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



对比文件 3 (KR10-2004-0070669A) 中公开了一种制造存储器装置的方法 (参见第 1 页第 1 行到第 5 页最后一行, 图 1-3): 缓冲氮化层 103 (相当于第一层) 通过缓冲氧化层 104 (相当于包括氧化物的反隧穿层) 与俘获氮化层 105 (相当于第二层) 分开。可见对比文件 3 给出了在电荷存储结构中的两个氮化层之间设置一个氧化层, 最终形成 SONOS, 从而提高其保持特性减少电荷泄漏的技术启示。在此启示下, 本领域技术人员有动机将其应用到对比文件 2 中, 即在底部富氧的氮氧化硅部分和顶部富硅的氮氧化硅部分之间设置包括氧化物的反隧穿层。此外, 根据实际应用需要, 选择多晶硅做为沟道材料, 仅属于本领域的常规选择之一。由此可知, 在对比文件 2 的基础上结合对比文件 3 及公知常识得到权利要求 8 所要保护的技术方案, 对本领域技术人员来说是显而易见的, 因此权利要求 8 所要保护的技术方案不具备突出的实质性特点和显著的进步, 不符合专利法第 22 条第 3 款关于创造性的规定。

权利要求 2、4 是权利要求 1 的从属权利要求, 权利要求 9、11 是权利要求 8 的从属权利要求。在所属技术领域, 氧化工艺包括很多种, 如等离子氧化工艺、原位水汽生成 ISSG 工艺等, 因此, 根据实际应用情况, 设置第一氧化工艺和第二氧化工艺中的至少一个包括等离子体氧化工艺或者原位水汽生成 ISSG 工艺, 均属于本领域的常用技术手段。因此, 当其各自引用的权利要求不具备创造性时, 该些权利要求不符合专利法第 22 条第 3 款关于创造性的规定。

权利要求 3 是权利要求 2 的从属权利要求, 权利要求 5-6 是权利要求 4 的从属权利要求, 权利要求 10 是权利要求 9 的从属权利要求, 权利要求 12-13 是权利要求 11 的从属权利要求。根据实际应用需要, 沟道材料选择多晶硅, 或沟道材料形状选择纳米线, 其中多晶硅采用再结晶方式形成, 这些均属于本领域的常规选择。因此, 当其各自引用的权利要求不具备创造性时, 该些权利要求不符合专利法第 22 条第 3 款关于创造性的规定。

权利要求 7 是权利要求 1 的从属权利要求, 权利要求 14 是权利要求 8 的从属权利要求。其附加技术特征已经在对比文件 2 中公开 (参见第 0035-0092 段, 图 2-10E): 所述第一氧化工艺或第二氧化工艺中的至少一个是基团氧化工艺 (相当于自由基氧化工艺), 第二介质层 606 通过第二基团氧化制程形成, 类似于图 4B 中形成阻挡介质层 406 的基团氧化制程, 由此本领域技术人员可以确定, 所述基团氧化工艺包括使氢气 H_2 和氧气 O_2 流动到氧化腔体 (相当于加工室) 内, 并且在顶部富硅的氮氧化硅部分 (相当于第二氮氧化物层) 的表面上形成自由基以消耗所述顶部富硅的氮氧化硅部分的一部分并且形成第二介质层 606 而没有发生使所述 H_2 和 O_2 热解的点火事件。因此, 当其各自引用的权利要求不具备创造性时, 该些权利要求不符合专利法第 22 条第 3 款关于创造性的规定。

权利要求 15 要求保护一种制造存储器装置的方法。对比文件 4 (US2009/0294844A1) 是最接近的现有技术, 其公开了一种制造存储器装置的方法, 并具体公开了以下技术特征 (参见说明书第 0001-0130 段, 图 1-26): 图 23-26 所示存储器装置的制造方法, 包括: 在衬底 201 或 2301 的表面上形成层的堆叠, 所述层的堆叠包括至少有介质层 2303 (相当于第一电介质层)、栅极层 2304 以及介质层 2305 (相当于第二电介质层), 其中所述栅极层 2304 通过所述介质层 2303 与所述衬底 201 或 2301 的所述表面分开, 并且所述介质层 2305 通过所述栅极层 2304 与所述介质层 2303 分开; 形成开口 301, 所述开口 301 穿过所述层的堆叠延伸到在所述衬底 201 或 2301 的所述表面上形成的源极区 2303 (相当于第一掺杂的扩散区); 在所述开口 301 的侧壁上形成采用 CVD 制备的氧化硅膜 2401 (相当于高温氧化物 HTO 层); 在所述氧化硅膜 2401 的内侧侧壁上形成氮化硅膜 2402 (相当于电荷存储层); 在所述氮化硅膜 2402 的内侧侧壁上形成氧化硅膜 2404 (相当于隧穿氧化物层); 以及在所述氧化硅膜 2404 的内侧侧壁上形成包括非晶硅膜 2601 的垂直的沟道, 其中所述垂直的沟道将第一掺杂的源极区 2303 电气耦合到在氧化硅膜 2602 (属于半导体材料层) 中形成的漏极 2603 (相当于第二掺杂的扩散区), 所述氧化硅膜 2602 随后形成在所述层的堆叠和所述开口 301 上。

该权利要求的技术方案与对比文件 4 相比, 其区别技术特征是: (1) 电荷存储层为多层电荷存储层, 所述多层电荷存储层包括贫氧的第一氮氧化物层和富氧的第二氮氧化物层, 所述第一氮氧化物层在所述 HTO 层上, 其中所述第一氮氧化物层的化学计量组成导致其是陷阱密集的, 所述第二氮氧化物层在所述第一氮氧化物层上, 其中所述第一氮氧化物层的化学计量组成导致其大体上没有陷阱; (2) 其中所述隧穿氧化物层和所述 HTO 层中的至少一个是在使用自由基氧化工艺形成的, 所述自由基氧化工艺是在 600-900 摄氏度的范围内的温度下在 0.5-5 托的范围内的压力下持续 100-150 分钟的范围内的持续时间所执行的; (3) 沟道包括多晶硅,



其中所述垂直的沟道完全填充所述开口。基于此区别技术特征，该权利要求实际所要解决的技术问题是在保持良好的数据保持性的情况下等比缩小电荷俘获层的厚度以及获得更高质量的薄膜。

区别特征(1)：对比文件5(CN101517714A)中公开了一种制造存储器装置的方法(参见说明书第1页第1行到第15页最后一行，图1-10)：电荷俘获层(即电荷存储层)为多层电荷俘获层，所述多层电荷俘获层包括少氧(即贫氧)的顶端氮氧化硅518B(即第一氮氧化物层)和富氧的底端氮氧化硅518A(即第二氮氧化物层)，所述顶端氮氧化硅518B与在高温氧化HTO下沉积的阻挡层520(相当于HTO层)邻接，其中所述顶端氮氧化硅518B的化学计量组成导致其是陷阱密集的，所述底端氮氧化硅518A在所述顶端氮氧化硅518B上，其中所述底端氮氧化硅518A的化学计量组成导致其大体上没有陷阱。可见对比文件5给出了设置包括贫氧的第一氮氧化物层和富氧的第二氮氧化物层的多层电荷存储层，从而在保持良好的数据保持性的情况下等比缩小电荷俘获层的厚度的技术启示。在此启示下，本领域技术人员有动机将其应用到对比文件4中，设置包括贫氧的第一氮氧化物层和富氧的第二氮氧化物层的多层电荷存储层，第一氮氧化物层在上述氧化硅膜2401上，所述第二氮氧化物层在所述第一氮氧化物层上，这无需付出创造性的劳动。

区别特征(2)：对比文件2(US2008/0293255A1)公开了一种制造存储器装置的方法，并具体公开了以下技术特征(参见说明书第0001-0106段，图1-13B)：作为隧穿介质层的第一介质层602(即隧穿氧化物层)和制程温度为600-900摄氏度的第二介质层606(相当于高温氧化物HTO层)中的至少一个是使用基团氧化工艺(相当于自由基氧化工艺，第0043、0050、0057段)形成的，所述基团氧化工艺是在600-900摄氏度如700-800摄氏度的范围内的温度下在0.5-5托的范围内的压力下持续100-150分钟的范围内的持续时间所执行的。该技术特征在对比文件2中的作用与其在该权利要求中的作用相同，都是采用自由基氧化工艺以获得更高质量的薄膜。因此，对比文件2给出了将上述技术特征应用到对比文件4中的启示。

区别特征(3)：根据实际应用需要，选择多晶硅做为沟道材料，仅属于本领域的常规选择之一；此外，在存储器领域中，垂直的沟道完全填充开口，是本领域的常规设置，如现有技术(US2010/0178759A1、US2010/0006922A1、US2010/0252877A1)，这无需付出创造性的劳动。

由此可知，在对比文件4的基础上结合对比文件5、2及公知常识得到权利要求15所要保护的技术方案，对本领域技术人员来说是显而易见的，因此权利要求15所要保护的技术方案不具备突出的实质性特点和显著的进步，不符合专利法第22条第3款关于创造性的规定。

权利要求16-17是权利要求15的从属权利要求。在实际应用中，本领域技术人员有动机通过其他任意合适的方式形成高温氧化物HTO层，如等离子氧化工艺、原位水汽生成ISSG工艺等，均属于本领域的常用的氧化手段。因此，当其各自引用的权利要求不具备创造性时，该些权利要求不符合专利法第22条第3款关于创造性的规定。

权利要求18-19是权利要求15的从属权利要求。对比文件3(KR10-2004-0070669A)中公开了一种制造存储器装置的方法(参见说明书第1页第1行到第5页最后一行，图1-3)：缓冲氮化层103(相当于第一层)通过缓冲氧化层(相当于包括氧化物的反隧穿层)与俘获氮化层105(相当于第二层)分开。可见对比文件3给出了在电荷存储结构中的两个氮化层之间设置一个氧化层，最终形成SONOS，从而提高其保持特性减少电荷泄漏的技术启示。在此启示下，本领域技术人员有动机将其应用到对比文件4中。此外，在实际应用中，本领域技术人员有动机通过其他任意合适的方式形成高温氧化物HTO层，如等离子氧化工艺、原位水汽生成ISSG工艺等，均属于本领域的常用的氧化手段。由此可知，在对比文件4的基础上结合对比文件5、2、3及公知常识得到权利要求18-19所要保护的技术方案，对本领域技术人员来说是显而易见的，因此权利要求18-19所要保护的技术方案不具备突出的实质性特点和显著的进步，不符合专利法第22条第3款关于创造性的规定。

2. 关于申请人意见陈述及答复

申请人在意见陈述书中指出：

对比文件2中的特征“第一介质层602”描述了本申请修改后的权利要求1所要求保护的“隧穿氧化物层”，并且第二介质层606描述了本申请修改后的权利要求1所要求保护的“高温氧化物HTO层”。基于此，参考对比文件2的图6E，审查员明显认为对比文件2中的层604描述了本申请要求保护的“多层电荷存储层”，



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所述多层电荷存储层包括富氧的第一层和贫氧的第二层”。对此，申请人谨不同意。谨认为审查员的上述意见是不合理的，因为对比文件 2 的层 604 显然不是包含富氧的第一层和贫氧的第二层的多层电荷存储层。

仅为了说明的缘故且并不表示承认，即使对比文件 2 的层 604、606 分别描述了本申请的富氧的第一层和贫氧的第二层，对比文件 2 的栅极层 608 由含金属的材料构成，但其也不是本申请要求保护的覆盖层 604、606（所认为的多层电荷存储层）的“高温氧化物 HT0 层”。

此外，对比文件 2 未提及本申请要求保护的“所述第一层的化学计量组成导致其大体上没有陷阱，……所述第二层的化学计量组成导致其是陷阱密集的”。

因此，谨认为本申请修改后的权利要求 1 与对比文件 2 的区别技术特征至少包括：形成覆盖所述隧穿氧化物层的多层电荷存储层，所述多层电荷存储层包括富氧的第一层和贫氧的第二层，所述第一层含有氮化物、在所述隧穿氧化物层上，其中所述第一层的化学计量组成导致其大体上没有陷阱，所述第二层含有氮化物、在所述第一层上，其中所述第二层的化学计量组成导致其是陷阱密集的，其中，所述第一层通过包括氧化物的反隧穿层与所述第二层分开。

权利要求 8 的附加技术特征“其中，所述第一层通过包括氧化物的反隧穿层与所述第二层分开”并入权利要求 1 后，谨认为通过将对文件 2 与对比文件 3 结合，不能实现本申请修改后的权利要求 1 的特征。审查员认为对比文件 3 公开了缓冲氮化层 103 通过缓冲氧化层与俘获氮化层 105 分开，因而审查员认为对比文件 3 在电荷存储结构中的两个氮化层之间提供了氧化层。然而，可以看出，对比文件 3 中的缓冲氮化层 103 和“俘获氮化层 105”明显不同于本申请中的“富氧的第一层”和“贫氧的第二层”，且对比文件 3 没有公开其缓冲氧化层提供任何反隧穿功能。因此，本领域技术人员将不会合理地想到通过将对文件 3 应用于对比文件 2 来实现本申请修改后的权利要求 1 中的特征“所述第一层通过包括氧化物的反隧穿层与所述第二层分开”。

对于申请人的上述意见，审查员认为：

(1) 审查员在通知书中评述的是：作为隧穿介质层的第一介质层 602（即隧穿氧化物层），制程温度为 600-900 摄氏度的第二介质层 606（相当于高温氧化物 HT0 层），形成覆盖所述第一介质层 602 的多层电荷存储层，所述多层电荷存储层包括底部富氧的氮氧化硅部分（相当于富氧的第一层）和顶部富硅的氮氧化硅部分（相当于贫氧的第二层）；可见，审查员并没有认定层 604 为多层电荷存储层，也没有认定层 604、606 分别为富氧的第一层和贫氧的第二层，更没有认定层 608 为高温氧化物 HT0 层；而审查员认定的多层电荷存储层的相关内容是根据对比文件 2 第 0055 段文字记载“In another aspect of the present invention, the charge-trapping layer may include multiple composition regions. For example, in accordance with an embodiment of the present invention, the charge-trapping layer includes an oxygen-rich portion and a silicon-rich portion and is formed by depositing an oxygen-rich oxy-nitride film by a first composition of gases and, subsequently, depositing a silicon-rich oxy-nitride film by a second composition of gases. In accordance with an embodiment of the present invention, the charge-trapping layer comprises a bottom oxygen-rich silicon oxy-nitride portion having a thickness approximately in the range of 2.5-3.5 nanometers and a top silicon-rich silicon oxy-nitride portion having a thickness approximately in the range of 9-10 nanometers”，其公开了特征“形成覆盖所述第一介质层 602 的多层电荷存储层，所述多层电荷存储层包括底部富氧的氮氧化硅部分（相当于富氧的第一层）和顶部富硅的氮氧化硅部分（相当于贫氧的第二层），所述底部富氧的氮氧化硅部分含有氮化物、在所述第一介质层 602 上，所述顶部富硅的氮氧化硅部分含有氮化物、在所述底部富氧的氮氧化硅部分上”，这并不构成区别特征；此外，提醒申请人注意，对比文件 2 的图 5-6E 及说明书第 0045-0062 段实施例，与本申请的图 5-6E 及说明书第 0060-0077 段实施例，二者内容几乎完全一致。

(2) 关于特征“所述第一层的化学计量组成导致其大体上没有陷阱，……所述第二层的化学计量组成导致其是陷阱密集的”：本申请说明书第 0140、0150、0166 段记载了“顶部电荷俘获层包含富硅、贫氧的氮化物层并且包含分布在多个电荷俘获层中的电荷陷阱中的多数，然而底部电荷俘获层包含富氧的氮化物或氮氧化硅，并且相对于顶部电荷俘获层是富氧的以减少其中电荷陷阱的数目”，而对比文件 2 已经公开了：所述多



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层电荷存储层包括底部富氧的氮氧化硅部分（相当于富氧的第一层）和顶部富硅的氮氧化硅部分（相当于贫氧的第二层），由此本领域技术人员可以直接毫无疑问的确定其中所述底部富氧的氮氧化硅部分的化学计量组成导致其大体上没有陷阱，其中所述顶部富硅的氮氧化硅部分的化学计量组成导致其是陷阱密集的。

此外，对比文件 5 说明书第 8 页第 1-3 段明确记载了：电荷俘获层（即电荷存储层）为多层电荷俘获层，所述多层电荷俘获层包括少氧（即贫氧）的顶端氮氧化硅 518B（即第一氮氧化物层）和富氧的底端氮氧化硅 518A（即第二氮氧化物层），其中所述顶端氮氧化硅 518B 的化学计量组成导致其是陷阱密集的（第 8 页第 3 段），所述底端氮氧化硅 518A 在所述顶端氮氧化硅 518B 上，其中所述底端氮氧化硅 518A 的化学计量组成导致其大体上没有陷阱（第 8 页第 2 段）。

（3）最接近的现有技术对比文件 2 已经公开了特征“富氧的氮氧化硅部分（相当于富氧的第一层）、顶部富硅的氮氧化硅部分（相当于贫氧的第二层）”，这并不是区别特征，不需要在对比文件 3 中寻找。

根据本申请的记载可知，“富氧的第一层”、“贫氧的第二层”本质是为氮化物的电荷存储层，位于隧穿氧化物层与阻挡电介质层之间；关于反隧穿层的作用，本申请第 0124 段记载了“反隧穿层 1421 大体上减少了在从隧穿到底部氮化物层 1419 编程期间在上方的氮化物层 1418 的边界处积聚的电子电荷的概率，这导致比用于图 1 中示出的结构更低的泄漏电流”；而对比文件 3 公开了：一种存储器装置，缓冲氮化层 103、俘获氮化层 105 是位于隧穿氧化物层 102 与阻挡氧化物层 106 之间的为氮化物的电荷存储层，因此，该缓冲氮化层 103 相当于本申请中的第一层，该俘获氮化层 105 相当于本申请的第二层，缓冲氮化层 103（相当于第一层）通过缓冲氧化层 104（相当于包括氧化物的反隧穿层）与俘获氮化层 105（相当于第二层）分开，缓冲氧化层 104 提高了其保持特性（说明书第 3 页第 3-5 段），本领域技术人员可以确定该保持特性即为电荷保持特性即可以减少泄漏电流，这与本申请中的作用是相同的，因此本领域技术人员有动机将其应用到对比文件 2 中。

综上所述，审查员对申请人的陈述意见进行了仔细考虑，认为申请人的意见陈述不具有说服力，坚持本申请不具备授权前景。

基于上述理由，该申请不具备授权前景。如果申请人不能在本通知书指定的答复期限内通过意见陈述和/或修改申请文件以提出反对上述审查意见的充分理由和证据，该专利申请将被驳回。

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纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。



中华人民共和国国家知识产权局

100192

北京市海淀区学清路8号B座1601A 北京安信方达知识产权代理有限公司
张瑞 郑霞

发文日:

2018年01月26日



申请号或专利号: 201380016893.2

发文序号: 2018012301747740

申请人或专利权人: 赛普拉斯半导体公司

发明创造名称: 具有多个氮氧化物层的氧化物氮化物氧化物堆栈

第三次审查意见通知书

1. ☒ 审查员已经收到申请人于 2017 年 8 月 28 日提交的意见陈述书, 在此基础上审查员对上述专利申请继续进行实质审查。

☐ 根据国家知识产权局专利复审委员会于____年____月____日作出的复审决定, 审查员对上述专利申请继续进行实质审查。

☐

2. ☐ 经审查, 申请人于____提交的修改文件, 不符合专利法实施细则第 51 条第 3 款的规定, 不予接受。

3. 继续审查是针对下列申请文件进行的:

☐ 上述意见陈述书中所附的经修改的申请文件。

☒ 前次审查意见通知书所针对的申请文件以及上述意见陈述书中所附的经修改的申请文件替换文件。

☐ 前次审查意见通知书所针对的申请文件。

☐ 上述复审决定所确定的申请文件。

☐

4. ☒ 本通知书未引用新的对比文件。

☐ 本通知书引用下列对比文件(其编号续前, 并在今后的审查过程中继续沿用):

编号	文件号或名称	公开日期 (或抵触申请的申请日)
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5. 审查的结论性意见:

关于说明书:

☐ 申请的内容属于专利法第 5 条规定的不授予专利权的范围。

☐ 说明书不符合专利法第 26 条第 3 款的规定。

☐ 说明书的修改不符合专利法第 33 条的规定。

☐ 说明书的撰写不符合专利法实施细则第 17 条的规定。

☐

关于权利要求书:

☐ 权利要求____不符合专利法第 2 条第 2 款的规定。

☐ 权利要求____不符合专利法第 9 条第 1 款的规定。

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2010.2

纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



中华人民共和国国家知识产权局

- ☐ 权利要求_____不具备专利法第 22 条第 2 款规定的新颖性。
☒ 权利要求 1-20 不具备专利法第 22 条第 3 款规定的创造性。
☐ 权利要求_____不具备专利法第 22 条第 4 款规定的实用性。
☐ 权利要求_____属于专利法第 25 条规定的不授予专利权的范围。
☐ 权利要求_____不符合专利法第 26 条第 4 款的规定。
☐ 权利要求_____不符合专利法第 31 条第 1 款的规定。
☐ 权利要求_____的修改不符合专利法第 33 条的规定。
☐ 权利要求_____不符合专利法实施细则第 19 条的规定。
☐ 权利要求_____不符合专利法实施细则第 20 条的规定。
☐ 权利要求_____不符合专利法实施细则第 21 条的规定。
☐ 权利要求_____不符合专利法实施细则第 22 条的规定。
☐ _____

☐ 申请不符合专利法第 26 条第 5 款或者实施细则第 26 条的规定。

☐ 申请不符合专利法第 20 条第 1 款的规定。

☐ 分案申请不符合专利法实施细则第 43 条第 1 款的规定。

上述结论性意见的具体分析见本通知书的正文部分。

6. 基于上述结论性意见, 审查员认为:

☐ 申请人应当按照通知书正文部分提出的要求, 对申请文件进行修改。

☐ 申请人应当在意见陈述书中论述其专利申请可以被授予专利权的理由, 并对通知书正文部分中指出的不符合规定之处进行修改, 否则将不能授予专利权。

☒ 专利申请中没有可以被授予专利权的实质性内容, 如果申请人没有陈述理由或者陈述理由不充分, 其申请将被驳回。

☐ _____

7. 申请人应注意下列事项:

(1) 根据专利法第 37 条的规定, 申请人应当在收到本通知书之日起的 2 个月内陈述意见, 如果申请人无正当理由逾期不答复, 其申请将被视为撤回。

(2) 申请人对其申请的修改应当符合专利法第 33 条的规定, 不得超出原说明书和权利要求书记载的范围, 同时申请人对专利申请文件进行的修改应当符合专利法实施细则第 51 条第 3 款的规定, 按照本通知书的要求进行修改。

(3) 申请人的意见陈述书和/或修改文本应当邮寄或递交国家知识产权局专利局受理处, 凡未邮寄或递交给受理处的文件不具备法律效力。

(4) 未经预约, 申请人和/或代理人不得前来国家知识产权局与审查员举行会晤。

8. 本通知书正文部分共有 9 页, 并附有下列附件:

☐ 引用的对比文件的复印件共_____份_____页。

☐ _____

审查员: 肖玲

联系电话: 027-59371921

审查部门: 专利审查协作湖北中心电学发明审查部

210403
2010. 2

纸件申请, 回函请寄: 100088 北京市海淀区蓟门桥西土城路 6 号 国家知识产权局专利局受理处收
电子申请, 应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外, 以纸件等其他形式提交的文件视为未提交。



第三次审查意见通知书

申请号:2013800168932

申请人于 2017 年 08 月 28 日针对第二次审查意见通知书提交了意见陈述书和修改过的权利要求书, 审查员在阅读了上述文件后, 对本案继续进行审查, 提出如下审查意见。

一、权利要求 1-20 不符合专利法第 22 条第 3 款规定的创造性。

1. 权利要求 1 要求保护一种存储设备, 对比文件 1 (US8063434 B1) 公开了一种存储晶体管, 并具体公开了如下技术特征(参见说明书第 2 栏第 38-46 行, 第 3 栏第 42-47 行, 第 8 栏第 43-63 行, 图 3): 如图 3 所示, 沟道 312 由覆盖在衬底 306 上的表面的半导体材料形成, 所述沟道连接存储设备 300 的源极/漏极 314; 隧道氧化物层 316 覆盖沟道 312; 以及多层电荷储存层 318A 和 318B, 包括在隧道氧化物层 316 上的无陷阱氮氧化层 318B (即第一氮氧化物层, 化学计量组合物导致其实质上没有陷阱) 和在无缺陷氮氧化层 318B 上的电荷陷阱氮氧化层 318A (即第二氮氧化物层, 化学计量组合物导致其陷阱密集); 底层无陷阱氮氧化层 318B 是富氧, 富硅氮氧化层; 顶层电荷陷阱氮氧化层 318A 是贫氧, 富硅氮氧化层; 电荷陷阱氮氧化层 318A 上的阻挡氧化层 320。

权利要求 1 与对比文件 1 公开的内容相比, 区别技术特征是: (1) 退火的所述阻挡介电层包括顶面, 所述顶面中的陷阱的数量已经通过蒸气退火而被减少; (2) 沟道由被布置为覆盖衬底上的表面并与衬底上的表面分离的半导体材料形成。基于上述区别技术特征, 该权利要求实际解决的技术问题是: (1) 如何减少阻挡介电层中陷阱的数量; (2) 如何提高栅极对沟道的控制。

针对区别技术特征 (1), 对比文件 7 (CN1107254 A) 公开了一种制造半导体集成电路的方法和设备, 并具体公开了 (参见说明书第 2 页第 17-20 行): 通过在每一道处理工序中, 用近似 1000℃ 的较高的温区进行氧气退火或者水蒸气退火的技术, 以便除去硅衬底中的微小缺陷或者叠层缺陷, 从而使氧化膜/衬底界面的表面态稳定。由此可知, 对比文件 7 公开了水蒸气退火可以减少缺陷, 提高界面态稳定。本领域技术人员有动机将上述方法运用到阻挡介电层的顶面, 提高顶面界面态稳定, 减少顶面中的陷阱的数量。

针对区别技术特征 (2), 本领域技术人员为了提高场效应晶体管栅极对沟道的控制能力, 提高栅极与沟道的接触面积, Finfet, 环栅, 多栅是本领域技术人员的常规器件结构。当使用 Finfet 结构时, 沟道由被布置为覆盖衬底上的表面并与衬底上的表面分离的半导体材料形成, 是本领域技术人员的常规技术手段。

因此在对比文件 1 的基础上结合对比文件 7 获得该权利要求所要求保护的技术方案, 对本



领域技术人员来说是显而易见的，因此该权利要求所要求保护的技术方案不具备突出的实质性特点和显著的进步，因而不具备专利法第 22 条第 3 款规定的创造性。

2. 权利要求 2-3 是权利要求 1 的从属权利要求，权利要求 2-3 与对比文件 1 公开的内容相比，区别技术特征是：沟道包括多晶硅，沟道包括再结晶的多晶硅。基于上述区别技术特征，该权利要求实际解决的技术问题是：如何选择沟道材料。

对比文件 2 (US2008/0048237 A1) 公开了一种半导体存储器件，并具体公开了（参见对比文件 2 说明书第 132 段）：存储单元晶体管的沟道区 25 可以通过再结晶无定型硅或者多晶硅形成。而且该特征在对比文件 2 中所起的作用与其在本发明中为解决其技术问题所起的作用相同，也就是说对比文件 2 给出了将该技术特征用于该对比文件 1 以解决其技术问题的启示。

因此在对比文件 1 的基础上结合对比文件 2 获得该权利要求所要求保护的技术方案，对本领域技术人员来说是显而易见的，因此该权利要求所要求保护的技术方案不具备突出的实质性特点和显著的进步，因而不具备专利法第 22 条第 3 款规定的创造性。

3. 权利要求 4 是权利要求 1 的从属权利要求，权利要求 4 与对比文件 1 公开的内容相比，区别技术特征是：沟道包括硅纳米线。基于上述区别技术特征，该权利要求实际解决的技术问题是：如何选择沟道结构。

对比文件 3 (CN1801478A) 公开了一种半导体元件，并具体公开了（参见对比文件 3 说明书第 2 页第 9-15 行，图 1a-1b, 2c）：如图 1a-1b 所示，晶体管 1 包含有由纳米线组成的源极 2 以及漏极 4，而源极 2 和漏极 4 间的区域即为沟道 7。且该特征在对比文件 3 中所起的作用与其在本发明中为解决其技术问题所起的作用相同，也就是说对比文件 3 给出了将该技术特征用于该对比文件 1 以解决其技术问题的启示。

因此在对比文件 1 的基础上结合对比文件 3 获得该权利要求所要求保护的技术方案，对本领域技术人员来说是显而易见的，因此该权利要求所要求保护的技术方案不具备突出的实质性特点和显著的进步，因而不具备专利法第 22 条第 3 款规定的创造性。

4. 权利要求 5 是权利要求 1 的从属权利要求。对比文件 1 公开了（参见说明书第 2 栏第 38-46 行，第 3 栏第 42-47 行，第 8 栏第 43-63 行，图 3）：如图 3 所示，沟道 312 由覆盖在衬底 306 上的表面的半导体材料形成，所述沟道连接存储设备 300 的源极/漏极 314；隧道氧化物层 316 覆盖沟道 312；以及多层电荷储存层 318A 和 318B。



权利要求 5 与对比文件 1 公开的内容相比，区别技术特征是：所述存储设备包括非平面晶体管，所述非平面晶体管包括具有邻接所述沟道的多个表面的栅极。基于上述区别技术特征，该权利要求实际解决的技术问题是：如何选择晶体管类型，如何避免短沟道效应。

对比文件 3 (CN1801478A) 公开了一种半导体元件，并具体公开了（参见对比文件 3 说明书第 2 页第 9-15 行，图 1a-1b, 2c）：如图 2c 所示，所述存储设备包括非平面晶体管，所述非平面晶体管的栅极围绕在沟道顶面和侧面（即具有邻接所述沟道的多个表面的栅极）。且该特征在对比文件 3 中所起的作用与其在本发明中为解决其技术问题所起的作用相同，也就是说对比文件 3 给出了将该技术特征用于该对比文件 1 以解决其技术问题的启示。

因此在对比文件 1 的基础上结合对比文件 3 获得该权利要求所要求保护的技术方案，对本领域技术人员来说是显而易见的，因此该权利要求所要求保护的技术方案不具备突出的实质性特点和显著的进步，因而不具备专利法第 22 条第 3 款规定的创造性。

5. 权利要求 6-7 依次是权利要求 5 和 1 的从属权利要求。对比文件 1 公开了（参见说明书第 2 栏第 38-46 行，第 3 栏第 42-47 行，第 8 栏第 43-63 行，图 3）：如图 3 所示，栅极还包括覆盖电荷储存层 318A 和 318B 的阻挡氧化层 320 和覆盖阻挡氧化层 320 的栅极层 308。此外，栅极层为金属材料，阻挡介质是高 K 介质材料，是本领域技术人员的常规技术手段。因此，在其引用的权利要求不具备创造性的前提下，该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

6. 权利要求 8 是权利要求 1 的从属权利要求，其附加技术特征已被对比文件 1 公开（参见说明书第 2 栏第 38-46 行，第 3 栏第 42-47 行，第 8 栏第 43-63 行，图 3）：顶层电荷陷阱氮氧化物层通过在化学气相沉积时增加一定浓度的碳来增加陷阱数量（参见说明书第 3 栏第 42-47 行）。因此，在其引用的权利要求不具备创造性的前提下，该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

7. 权利要求 9 要求保护一种存储设备，对比文件 1 (US8063434 B1) 为最接近的现有技术，公开了一种存储晶体管，并具体公开了如下技术特征（参见说明书第 2 栏第 38-46 行，第 3 栏第 42-47 行，第 8 栏第 43-63 行，图 3）：如图 3 所示，沟道 312（毫无疑义确定，沟道在器件工作时可以导电）由覆盖在衬底 306 上的表面的半导体材料形成，沟道连接存储设备 300 的源极/漏极 314；隧道氧化物层 316 覆盖沟道 312；以及多层电荷储存层 318A 和 318B，包括在隧



道氧化物层 316 上的无陷阱氮氧化层 318B (即第一氮氧化物层) 和在无缺陷氮氧化层 318B 上的电荷陷阱氮氧化层 318A (即第二氮氧化物层); 电荷陷阱氮氧化层 318A 上的阻挡氧化层 320。

权利要求 9 与对比文件 1 公开的内容相比, 区别技术特征是: (1) 所述沟道由被布置为覆盖衬底上的表面并与衬底上的表面分离的半导体材料形成, 所述栅极具有邻接所述沟道的多个表面; (2) 所述第一氮氧化物层被包含氧化物的反隧穿层从所述第二氮氧化物层分开; (3) 退火的所述阻挡介电层包括顶面, 所述顶面中的陷阱的数量已经通过蒸气退火而被减少。

基于上述区别技术特征, 该权利要求实际解决的技术问题是: (1) 如何避免短沟道效应; (2) 如何降低泄漏电流; (3) 如何减少阻挡介电层中陷阱的数量。

针对区别技术特征 (1), 围栅, 鳍式场效应晶体管的栅极都是本领域常见的栅极结构, 这两种栅极结构中, 沟道覆盖衬底上的表面并与衬底上的表面分离, 栅极可以与沟道具有较大的接触面, 因此可以一定程度上加强栅极对沟道的控制作用, 缓解短沟道效应。因此, 栅极具有邻接所述沟道的多个表面是本领域技术人员利用鳍式场效应晶体管避免短沟道效应的常规技术手段。

针对区别技术特征 (2), 对比文件 4 (US6709928B1) 公开了一种半导体装置, 并具体公开了 (参见对比文件 4 说明书第 4 栏第 28-35 行, 第 5 栏第 37-47 行, 附图 2B): 如图 2B 所示, 电荷存储层是氮氧化物, 其中, 电荷捕获层 212 (其中 212b 相当于第二氮氧化物层分开) 比 206e 层 (相当于第一氮氧化物层) 具有更多的陷阱; 电荷存储层中的电荷捕获层 212 (其中 212a 相当于包含氧化物的反隧穿层) 可以阻止电荷反隧穿通过电荷存储层; 其中 206e 层被电荷捕获层 212a 从电荷捕获层 212b 分开。且该技术特征在对比文件 4 和本申请中的作用相同, 即对比文件 4 给出了将上述技术特征用于对比文件 1 的技术启示。

针对区别技术特征 (3), 对比文件 7 (CN1107254 A) 公开了一种制造半导体集成电路的方法和设备, 并具体公开了 (参见说明书第 2 页第 17-20 行): 通过在每一道处理工序中, 用近似 1000℃ 的较高的温区进行氧气退火或者水蒸气退火的技术, 以便除去硅衬底中的微小缺陷或者叠层缺陷, 从而使氧化膜/衬底界面的表面态稳定。由此可知, 对比文件 7 公开了水蒸气退火可以减少缺陷, 提高界面态稳定。因此, 对比文件 7 给出了将上述技术特征用于阻挡介电层中以减少界面缺陷的启示。

因此在对比文件 1 的基础上结合对比文件 4、对比文件 7 以及公知常识获得该权利要求所要求保护的技术方案, 对本领域技术人员来说是显而易见的, 因此该权利要求所要求保护的技术方案不具备突出的实质性特点和显著的进步, 因而不具备专利法第 22 条第 3 款规定的创造性。



6. 权利要求 10 是权利要求 9 的从属权利要求, 权利要求 10 与对比文件 1 公开的内容相比, 区别技术特征是: 沟道包括硅纳米线。基于上述区别技术特征, 该权利要求实际解决的技术问题是: 如何选择沟道结构。对比文件 3 (CN1801478A) 公开了一种半导体元件, 并具体公开了(参见对比文件 3 说明书第 2 页第 9-15 行, 图 1a-1b, 2c): 如图 1a-1b 所示, 晶体管 1 包含有由纳米线组成的源极 2 以及漏极 4, 而源极 2 和漏极 4 间的区域即为沟道 7。且该特征在对比文件 3 中所起的作用与其在本发明中为解决其技术问题所起的作用相同。因此, 在其引用的权利要求不具备创造性的前提下, 该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

7. 权利要求 11-12 依次是权利要求 9 的从属权利要求。对比文件 1 公开了(参见说明书第 2 栏第 38-46 行, 第 3 栏第 42-47 行, 第 8 栏第 43-63 行, 图 3): 如图 3 所示, 栅极还包括覆盖电荷储存层 318A 和 318B 的阻挡氧化层 320 和覆盖阻挡氧化层 320 的栅极层 308。此外, 栅极层为金属材料, 阻挡介质是高 K 介质材料, 晶体管为 FinFET, 是本领域技术人员的常规技术手段。因此, 在其引用的权利要求不具备创造性的前提下, 该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

8. 权利要求 13 是权利要求 9 的从属权利要求, 对比文件 5 (CN101558481 A) 公开了一种非易失性电荷俘获存储器件(参见对比文件 5 权利要求 4, 说明书第 3 页第 26-30 行, 第 4 页第 4 段, 图 4B): 执行多次基团氧化工艺为非易失性电荷俘获存储器件提供隧穿介质层和阻挡介质层(即反隧穿层); 电荷俘获层包含选自下列组中的材料: 氮化硅, 氮氧化硅, 富氧氮氧化硅和富硅氮氧化硅(包含第一氮氧化物层); 阻挡介质层 406 通过将电荷俘获层暴露(即第一氮氧化物层的一部分)在基团氧化制程中来氧化电荷俘获层的区域 404B 而形成。且该技术特征在对比文件 5 和本申请中都是在电荷俘获层附近形成反隧穿层以防止电流泄露。因此, 在其引用的权利要求不具备创造性的前提下, 该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

9. 权利要求 14 是权利要求 9 的从属权利要求。对比文件 1 公开了(参见说明书第 2 栏第 38-46 行, 第 3 栏第 42-47 行, 第 8 栏第 43-63 行, 图 3): 多层电荷储存层 318A 和 318B, 包括在隧道氧化物层 316 上的无陷阱氮氧化物层 318B(即第一氮氧化物层, 实质上没有陷阱)和在无缺陷氮氧化物层 318B 上的电荷陷阱氮氧化物层 318A(即第二氮氧化物层, 其陷阱密集); 底层无陷阱氮氧化物层 318B 是富氧, 富硅氮氧化物层; 顶层电荷陷阱氮氧化物层 318A 是贫氧, 富硅氮氧化物层; 顶层电荷陷阱氮氧化物层通过在化学气相沉积时增加一定浓度的碳来增加陷阱数量(参见说明书



第 3 栏第 42-47 行)。因此,在其引用的权利要求不具备创造性的前提下,该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

10. 权利要求 15 要求保护一种存储设备,对比文件 6 (W02011/162725 A1) 为最接近的现有技术,公开了一种用于存储的纳米线晶体管,并具体公开了如下技术特征(参见对比文件 6 说明书第 128-132 段,图 6):如图 6 所示,纳米线晶体管 600 包括载体 602,属于硅晶片衬底 604 的一部分;垂直沟道 608,由载体 602 (属于半导体材料)的薄的凸出形成,所述薄的凸出从在衬底 604 上的表面上形成的源区 614b (即第一扩散区)延伸到在衬底 604 的表面上方形成的漏区 614a (即第二扩散区),所述垂直沟道 608 将源区 614b 电连接到所述漏区 614a;栅极绝缘层 610 (即隧道氧化物层),邻接所述垂直沟道 608。

权利要求 15 与对比文件 6 公开的内容相比,区别技术特征是:(1) 多层电荷储存层,所述多层电荷储存层邻接所述隧道氧化物层,所述多层电荷储存层包括第一氮氧化物层和第二电荷俘获层,所述第一氮氧化物层包括更靠近所述隧道氧化物层的富氧氮化物,所述第二电荷俘获层包括覆盖所述第一氮氧化物层的富硅、贫氧氮化物,其中,所述第二电荷俘获层包括分布在分离电荷俘获区中的大多数电荷陷阱,所述第二电荷俘获层上的阻挡介电层;(2) 退火的所述阻挡介电层包括顶面,所述顶面中的陷阱的数量已经通过蒸气退火而被减少。

基于上述区别技术特征,该权利要求实际解决的技术问题是:(1) 如何改进编程和擦除速度和数据保持;(2) 如何减少阻挡介电层中陷阱的数量。

针对上述区别技术特征(1),对比文件 1 (US8063434 B1) 公开了一种存储晶体管,并具体公开了如下技术特征(参见说明书第 2 栏第 38-46 行,第 3 栏第 42-47 行,第 8 栏第 43-63 行,图 3):如图 3 所示,隧道氧化物层 316 覆盖沟道 312;以及多层电荷储存层 318A 和 318B,包括在隧道氧化物层 316 上的无陷阱氮氧化层 318B (即第一氮氧化物层,更靠近所述隧道氧化物层的氮化物,化学计量组合物导致其实质上没有陷阱)和在无缺陷氮氧化层 318B 上的电荷陷阱氮氧化层 318A (即第二氮氧化物层,化学计量组合物导致其陷阱密集);底层无陷阱氮氧化层 318B 是富氧,富硅氮氧化层;顶层电荷陷阱氮氧化层 318A 是贫氧,富硅氮氧化层;电荷陷阱氮氧化层 318A 上的阻挡氧化层 320。且该技术特征在对比文件 1 和本申请中的作用相同,即对比文件 1 给出了将上述技术特征用于对比文件 6 的技术启示。

针对上述区别技术特征(2),对比文件 7 (CN1107254 A) 公开了一种制造半导体集成电路的方法和设备,并具体公开了(参见说明书第 2 页第 17-20 行):通过在每一道处理工序中,用近似 1000℃的较高的温区进行氧气退火或者水蒸气退火的技术,以便除去硅衬底中的微小缺陷



或者叠层缺陷,从而使氧化膜/衬底界面的表面态稳定。由此可知,对比文件7公开了水蒸气退火可以减少缺陷,提高界面态稳定。因此,对比文件7给出了将上述技术特征用于阻挡介电层中以减少界面缺陷的启示。

因此,在对比文件6的基础上结合对比文件1和对比文件7获得该权利要求所要求保护的技术方案,对本领域技术人员来说是显而易见的,因此该权利要求所要求保护的技术方案不具备突出的实质性特点和显著的进步,因而不具备专利法第22条第3款规定的创造性。

11. 权利要求16是权利要求15的从属权利要求,对比文件6公开(参见对比文件6说明书第128-132段,图6):如图6所示,垂直纳米线晶体管600包括载体602,属于硅晶片衬底604的一部分;垂直沟道608为纳米线结构。因此,在其引用的权利要求不具备创造性的前提下,该权利要求也不具备专利法第22条第3款规定的创造性。

12. 权利要求17是权利要求16的从属权利要求,对比文件4(US6709928B1)公开了一种半导体装置,并具体公开了(参见对比文件4说明书第4栏第28-35行,第5栏第37-47行,附图2B):如图2B所示,电荷存储层是氮氧化物,其中,电荷捕获层212(其中212b相当于第二电荷俘获层分开)比206e层(相当于第一氮氧化物层)具有更多的陷阱;电荷存储层中的电荷捕获层212(其中212a相当于包含氧化物的反隧穿层)可以阻止电荷反隧穿通过电荷存储层;其中206e层被电荷捕获层212a从电荷捕获层212b分开。且该技术特征在对比文件4和本申请中的作用相同。因此,在其引用的权利要求不具备创造性的前提下,该权利要求也不具备专利法第22条第3款规定的创造性。

13. 权利要求18是权利要求16的从属权利要求。然而,阻挡介质是高K介质材料,是本领域技术人员的常规技术手段。因此,在其引用的权利要求不具备创造性的前提下,该权利要求也不具备专利法第22条第3款规定的创造性。

14. 权利要求19是权利要求18的从属权利要求,对比文件4(US6709928B1)公开了一种半导体装置,并具体公开了(参见对比文件4说明书第4栏第28-35行,第5栏第37-47行,附图2B):如图2B所示,电荷存储层是氮氧化物,其中,电荷捕获层212(其中212b相当于第二电荷俘获层分开)比206e层(相当于第一氮氧化物层)具有更多的陷阱;电荷存储层中的电荷捕获层212(其中212a相当于包含氧化物的反隧穿层)可以阻止电荷反隧穿通过电荷存储层;



其中 206e 层被电荷捕获层 212a 从电荷捕获层 212b 分开。且该技术特征在对比文件 4 和本申请中的作用相同。因此，在其引用的权利要求不具备创造性的前提下，该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

15. 权利要求 20 是权利要求 15 的从属权利要求，其附加技术特征已被对比文件 1 公开（参见说明书第 2 栏第 38-46 行，第 3 栏第 42-47 行，第 8 栏第 43-63 行，图 3）：顶层电荷陷阱氮氧化物层通过在化学气相沉积时增加一定浓度的碳来增加陷阱数量（参见说明书第 3 栏第 42-47 行）。因此，在其引用的权利要求不具备创造性的前提下，该权利要求也不具备专利法第 22 条第 3 款规定的创造性。

二、针对申请人的意见陈述

审查员和申请人均认为区别技术特征是：（1）退火的所述阻挡介电层包括顶面，所述顶面中的陷阱的数量已经通过蒸气退火而被减少；（2）沟道由被布置为覆盖衬底上的表面并与衬底上的表面分离的半导体材料形成。但申请人认为对比文件并没有公开上述区别技术特征，且上述特征也不属于公知常识。

审查员认为：

针对区别技术特征（1），界面态稳定是半导体材料的常见技术问题，本领域技术人员知晓稳定的界面态，可以降低表面粗糙度，提高载流子通过率，减少电荷陷阱数量。而本申请的这种多层结构，包括阻挡介电层，也是需要提高界面态稳定的。在解决这个问题的动力驱使下，本领域技术人员有动力寻找一种方法提高阻挡介电层界面态稳定。对比文件 7（CN1107254 A）公开了一种制造半导体集成电路的方法和设备，并具体公开了（参见说明书第 2 页第 17-20 行）：通过在每一道处理工序中，用近似 1000℃ 的较高的温区进行氧气退火或者水蒸气退火的技术，以便除去硅衬底中的微小缺陷或者叠层缺陷，从而使氧化膜/衬底界面的表面态稳定。由此可知，对比文件 7 公开了水蒸气退火可以减少缺陷，提高界面态稳定。本领域技术人员有动机将上述方法运用到阻挡介电层的顶面，提高顶面界面态稳定，减少顶面中的陷阱的数量。

针对区别技术特征（2），本领域技术人员为了提高场效应晶体管栅极对沟道的控制能力，提高栅极与沟道的接触面积，Finfet，环栅，多栅是本领域技术人员的常规器件结构。当使用 Finfet 结构时，沟道由被布置为覆盖衬底上的表面并与衬底上的表面分离的半导体材料形成，是本领域技术人员的常规技术手段。



中华人民共和国国家知识产权局

基于上述理由，本申请的独立权利要求以及从属权利要求都不具备创造性，同时说明书中也没有记载其他任何可以授予专利权的实质性内容，因而即使申请人对权利要求进行重新组合和或根据说明书记载的内容作进一步的限定，本申请也不具备被授予专利权的前景。如果申请人不能在本通知书规定的答复期限内提出表明本申请具有创造性的充分理由，本申请将被驳回。

审查员姓名:肖玲

审查员代码:224641

210403
2010.2

纸件申请，回函请寄：100088 北京市海淀区蓟门桥西土城路6号 国家知识产权局专利局受理处收
电子申请，应当通过电子专利申请系统以电子文件形式提交相关文件。除另有规定外，以纸件等其他形式提交的文件视为未提交。

Electronic Patent Application Fee Transmittal				
Application Number:		15335180		
Filing Date:		26-Oct-2016		
Title of Invention:		MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE		
First Named Inventor/Applicant Name:		Igor Polishchuk		
Filer:		Stoycho Doncheff Draganoff/Daniel Pheng		
Attorney Docket Number:		PM07027D1CIP1C3		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				2040



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Decision Date : February 15, 2018

In re Application of :

Igor Polishchuk

DECISION ON PETITION

UNDER CFR 1.313(c)(2)

Application No : 15335180

Filed : 26-Oct-2016

Attorney Docket No : PM07027D1CIP1C3

This is an electronic decision on the petition under 37 CFR 1.313(c)(2), filed February 15, 2018, to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). See 37 CFR 1.313(c)(2).

Petitioner is advised that the issue fee paid in this application cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being referred to Technology Center AU 2893 for processing of the request for continuing examination under 37 CFR 1.114.

Office of Petitions

Electronic Acknowledgement Receipt

EFS ID:	31802363
Application Number:	15335180
International Application Number:	
Confirmation Number:	6223
Title of Invention:	MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE
First Named Inventor/Applicant Name:	Igor Polishchuk
Customer Number:	60909
Filer:	Stoycho Doncheff Draganoff/Daniel Pheng
Filer Authorized By:	Stoycho Doncheff Draganoff
Attorney Docket Number:	PM07027D1CIP1C3
Receipt Date:	15-FEB-2018
Filing Date:	26-OCT-2016
Time Stamp:	13:59:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 2040
RAM confirmation Number	021618INTEFSW00000213503781
Deposit Account	503781
Authorized User	Timothy Croll
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

37 CFR 1.19 (Document supply fees)
 37 CFR 1.20 (Post Issuance fees)
 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition automatically granted by EFS	petition-request.pdf	31564	no	2
			91cf4bad2de226a1f4fd28c807e185e4b435b176		
Warnings:					
Information:					
2	Request for Continued Examination (RCE)	PM07027D1CIP1C3_RCE_02152018.pdf	697625	no	3
			aa4ef86589a32dfcefc98245c7a959b5a614191		
Warnings:					
Information:					
3	Quick Path Information Disclosure Statement	PM07027D1CIP1C3_QPIDSform_Foreign_02152018.pdf	342738	no	2
			2b3e23fac75905667a137e805aeeed6b39a1a7f14		
Warnings:					
Information:					
4	Information Disclosure Statement (IDS) Form (SB08)	PM07027D1CIP1C3_IDS_02152018.pdf	1053804	no	4
			77e4263b80558cba419493269314895e854b385d		
Warnings:					
Information:					
A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.					
5	Transmittal Letter	PM07027D1CIP1C3_ConciseExplanationUnderRule1_02152018.pdf	32612	no	1
			4495058edacf638fe6f2b738dcae2cdc0a9fed68		
Warnings:					
Information:					

6	Non Patent Literature	PM07024CIP1CN_3OA_CN_012 92018.pdf	640156	no	7
			9b59fcb6ea61cd4acd91aa4214afb906e89d b00d4		
Warnings:					
Information:					
7	Non Patent Literature	PM07002CIP2CN_3OA_CN_012 62018.pdf	727649	no	11
			eef0d7c9ba769b3232e9af7b58270d0f3669 7b77		
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	32443	no	2
			d945c7937517796670bb8d8dd1b6609e55 1817e5		
Warnings:					
Information:					
Total Files Size (in bytes):			3558591		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

Doc Code: PET.AUTO Document Description: Petition automatically granted by EFS-Web		PTO/SB/140 U.S. Patent and Trademark Office Department of Commerce			
Electronic Petition Request	PETITION TO WITHDRAW AN APPLICATION FROM ISSUE AFTER PAYMENT OF THE ISSUE FEE UNDER 37 CFR 1.313(c)				
Application Number	15335180				
Filing Date	26-Oct-2016				
First Named Inventor	Igor Polishchuk				
Art Unit	2893				
Examiner Name	NIKOLAY YUSHIN				
Attorney Docket Number	PM07027D1CIP1C3				
Title	MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE				
An application may be withdrawn from issue for further action upon petition by the applicant. To request that the Office withdraw an application from issue, applicant must file a petition under this section including the fee set forth in § 1.17(h) and a showing of good and sufficient reasons why withdrawal of the application from issue is necessary. APPLICANT HEREBY PETITIONS TO WITHDRAW THIS APPLICATION FROM ISSUE UNDER 37 CFR 1.313(c). A grantable petition requires the following items: (1) Petition fee; and (2) One of the following reasons: (a) Unpatentability of one or more claims, which must be accompanied by an unequivocal statement that one or more claims are unpatentable, an amendment to such claim or claims, and an explanation as to how the amendment causes such claim or claims to be patentable; (b) Consideration of a request for continued examination in compliance with § 1.114 (for a utility or plant application only); or (c) Express abandonment of the application. Such express abandonment may be in favor of a continuing application, but not a CPA under 37 CFR 1.53(d).					
Petition Fee <table border="1"> <tr> <td>☐ Small Entity</td> </tr> <tr> <td>☐ Micro Entity</td> </tr> <tr> <td>☒ Regular Undiscounted</td> </tr> </table>			☐ Small Entity	☐ Micro Entity	☒ Regular Undiscounted
☐ Small Entity					
☐ Micro Entity					
☒ Regular Undiscounted					
Reason for withdrawal from issue					

- ☐ One or more claims are unpatentable
- ☒ Consideration of a request for continued examination (RCE) (List of Required Documents and Fees)
- ☐ Applicant hereby expressly abandons the instant application (any attorney/agent signing for this reason must have power of attorney pursuant to 37 CFR 1.32(b)).

RCE request, submission, and fee.

- ☐ I certify, in accordance with 37 CFR 1.4(d)(4) that :
The RCE request ,submission, and fee have already been filed in the above-identified application on
- ☒ Are attached.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

- ☒ An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application.
- ☐ An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity.
- ☐ A sole inventor
- ☐ A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application
- ☐ A joint inventor; all of whom are signing this e-petition

Signature	/Kin Hung Lai/
Name	Kin Hung Lai
Registration Number	69251

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL **(Submitted Only via EFS-Web)**

Application Number	15/335,180	Filing Date	2016-10-26	Docket Number (if applicable)	PM07027D1CIP1C3	Art Unit	2893
First Named Inventor	Igor Polishchuk			Examiner Name	YUSHIN, NIKOLAY K		

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.

Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

☐ Other _____

☒ Enclosed

☐ Amendment/Reply

☒ Information Disclosure Statement (IDS)

☐ Affidavit(s)/ Declaration(s)

☐ Other _____

MISCELLANEOUS

☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____
 (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

☐ Other _____

FEES

The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

☒ The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 503781

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature

Applicant Signature

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	/Kin Hung Lai/	Date (YYYY-MM-DD)	2018-02-15
Name	Kin Hung Lai	Registration Number	69251

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Document code: WFEE

United States Patent and Trademark Office
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AFORD1	SALE	#00000006	Mailroom Dt: 02/15/2018	503781	15335180
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United States Patent and Trademark Office
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P.O. Box 1450
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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/335,180	10/26/2016	Igor Polishchuk	PM07027D1CIP1C3	6223
60909 7590 02/27/2018 CYPRESS SEMICONDUCTOR CORPORATION 198 CHAMPION COURT SAN JOSE, CA 95134-1709			EXAMINER YUSHIN, NIKOLAY K	
			ART UNIT 2893	PAPER NUMBER
			NOTIFICATION DATE 02/27/2018	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@cypress.com

Corrected Notice of Allowability	Application No. 15/335,180	Applicant(s) POLISHCHUK ET AL.	
	Examiner NIKOLAY YUSHIN	Art Unit 2893	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to QPIDS filed on 02/15/2018.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 21-26,28-33 and 35-40. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. ☐ Notice of References Cited (PTO-892) | 5. ☐ Examiner's Amendment/Comment |
| 2. ☒ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date <u>02/15/2018</u> | 6. ☐ Examiner's Statement of Reasons for Allowance |
| 3. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. ☐ Other _____. |
| 4. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/NIKOLAY YUSHIN/
Primary Examiner, Art Unit 2893

Receipt date: 02/15/2018

15/335,180 - GAU: 2893

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)

Approved for use through 07/31/2016. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	15335180
	Filing Date	2016-10-26
	First Named Inventor	Igor Polishchuk
	Art Unit	2893
	Examiner Name	YUSHIN, NIKOLAY K
	Attorney Docket Number	PM07027D1CIP1C3

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear		
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NON-PATENT LITERATURE DOCUMENTS								Remove
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.						T ⁵

Receipt date: 02/15/2018

15/335,180 - GAU: 2893

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15335180
Filing Date	2016-10-26
First Named Inventor	Igor Polishchuk
Art Unit	2893
Examiner Name	YUSHIN, NIKOLAY K
Attorney Docket Number	PM07027D1CIP1C3

1	~~SIPO Office Action for Chinese Application No. 2013800168032 (PM07002CIP2CN) dated 01/26/2018, 11 pages~~
2	~~SIPO Office Action for Chinese Application Number 2013800319099 (PM07024CIP1CN) dated 01/29/2018, 7 pages~~

If you wish to add additional non-patent literature document citation information please click the Add button **EXAMINER SIGNATURE**

Examiner Signature	/NIKOLAY K YUSHIN/	Date Considered	02/16/2018
--------------------	--------------------	-----------------	------------

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

No English translation provided for SIPO Office Actions.

See MPEP609 for proper Content of information disclosure statement @ 37 C.F.R. 1.98

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	15335180
Filing Date	2016-10-26
First Named Inventor	Igor Polishchuk
Art Unit	2893
Examiner Name	YUSHIN, NIKOLAY K
Attorney Docket Number	PM07027D1CIP1C3

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

- ☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

- ☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

- ☒ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Kin Hung Lai/	Date (YYYY-MM-DD)	2018-02-15
Name/Print	Kin Hung Lai	Registration Number	69251

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Application	Document	Mailroom Date	Attorney Docket No.
15335180	NOA	02/27/2018	PM07027D1CIP1C3
	1449	02/27/2018	PM07027D1CIP1C3

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PATENT WITHDRAWAL NOTICE

DATE WITHDRAWN

2/20/2018

WITHDRAWAL NUMBER

40897

The following application has been **WITHDRAWN** from the
2/20/2018 issue.

SERIAL NO.

15335180

PATENT NUMBER

9899486

TITLE

MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK
FUNCTION GATE ELECTRODE

NAME AND ADDRESS

IGOR POLISHCHUK
Fremont, CA

REASON FOR WITHDRAWAL

Auto-petition to withdraw - Granted

-

APPROVED

/Kimberly Terrell/, Manager

Patent Publication Branch
Office of Data Management



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/335,180	03/27/2018	9929240	PM07027D1CIP1C3	6223

60909 7590 03/07/2018
CYPRESS SEMICONDUCTOR CORPORATION
198 CHAMPION COURT
SAN JOSE, CA 95134-1709

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Igor Polishchuk, Fremont, CA;
Cypress Semiconductor Corporation, San Jose, CA
Sagy Charel Levy, Zichron Yaakov, ISRAEL;
Krishnaswamy Ramkumar, San Jose, CA;

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Application	Document	Mailroom Date	Attorney Docket No.
15335180	ISSUE.NTF	03/07/2018	PM07027D1CIP1C3

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Electronic Acknowledgement Receipt	
EFS ID:	31802363
Application Number:	15335180
International Application Number:	
Confirmation Number:	6223
Title of Invention:	MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE
First Named Inventor/Applicant Name:	Igor Polishchuk
Customer Number:	60909
Filer:	Stoycho Doncheff Draganoff/Daniel Pheng
Filer Authorized By:	Stoycho Doncheff Draganoff
Attorney Docket Number:	PM07027D1CIP1C3
Receipt Date:	15-FEB-2018
Filing Date:	26-OCT-2016
Time Stamp:	13:59:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$2040
RAM confirmation Number	021618INTEFSW00000213503781
Deposit Account	503781
Authorized User	Timothy Croll
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: 37 CFR 1.16 (National application filing, search, and examination fees) 37 CFR 1.17 (Patent application and reexamination processing fees)	

Electronic Patent Application Fee Transmittal				
Application Number:		15335180		
Filing Date:		26-Oct-2016		
Title of Invention:		MEMORY TRANSISTOR WITH MULTIPLE CHARGE STORING LAYERS AND A HIGH WORK FUNCTION GATE ELECTRODE		
First Named Inventor/Applicant Name:		Igor Polishchuk		
Filer:		Stoycho Doncheff Draganoff/Daniel Pheng		
Attorney Docket Number:		PM07027D1CIP1C3		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
PETITION FEE- 37 CFR 1.17(H) (GROUP III)	1464	1	140	140
RCE- 2ND AND SUBSEQUENT REQUEST	1820	1	1900	1900
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Adjustment date: 03/06/2018 SDIRETA1
02/16/2018 INTEFSW 00000213 503781 15335180
02 FC:1620 1900.00 CR